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CONTENTS

Data of Coal Market from July to September

Tension between coal supply-demand and continuous high price of electricity coal

1. Decline in coal supply

In July, China produced 310 million tons of raw coal, with a year-on-year decrease of 3.3% (5% in June), a decrease of 6.9% year on year over the same period in 2019, reflecting a two-year average decrease of 3.5%, and it reached an average daily production of 10.13 million tons. In addition, 30.18 million tons of coal were imported, with a year-on-year growth of 15.6% and a decrease of 8.2% over the same period in 2019[1]. In August, China produced 340 million tons of raw coal, with a year-on-year growth of 0.8% compared with a decrease of 3.3% last month, and an increase of 0.7% over the same period in 2019, reflecting a two-year average growth of 0.3% and the average daily production was 10.81 million tons. The coal imports reached 28.05 million tons, with a year-on-year growth of 35.8% and a decrease of 14.9% over the same period in 2019[2]. In September, China produced 330 million tons of raw coal, with a year-on-year decrease of 0.9% and a decrease of 1.8% over the same period in 2019, reflecting a two-year average decrease of 0.9% and it reached an average daily production of 11.14 million tons. In addition, China imported 32.88 million tons of coal, with a year-on-year growth of 76.0% and an increase of 8.6% over the same period in 2019[3]. On the supply side of coal, domestic coal production capacity was experiencing cyclical downturn. Moreover, although coal imports have rebounded from July to September than before, affected by international relations and overseas pandemic, China's total coal imports from Mongolia and Australia decreased as a whole this year. With multiple factors, the coal stocks of coal-fired electricity generating enterprises in China encountered pressure at the end of September.

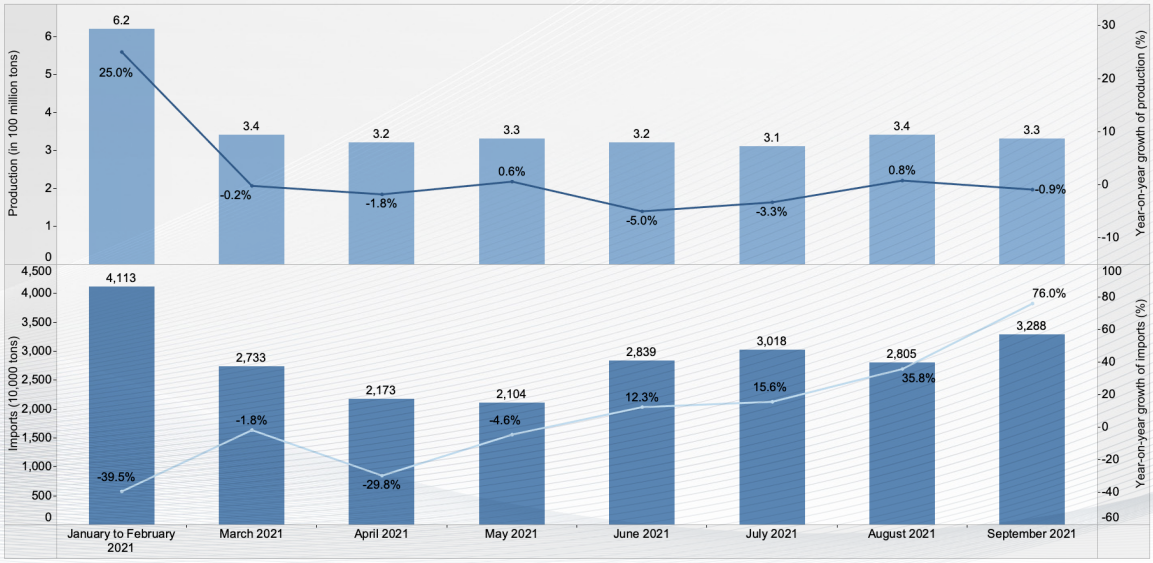

Figure 1 Production and import of raw coal from January to September 2021

Data source: National Bureau of Statistics

2. A sudden surge of coal demand

With China's economic recovery after the COVID-19 in 2021, the economic growth continued to accelerate with the support of macro policies. The total value-added of China's industries increased by 13.1% year on year from January to August. The traditional infrastructure sector improved steadily, with the total production of steel and cement increased by 7.3% and 8.3% year on year separately from January to August. In addition, new energy industry developed rapidly, and the production of main products in high energy-cosuming industries showed a significant rebound trend in the short term. From January to August, the total production of ten non-ferrous metals, chemical fiber, plastic products, and ethylene grew by 9.1%, 15.6%, 11.4%, and 25.0% year on year respectively. In addition, the China's excellent control of COVID-19 accelerated the recovery of economic export and China's exports to other countries reached a peak in demand. In terms of high energy-consuming manufacturing industries, the total export delivery value of ferrous metal smelting, non-ferrous metals, rubber and plastic products, chemical fiber products, chemical raw materials, and chemical products increased by 47.5%, 58.0%, 20.5%, 44.6%, and 31.7% respectively year on year from January to August. As the main energy for electricity and heat supply as well as the main raw material for steel, cement and chemical production, the demand of coal showed a sharp increase trend in the short term with the dual stimulation of "new infrastructure construction" driving domestic demand and export substitution driving external demand[4].

3. Continuously soaring price of thermal coal

The first half of 2021 witnessed the electricity shortage in many provinces of China, and the price of thermal coal continued to rise. From January to July, the total sales volume of thermal coal increased by 13.4% year on year, but the production of raw coal increased by only 6.5% year on year, and the production even showed a negative growth year on year in July. A short of supply caused a market expectation of coal supply shortage. This situation was not alleviated as China entered the peak of electricity consumption at the end of summer from July to September. The unbalanced supply and demand of thermal coal also led to the continuous increase of thermal coal prices. According to the price index issued by China Electricity Council, the prices of 5,500 Kcal and 5,000 Kcal thermal coal rose to 1,086 yuan/ton and 971 yuan/ton respectively, and the price of imported coal specified product 7,000 rose to 1,283 yuan/ton as of mid-September, causing great cost pressure on coal-fired power generation enterprises[5].

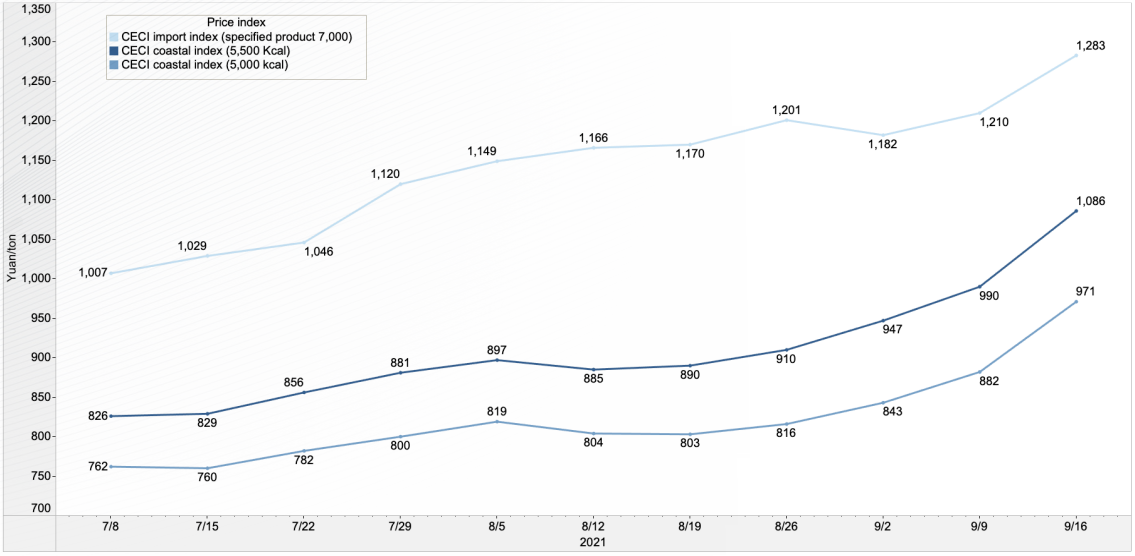

Figure 2 China electricity coal index from July to September 2021

Data source: China Electricity Council

Tension between electricity supply-demand and orderly electricity consumption in many places

1. Supply of electricity

By the end of September 2021, China's installed power generation capacity had reached 2.29 billion kW, including 380 million kW of hydropower, 53.26 million kW of nuclear power, 300 million kW of wind power, 280 million kW of solar power and 1.28 billion kW of thermal power. The thermal power contained 1.1 billion kW of coal-fired power, 106.57 million kW of gas-fired power, 35.36 million kW of biomass power[6].

From January to September 2021, China generated 6.07 trillion kWh of electricity, with a year-on-year growth of 10.7%. For the power supply structure, the total volume of thermal power was 4,327.3 billion kWh, accounting for 71.3% of the total power generation. The hydropower was 902.99 billion kWh, accounting for 14.9% of the total power generation. The wind power was 402.5 billion kWh, accounting for 6.6% of the total power generation. The solar power was 136.22 billion kWh, accounting for 2.2% of the total power generation. By province, the top 10 provinces in the first half of 2021 regarding electricity volume generated were: Guangdong (461.46 billion kWh), Inner Mongolia (439.89 billion kWh), Jiangsu (435.31 billion kWh), Shandong (431.64 billion kWh), Xinjiang (342.43 billion kWh), Zhejiang (303.52 billion kWh), Sichuan (298.64 billion kWh), Yunnan (276.37 billion kWh), Shanxi (274.76 billion kWh), and Hebei (247.24 billion kWh)[6].

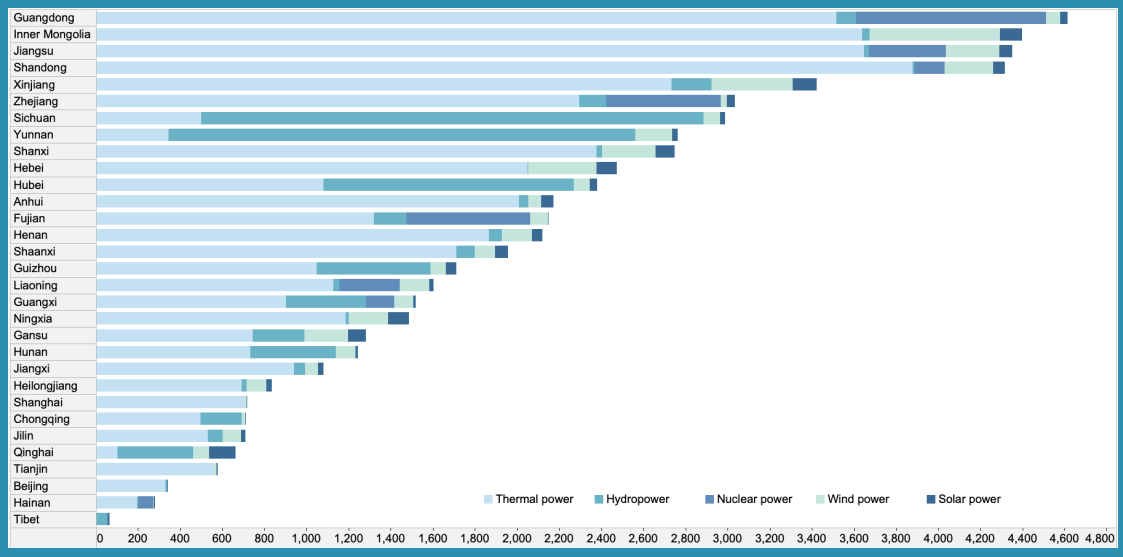

Figure 3 Cumulative power generation of different sources from January to September 2021 (by province)

Data source: National Bureau of Statistics

2. Overall steady growth of renewable energy

By the end of September 2021, China's installed capacity of renewable energy had reached 994 million kW, accounting for 43.4% of the total installed capacity. From January to September, China's power generated by renewable energy reached 1.75 trillion kWh, accounting for 28.68% of the total power generated. From January to September, renewable energy maintained a high utilization rate, and the average utilization rates of hydropower, wind energy, and solar energy reached 97.6%, 96.9%, and 98.0% respectively. The construction of large-scale wind power and solar energy base projects in desert areas and Gobi Desert sped up, and the first batch of projects with an installed capacity of about 100 million kW were started in an orderly manner.

In the first three quarters, the new grid-connected capacity of hydropower was 14.36 million kW in China. The new grid-connected installed capacity of wind power was 16.43 million kW, including 12.61 million kW of onshore wind power and 3.82 million kW of offshore wind power. The new

installed capacity of photovoltaic power was 25.56 million kW, including 9.15 million kW from photovoltaic power stations and 16.41 million kW from distributed photovoltaics. In addition, the new installed capacity of biomass power was 5.55 million kW[7].

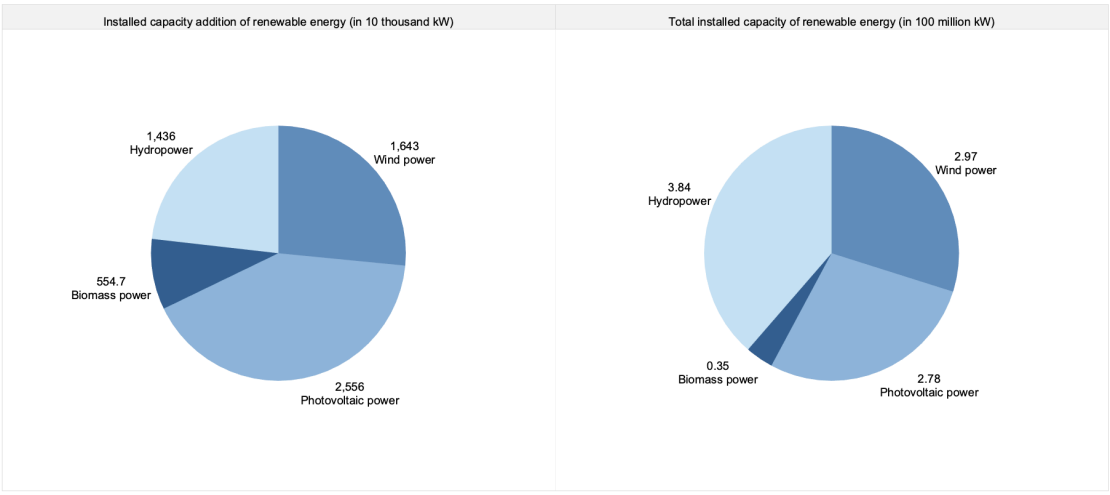

Figure 4 Additional installed capacity and total installed capacity of renewable energy from January to September 2021

Data source: National Bureau of Statistics

3. Obvious trend of large capacity in new coal-fired electric generating units

According to statistics from SinoCarbon Innovation & Investment Co., Ltd., 93,853 MW of coal-fired electricity generating projects were newly added in 16 provinces from January to September 2021. Among them, the total installed capacity of coal-fired electric generating units under planning was 14,544 MW, and the total installed capacity that has been approved and under construction is 52,619 MW and 26,690 MW respectively. In terms of installed capacity levels, the total installed capacity of 1,000 MW and above was 59,000 MW, accounting for 63% of the new installed capacity of coal-fired electricity generation from January to September. The total installed capacity of 600 MW and above but below 1,000 MW was 27,320 MW, accounting for 29% of the new total installed capacity. The installed capacity of 300 MW to 600 MW and below 300 MW was 6,520 MW and 1,013 MW respectively, accounting for about 8% of the new installed capacity from January to September in China, 2% lower than the previous two quarters[8].

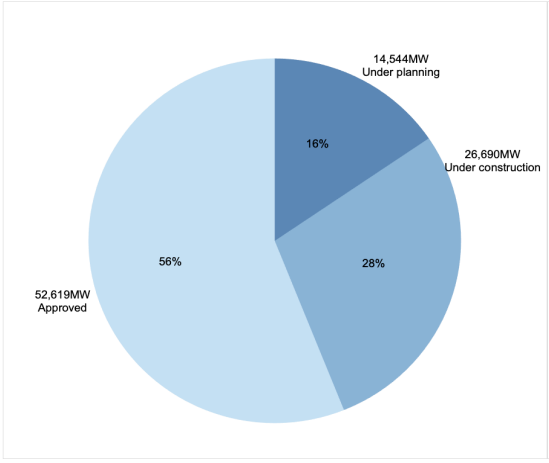

Figure 5 Status of coal-fired electric generating unit additions from January to September 2021

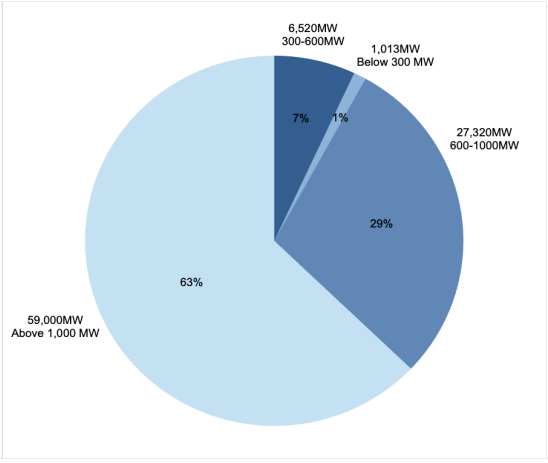

Figure 6 Type of additional coal-fired electric generating unit projects from January to September 2021

Data source: www.bjx.com

By province, the top 10 provinces in terms of new installed capacity of coal-fired electirc generating units were: Shanxi (10,700 MW), Hunan (9,320 MW), Guangdong (8,760 MW), Shaanxi (7,940 MW), Hubei (7,690 MW), Anhui (7,073 MW), Inner Mongolia (7,040 MW), Jiangxi (5,320 MW), Zhejiang (5,000 MW), and Guangxi (4,350 MW)[8].

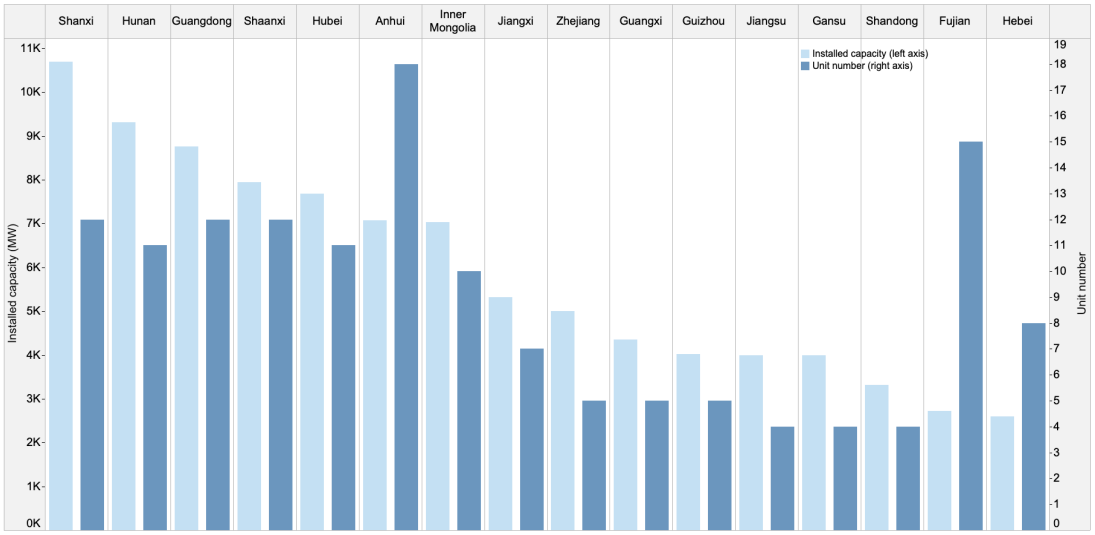

Figure 7 Additional installed capacity and added number of coal-fired electric generating units from January to September 2021 (by province)

Data source: www.bjx.com

4. Rapid-growth in electricity consumption

Since 2021, China's electricity demand has continued to grow at a high speed. According to the National Energy Administration, from January to September 2021, China consumed 6.17 trillion kWh of electricity, an increase of 12.9% year on year. The primary industry consumed 75.8 billion kWh of electricity, with a year-on-year growth of 18.9% and a two-year average growth of 14.2%. The secondary industry consumed 4.10 trillion kWh of electricity, accounting for 66% of the total electricity consumption, with a year-on-year growth of 12.3% and a two-year average growth of 6.9% in two years. And the tertiary industry consumed 1.08 trillion kWh of electricity, with a year-on-year growth of 20.7% and a two-year average growth of 9.7%[9].

By province, the growth rate of social electricity consumption in 16 provinces exceeded the national average level from January to September 2021: Tibet (22.8%), Hubei (19.2%), Zhejiang (18.1%), Jiangxi (17.9%), Qinghai (17.2%), Fujian (16.8%), Shaanxi (16.7%), Guangdong (16.5%), Sichuan (16.1%), Ningxia (16.0%), Jiangsu (14.9%), Guangxi (14.9%), Chongqing (14.7%), Anhui (14.5%), Guizhou (13.7%), and Hunan (13.5%). In the past three quarters, the increase of electricity consumption in East, Central, West, and Northeast China all exceeded 8%: East China (13.6%), Central China (13.8%), West China (12.1%), and Northeast China (8.2%), with an average increase of 7.8%, 6.5%, 8.1%, and 4.3% separately in two years[10].

By industry, the demand of electricity in high energy-consuming industries also continued to rise from January to September 2021. The electricity consumption of the chemical industry was 374 billion kWh, an increase of 8.9% year on year, and the growth rate increased by 9.5%, higher than that of the same period of last year. The electricity consumption of the building materials industry was 308.4 billion kWh, up 12.3% year on year, the growth rate was 11.4% higher than that of the same period of last year. The electricity consumption of ferrous metal smelting industry was 480 billion kWh, with a year-on-year growth of 10.6%, and the growth rate increased by 8.3% over the same period of last year. And the electricity consumption of non-ferrous metal smelting industry was 499.6 billion kWh, with a year-on-year growth of 7.3%, and the growth rate increased by 3.9% over the same period of last year[10].

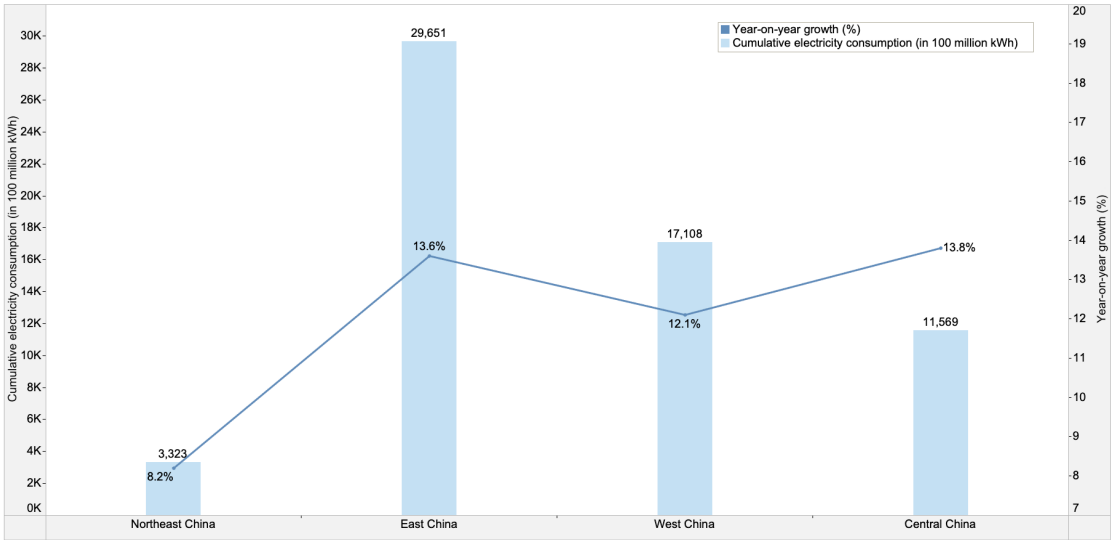

Figure 8 Cumulative electricity consumption from January to September 2021 (by region)

Data source: China Electricity Council

5. A large-scale electricity shortage across China

Since late August 2021, according to incomplete statistics, more than 20 provinces (autonomous regions and cities) across China have taken measures to cut and ration electricity in different degrees, which has a wide and far-reaching impact. It not only restricted the industrial production, but also posed difficulties for residents' lives. Orderly electricity consumption measures were taken in Tianjin, Hebei, Shandong, Jiangsu, Zhejiang, Liaoning, Heilongjiang, Jilin, Inner Mongolia, Shaanxi, Guangdong and other 9 provinces. The maximum off-peak electricity consumption reached 39.06 million kW in one day in the regions served by the State Grid[11]. Limited electricity rationing was implemented in many places in Northeast China. One the one hand, as Covid-19 has been effectively controlled and the economy started to recover, the demand for electricity across the three industries has been increasing. Due to the climate, the rising electricity consumption of urban and rural residents as well as the insufficient wind power, some regions experienced the increasing pressure of power supply. On the other hand, the supply shortage and rising prices of thermal coal together led to economic losses of coal-fired electricity generating enterprises and low enthusiasm for electricity generation. The multiple factors led to the implementation of orderly electricity consumption and electricity rationing, especially in Guangdong and Northeast China.

Since the early September, there has been a shortage of electricity supply in Guangdong Province, and the enterprises and residents have been required to use electricity orderly and economically. Affected by the subtropical highs and the typhoons "Conson" and "Chanthu", Guangdong province had sustained high-temperature and dry weather, which was 3-4℃ higher than that in the same period in previous years. According to the electricity consumption data in September, the electricity consumption in Guangdong increased rapidly, with a year-on-year growth of 11.26% and a two-year average increase of 10.49%. Urban and rural residents and the tertiary industry were the largest users contributing to the electricity consumption growth[12]. As of September 23, the highest load demand in Guangdong province reached 141 million kW, with a year-on-year growth of 11%, and the load has reached record highs for seven times[13]. The climate was not the only reason causing the shortage of electricity supply. The year of 2021 witnessed the robust economic recovery after the pandemic in Guangdong province. Therefore, the electricity demand increased rapidly. The electricity consumption of manufacturing industry accounted for over 80% of industrial electricity consumption, with a year-on-year growth of 12.23%[14]. In addition, according to the *Barometer of the Achievement of Dual Control Targets for Energy Consumption in the First Half of 2021*[15], Guangdong province's energy intensity and total energy consumption control were listed in the red light warning. Therefore, the pressure to comply to the "dual-control" policies and regulations was also one of the reasons for electricity rationing. During September 23 to 25, many places in

Northeast China went through the electricity rationing. However, the three provinces in Northeast China were not listed in the red light warning of "dual-control". The data of National Bureau of Statistics showed that Heilongjiang, Jinlin, and Liaoning generated electricity of 6.66 billion kWh, 4.81 billion kWh, and 11.29 billion kWh respectively in September 2021, with a year-on-year growth of 7.1%, -8.8% and 5.2% separately. And their wind electricity generation were 730 million kWh, 640 million kWh, and 820 million kWh, with a year-on-year growth of -13.2%, -20.6%, and -27% respectively. It is reported that Liaoning's thermal power generation was only about half of the installed capacity, and the wind power generation was even far less than 10% of the installed capacity during the period of electricity shortage[16]. Lugu and Gaoling DC transmission lines that Northeast Branch of State Grid Corporation of China used to transmit electricity to North China and Shandong had no other capacity for adjustment and reduction and the entire grid had no extra capacity for frequency regulation. As a result, the residential electricity was also forced to be rationed in order to ensure the safe operation of the power grid.

Comprehensively, the supply shortage and soaring prices of coal that restricted the electricity generation of coal-fired electricity generating enterprises were the main causes of the large-scale electricity shortage across China. In terms of the growth rate of coal supply and electricity consumption, the electricity consumption in China increased by 12.2% year on year from January to October 2021, and the thermal power generation above designated size increased by 11.3% year on year, while the growth rate of raw coal production was only 4%[17], which was far lower than the growth rate of thermal power generation, resulting in a supply gap of coal and a continuous decline of coal storage in power plants. The market mechanism of "market coal" and "planned electricity" was not straightened out yet, and the rising cost of fuel of enterprises cannot be transmitted to the terminal through electricity price, which was the deeper cause of the lack of willingness to generate electricity of thermal power enterprises. This problem has been solved to a certain extent by the new regulations on market-oriented price of coal-fired electricity issued by the National Development and Reform Commission in October.

Guided and regulated by the National Development and Reform Commission and other ministries and commissions, the capacity of coal supply was continuously enhanced, and the state-owned coal enterprises actively shouldered their political responsibilities and strived to increase production and supply. The coal market gradually took a favorable turn, the coal shortage and operating pressure of thermal power enterprises were alleviated, and the electricity supply and demand was returned to normal. Since the mid and late October, China's average daily production of coal has remained at above 11.5 million tons for several consecutive days, an increase of nearly 1.1 million tons over the end of September. Coal futures prices went down rapidly, and the price of dominant contract of thermal coal closed at 970 yuan/ton on October 29. By the end of October, the coal storage of power plants in China had reached 110 million tons and it was available for 20 days at most[18]. For reference, 12 days is the normal days available for coal storage in power plants[19]. It means that the coal storage in the power plants was higher than the safety level by the end of October, and the risk of coal shortage was basically eliminated. On November 4, China Southern Power Grid firstly operated without peak staggering since the orderly electricity consumption in the whole grids on May 10[20]. As of November 6, there was almost no orderly electricity consumption in the entire grid in the regions served by the State Grid, except for the orderly electricity consumption measures taken by individual provinces and in certain periods for high energy-intensity and high-polluting enterprises[21]. So far, this round of national electricity shortage has basically come to an end.

Improving the market price formation mechanism of coal is incredibly important to promote the coordinated development of upstream and downstream industries of coal and electricity and to guarantee the safe and reliable supply of electricity. The *Work Plan for Signing and Performing Medium and Long Term Coal Contracts in 2022 (Exposure Draft)* (hereinafter referred to as the *Draft*) was released in 2022 China Coal Trade Conference. According to the Draft, the benchmark price of 5,500 Kcal thermal coal in the medium and long term coal contracts is adjusted from 535 yuan/ton to 700 yuan/ton, with a floating range of 550 yuan/ton to 850 yuan/ton. The *Draft* expands the coverage of medium and long term contracts and helps to guarantee the supply of coal during the peak of consumption. Power generation and heat supply enterprises are required to realize full coverage of medium and long term contracts after deducting the imported coal, and the number of medium and long term contracts signed by all coal mining enterprises with an approved capacity of more than 300,000 tons/year shall reach over 80% of their own resources[22].

Policy Trends in Energy Sector from July to October

Launch of carbon emissions trading scheme and green power trading market

The national carbon emissions trading scheme is a core policy instrument to use the market mechanism to control and reduce greenhouse gas emissions and implement the goals of carbon peaking and carbon neutrality. At the end of 2017, the *Construction Plan for National Carbon Emissions Trading Market* was issued and implemented, which requires to construct a national unified carbon emissions trading scheme. On July 16, 2021, the national carbon emissions trading system was officially launched. Han Zheng, Vice Premier of the State Council, Ding Xuedong, Executive Deputy Secretary General of the State Council, Sun Jinlong, Party Secretary of the Ministry of Ecology and Environment, Huang Runqiu, Minister of the Ministry of Ecology and Environment, Xie Zhenhua, China Special Envoy for Climate Change and others attended the launching ceremony of online trading of the national carbon market. The first batch of 2,162 electricity generation enterprises participating in the national carbon market covers about 4.5 billion tons of carbon emissions[23], exceeding the carbon emissions coverage of EU ETS and becoming the world's largest carbon market in terms of carbon emissions coverage. The first day of transaction in the national carbon market was relatively active, with the opening quotation of 48 yuan/ton, the highest quotation of 52.80 yuan/ton, and the lowest quotation of 48.00 yuan/ton. The transaction volume on the first day was 4.10 million tons, with a turnover of over 210 million yuan and an average transaction price of 51.23 yuan/ton[24]. As of November 10, 2021, the national carbon market has been operated for 77 trading days, with a cumulative transaction volume of quota of 23.44 million tons, and a cumulative turnover of over 1 billion yuan, reaching 1.04 billion yuan[25].

On September 7, 2021, the first green power trading pilot was launched in China, reaching a trading electricity volume of 7.94 billion kWh[26]. The transaction price of green power was 0.03 yuan/kWh to 0.05 yuan/kWh higher than medium- and long-term trading price of local power[27]. Through green power trading, users who are willing to bear more social responsibilities can be distinguished and can directly trade with wind power and photovoltaic power generation projects, so as to guide green power consumption in a market-oriented way and reflect the environmental values of green power. The income generated from green power will be used to support the development and consumption of green power. Green power trading has initially established a cohesive mechanism with green power certificate, applying a trading mode of "integration of certificate and power", which is conducive to avoiding repeated calculation of environmental value. At the end of September, the National Development and Reform Commission and National Energy Administration officially approved the *Pilot Work Plan for Green Power Trading,* referred to as the *Plan,* prepared by the State Grid Corporation of China and China Southern Power Grid. The *Plan* defines green power products for the first time: Green power products are mainly the on-grid energy of wind power and photovoltaic power generation enterprises. When condition permits, it can be gradually expanded to eligible hydropower. At the initial stage, green power trading will give priority to wind power and photovoltaic power that are not included in the scope of the supplementary subsidy policy of national renewable energy prices, and the power users selected will be those with green power consumption demand. With the formation of awareness of green power consumption in the whole society, China will gradually guide the participation of such emerging market entities as electric vehicles and energy storage[28].

Launch of plans for new energy storage and pumped storage hydropower

According to the *Guidance on Accelerating the Development of New Energy Storage* referred to as the *Guidance* below issued by the National Development and Reform Commission and the National Energy Administration in July 2021, China will realize the transformation of new energy storage from the initial stage of commercialization to large-scale development by 2025, and the installed capacity will exceed 30 million kW. And the installed capacity will basically meet the corresponding needs of the new electricity system by 2030. The *Guidance* specifies to encourage diversified development of energy storage, actively support the user side to explore new scenarios for integrated development of energy storage around other end users. It encourages to aggregate and utilize distributed energy storage facilities to explore a variety of business models relying on big data, cloud computing, artificial intelligence, block chain, and other technologies and combine them with comprehensive innovation of system and mechanism. The diversified development of energy storage technology shall be kept to promote technological progress and realize the development from innovative technology research and demonstration to large-scale commercial application. In addition, it is proposed to improve the policy mechanism, the price mechanism of new energy storage and the incentive mechanism of "new energy + energy storage" projects[29]. In August, the General Administration Department of National Energy Administration published a letter on soliciting opinions on the *Medium- and Long-Term Development Plans for Pumped Storage (2021-2035)* (Exposure Draft). Officially issued in September, this document puts forward the development goal of three stages: The total pumped storage hydropower put into production shall double that in the period of the "13th Five-Year Plan" by 2025, up to more than 62 million kW. The total pumped storage hydropower put into production shall double that in the period of the "14th Five-Year Plan" by 2030, reaching about 120 million kW. A modern pumped hydropower storage industry with advanced technology, excellent management, and strong international competitiveness shall be established to meet the high proportion and large-scale development needs of new energy sector, and a number of large backbone enterprises of pumped storage shall be cultivated by 2035[30].

Adjustment of dual-control system of energy consumption

During the "13th Five-Year Plan", China established a dual-control system of energy-intensity and total energy consumption (hereinafter referred to as dual-control of energy consumption), set targets for energy-intensity reduction and total energy consumption nationwide, decomposed the targets to various regions, conducted strict assessment, and issued the "barometer" of dual-control of energy consumption every quarter.

In August 2021, National Development and Reform Commission issued the *Barometer of the Achievement of Dual Control Targets for Energy Consumption in the First Half of 2021*. The energy-intensity in such provinces (regions) as Qinghai, Ningxia, Guangxi, Guangdong, Fujian, Xinjiang, Yunnan, Shaanxi, and Jiangsu rose in the first half of the year and a Level I (most serious) warning was given to these provinces. In terms of total energy consumption control, such provinces (regions) as Qinghai, Ningxia, Guangxi, Guangdong, Fujian, Yunnan, Jiangsu and Hubei were also given Level I warning. In accordance with the *Measures for the Energy Conservation Examination of Fixed-Asset Investment Projects* (Decree No. 44 of the NDRC), the energy conservation examination of "energy-intensive and high-emission" project was suspended in 2021 for regions (prefecture-level cities, prefectures, and leagues) where energy-intensity did not reduce but rose with Level I warning in energy consumption intensity reduction (except for major projects planned by the country)[31].

From establishment to implementation, dual-control system of energy consumption has some problems to be improved. At the Fifth Meeting of the Central Financial and Economic Affairs

Commission in August 2019, General Secretary Xi Jinping called for appropriate flexibility in controlling total energy consumption in regions that met the energy-intensity standards and were developing rapidly. At the Central Economic Work Conference at the end of 2020, General Secretary Xi Jinping proposed to improve the dual-control system of energy consumption. In September 2021, the National Development and Reform Commission issued the *Plan for Improving the Dual Control System of Energy Consumption Intensity and Total Quantity* (hereinafter referred to as the *Plan*). The *Plan* clarifies that the dual-control targets for energy consumption should be decomposed in a differentiated way, and the use of renewable energy should be encouraged, and control of fossil energy consumption should be a priority. In term of specific policies, for regions that have overfulfilled the responsibility weight of incentive renewable energy power consumption, the consumption exceeding the responsibility weight of minimum renewable energy power consumption will not be included in the assessment of the total energy consumption in the current year and the five-year plan of the regions. The *Plan* proposes innovative ways to promote the refinement and flexibility of energy management. The first is to reserve a certain quantity of targets at the national level. The second is to optimize the decomposition of dual-control targets based on the energy production rate. And the third is to manage both the basic targets and incentive targets. In addition, the *Plan* puts forward to accelerate the establishment of the national energy consumption rights trading market, so as to boost the flow and aggregation of energy elements to high-quality projects, enterprises, industries, and regions with good economic development conditions[32].

No more new overseas coal-fired power projects

On September 21, 2021, the first anniversary of China's proposal of carbon peaking and carbon neutrality goals, Chinese President Xi Jinping delivered at the General Debate of the 76th Session of the United Nations General Assembly that China would strongly support the development of green energy and low carbon in developing countries and would not build any new coal-fired power project overseas. According to China's Global Power (CGP), China invested in 777 electricity generation projects in 83 countries abroad from 2000 to 2018, with a total installed capacity of 186.6 GW, of which 106.2 GW has been put into operation. In terms of the installed capacity, 40% of overseas electricity generation projects invested by China abroad are coal-fired power projects, with an installed capacity of 74 GW[33]. The announcement of no more new coal-fired power projects overseas is another important statement after China put forward the carbon peaking and carbon neutrality goals, which further shows China's determination to implement its own carbon peaking and carbon neutrality goals and China's responsibility to take a lead in global climate governance. The announcement also sends a clear policy signal for venture capital. It sends a clear policy expectation signal to coal-fired electricity generating equipment manufacturers, project construction and operation contractors and investors: it is time to stop overseas new coal-fired power projects and accelerate the transition to the market of green and low-carbon energy. All enterprises in the overseas coal-fired power industry chain must take the initiative to transform as soon as possible for sustainable development[34].

Domestic coal supply as priority

Since the beginning of 2021, China has faced with the tight supply and demand of electricity and coal. Many places have implemented orderly electricity consumption, and some regions have even rationed electricity. As the heating season comes in some regions, the demand of coal and electricity has further increased, which brings greater challenges to coal supply this winter and next spring. Therefore, the government has issued a series of policies and measures to ensure the supply of thermal coal.

1. Measures to enhance the supply-demand adjustment

On September 29, the head of the Bureau of Economic Operations Adjustment of the National Development and Reform Commission pointed out at the press conference on the work of ensuring energy supply that China will take multiple measures to enhance the supply-demand adjustment mainly from six aspects, to ensure the stable supply of energy and the security of residents' energy consumption. First, to increase supply resources of energy through multiple channels. Second, to give full play to the solid role of medium and long term contracts. Third, to further do a better job in the orderly energy consumption. Fourth, to give full play to the important role of energy storage and emergency support capacity. Fifth, to appropriately channel the energy consumption cost. Sixth, to effectively control unreasonable energy demand and resolutely restrict the unreasonable energy demand of "high energy-intensity and high-emission" projects[35].

2. Promotion of full coverage of medium and long term contracts for thermal coal

Signing medium- and long-term coal purchase contracts between electricity generation enterprises and coal enterprises and a strict implementation of these contracts are important means for electricity generation enterprises to ensure coal supply and control cost of coal. According to the information from National Development and Reform Commission on September 13, the General Office of the National Development and Reform Commission issued a notice to all local and relevant enterprises to make arrangements for full coverage of medium and long term coal contracts of coal directly supplied to electricity generation and heat supply enterprises. It requires promoting the full coverage of medium- and long-term coal contracts of coal directly supplied to electricity generation and heat supply enterprises, so as to ensure the coal demand for electricity generation and heat supply as well as the coal consumption for people's livelihood. In addition to the medium and long term contracts signed this year, the electricity generation and heat supply enterprises and coal enterprises will sign more medium and long term contracts to increase the proportion of the medium and long term contracts in the annual coal consumption of power generation and heat supply enterprises to 100%. On September 29, the National Development and Reform Commission and China State Railway Group Co., Ltd. jointly issued the *Notice on Tasks to Guarantee Railway Capacity for Fulfilling Medium and Long Term Coal Purchase Contracts by Power Generation and Heat Supply Enterprises*, which puts forward six requirements, aiming to strengthen the connection between production, transportation and demand, guarantee railway capacity for signing and fulfilling medium and long term contracts, accelerate the promotion of medium and long term coal direct guarantee contracts in power generation and heat supply enterprises, and ensure residential energy consumption in heating season[36].

3. Market-oriented reform of feed-in tariff for coal-fired electric generation

In order to give full play to the key role of electricity price in regulating electricity supply and demand, alleviate the recent price inversion of coal-fired electric generation, and further deepen the reforms of the power system, the National Development and Reform Commission issued the *Notice on Further Deepening the Market-oriented Reform on Feed-in Tariff for Coal-fired Power Generation* on October 11. There are four key areas in this reform. First, in principle, all coal-fired power shall

enter the electricity market, and the feed-in tariff shall be formed within the range of "benchmark price + fluctuation" through market transactions. Second, the floating range of trading price in coal-fired power market shall be expanded from the current floating range of no more than 10% up and no more than 15% down in principle to the floating range of no more than 20% up and down in principle. The market transaction electricity price of high energy-consuming enterprises shall not be limited by the up floating range of 20%. Third, all industrial and commercial users who have not yet entered the market shall be orderly introduced to the power market, the industrial and commercial catalog sales prices shall be cancelled, and power grid enterprises shall purchase electricity for industrial and commercial users who have not yet purchased electricity directly from the power market. Fourth, the electricity prices for residents, agriculture and public welfare undertakings shall be maintained stable[37].

Issuance of major documents involving carbon dioxide peaking and carbon neutrality "1 + N" policy framework

China issued two core documents of carbon dioxide peaking and carbon neutrality "1 + N" policy framework in October. On October 24, the CPC Central Committee and the State Council issued the *Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy* (hereinafter referred to as the *Guidance*)[38], and the State Council issued the *Action Plan for Carbon Dioxide Peaking before 2030* (hereinafter referred to as the *Action Plan*) on October 26[39]. As the "1" in the "1 + N" policy framework, the *Guidance* is the high-level guiding document, which constitutes the medium and long term systematic plan for China's carbon peaking and carbon neutrality. The *Action Plan* is the first and leading policy document in "N", which focuses on the goal to peak carbon emissions by 2030 and puts forward ten actions for carbon peaking. The *Guidance* and the *Action Plan* set specific goals by 2025, 2030, and 2060. The issuance of the *Guidance* and the *Action Plan* means that the core part of China's "1 + N" policy system about carbon dioxide peaking and carbon neutrality has been completed, marking that China's carbon dioxide peaking and carbon neutrality actions are being implemented substantively.

In order to build a clean, low-carbon, safe, and efficient energy system, promoting the high-quality and coordinated development of non-fossil energy and fossil energy is an important topic mentioned in the *Guidance* and the *Action Plan*. Both the *Guidance* and the *Action Plan* clearly point out the development goal of reducing coal consumption at an accelerated pace, strictly limiting the increase in coal consumption over the 14th Five-Year Plan period and phasing it down in the 15th Five-Year Plan period. And coal-fired power will be developed in coordination with power supplies and peaking shaving capacities, so as to strictly control coal-fired power generation projects. Upgrades and power flexibility retrofitting projects should be accelerated for existing coal power generators. In addition, we will vigorously promote the clean utilization of coal and rationally designate zones where burning bulk coal is prohibited, and gradually reduce and eventually prohibit burning of bulk coal. The *Action Plan* also makes guidance and requirements for the carbon peaking action in the industrial sector. It proposes that the steel industry will advance the use of electric furnace which can be totally charged with steel scrap. The petrochemical industry will strictly control additional production capacity in oil refining and traditional coal-based chemicals industry, and pursue development of a modern coal-based chemical industry in a steady and orderly manner. We should guide enterprises to shifting their energy use model, adjust the mix of raw materials, and control additional use of coal.

Table 1 Major goals in the *Opinion* and the *Action Plan*

Time	Major goals
2025	China will have created an initial framework for a green, low-carbon and circular economy and greatly improved the energy efficiency of key industries; Energy consumption per unit of GDP will be lowered by 13.5% from the 2020 level; CO_2 emissions per unit of GDP will be lowered by 18% from the 2020 level; The share of non-fossil energy consumption will have reached around 20%; The forest coverage rate will have reached 24.1%; The forest stock volume will have risen to 18 billion cubic meters.
2030	CO_2 emissions per unit of GDP will have dropped by more than 65% compared with the 2005 level; The share of non-fossil energy consumption will have reached around 25%; The total installed capacity of wind power and solar power will have reached over 1,200 gigawatts; The forest coverage rate will have reached about 25%; The forest stock volume will have reached 19 billion cubic meters; CO_2 emissions will reach peak and stabilization and then decline.
2060	China will have fully established a green, low-carbon and circular economy and a clean, low-carbon, safe and efficient energy system, and energy efficiency will be at the advanced international level; The share of non-fossil energy consumption will be over 80%.

Reference

Data of Coal Market from July to September

[1]National Bureau of Statistics. Energy Production in July, 2021.
http://www.stats.gov.cn/tjsj/zxfb/202108/t20210816_1820566.htm

[2]National Bureau of Statistics. Energy Production in August, 2021.
http://www.stats.gov.cn/tjsj/zxfb/202109/t20210915_1822087.html

[3]National Bureau of Statistics. Energy Production in September, 2021.
http://www.stats.gov.cn/tjsj/zxfb/202110/t20211018_1822966.html

[4]Energy Observer. Analysis and Reflections on the Current Nationwide "Power Rationing".
https://mp.weixin.qq.com/s/8wW3jKotP-kRaqKIssMGuQ

[5]China Electricity Council. CEC News.
https://cec.org.cn/menu/index.html?471

[6]China Electricity Council. Briefing on the Operation of Power Industry from January to September 2021.
https://cec.org.cn/detail/index.html?3-302143

[7]National Energy Administration. Text Record of the Online Press Conference of the National Energy Administration in the Fourth Quarter of 2020.
http://www.nea.gov.cn/2021-11/08/c_1310298464.htm

[8]www.bjx.com. Weekly Summary of Approved, Awarded and Commenced Thermal Power Projects.
https://huodian.bjx.com.cn/hdxm/

[9]National Energy Administration. China's Electricity Consumption in September increased 6.8% YoY.
http://www.nea.gov.cn/2021-10/13/c_1310241476.htm

[10]China Electricity Council. Electricity Consumption from January to September 2021.
https://cec.org.cn/detail/index.html?3-301725

[11]National Energy Administration. Supply- and Demand-side Contributed to Electricity Supply--China's Energy System Ensures Safe and Stable Supply of Electricity.
http://www.nea.gov.cn/2021-10/09/c_1310235048.htm

[12]State-owned Assets Supervision and Administration Commission of the State Council. Electricity Consumption in Guangdong Province Increased by 16.52% YoY in the First Three Quarters and China Southern Power Grid Fully Guaranteed the Electricity Consumption of Enterprises.
http://www.sasac.gov.cn/n2588025/n2588124/c21430098/content.html

[13]Guangdong Provincial Development and Reform Commission. Guangdong Province Actively Responds to the Progress of Electricity Supply and Ensures the Orderly Electricity Supply of the Province.
http://drc.gd.gov.cn/gzyw5618/content/post_3551749.html

[14]Xinhuanet. Electricity Consumption in Guangdong Province Reaches 786.663 billion kWh in 2021.
http://gd.news.cn/newscenter/2022-01/26/c_1128300744.htm

[15]www.gov.cn. Barometer of the Achievement of Dual Control Targets for Energy Consumption in the First Half of 2021.
http://www.gov.cn/zhengce/zhengceku/2021-08/18/content_5631846.htm

[16]Caijing.com.cn. Electricity Rationing in Northeast China Is the Result of Such Three Causes but Nothing to Do with the Dual Control of Energy Consumption.
https://mp.weixin.qq.com/s/PKViVjKCeynduBclfrEdQw

[17]National Bureau of Statistics. From January to October 2021, the cumulative increase in raw coal production and thermal power generation.
https://data.stats.gov.cn/easyquery.htm?cn=A01

[18]National Development and Reform Commission. Coal Storage in Power Plants Is Expected to Exceed 110 Million Tons in Three Days.
https://mp.weixin.qq.com/s/d4fwM1328aQuVnyOxVLT3A

[19]National Energy Administration. Economic Daily: Unnecessary Excessive Worry about the Energy Supply this Winter.
http://www.nea.gov.cn/2021-11/12/c_1310307217.htm

[20]Nanwang 50Hz. China Southern Power Grid Firstly Operates without Peak Staggering since the Orderly Electricity Consumption.
https://mp.weixin.qq.com/s/b9Ndmo1Nv7JCHXcU_fUwlg

[21]SGCCTOP. State Grid Makes Phased Achievements in Ensuring Electricity Supply. The Power Grid Operates Safely and Stably, and the Supply and Demand Return to Normal.
https://mp.weixin.qq.com/s/_SrnsxHso_lGk3FI-MB23g

[22]CaijingEleven. National Development and Reform Commission's Significant Adjustment on Price Mechanism of Coal.
https://mp.weixin.qq.com/s/CX5gimchly9ewg3LSkpyhQ

Policy Trends in Energy Sector from July to October

[23]Ministry of Ecology and Environment of the People's Republic of China. Han Zheng Attends the Online Launching Ceremony of National Carbon Emissions Trading Market.
https://www.mee.gov.cn/ywdt/szyw/202107/t20210716_847496.shtml

[24]Xinhua News Agency. Turnover Reaches RMB 210 Million Yuan! The First Day Witnesses a Good Start after Launching the National Carbon Market Online.
http://www.xinhuanet.com/fortune/2021-07/16/c_1127663437.htm

[25]Ministry of Ecology and Environment of the People's Republic of China. Accumulative Turnover of Quota of the National Carbon Emissions Trading Market Exceeds RMB 1 Billion Yuan.
http://www.mee.gov.cn/ywdt/hjywnews/202111/t20211112_960045.shtml

[26]National Development and Reform Commission. Pilot of Green Power Trading is Officially Started.
https://www.ndrc.gov.cn/fggz/fgzy/xmtjd/202109/t20210928_1298038.html?code=&state=123

[27]Xinhua News Agency. Pilot of Green Power Trading's Start Will Promote the Development of Renewable Energy.
https://baijiahao.baidu.com/s?id=1710410614596678303&wfr=spider&for=pc

[28]National Development and Reform Commission. Clarify the Green Power to Achieve the Goals of "Carbon Peaking and Carbon Neutrality" - Interpretation of Pilot Work Plan for Green Power Trading.
https://www.ndrc.gov.cn/fggz/fgzy/xmtjd/202109/t20210927_1297840_ext.html

[29]National Development and Reform Commission. Guidance on accelerating the development of new energy storage.
https://www.ndrc.gov.cn/xxgk/zcfb/ghxwj/202107/t20210723_1291321.html?code=&state=123

[30]National Energy Administration. Medium- and Long-term Development Plan for Pumped Storage (2021-2035).
http://zfxxgk.nea.gov.cn/1310193456_16318589869941n.pdf

[31]National Development and Reform Commission. Barometer of the Achievement of Dual Control Targets for Energy Consumption in the First Half of 2021.
https://www.ndrc.gov.cn/xxgk/zcfb/tz/202108/t20210817_1293835.html?code=&state=123

[32]National Development and Reform Commission. Plan for Improving the Dual Control System of Energy Consumption Intensity and Total Quantity.
https://www.ndrc.gov.cn/xwdt/tzgg/202109/t20210916_1296857.html?code=&state=123

[33]Boston University. China's Global Power (CGP).
https://www.bu.edu/gdp/files/2020/10/GCI_PB_000_CH-1.pdf

[34]Energy Foundation. China No Longer Building Overseas Coal-fired Electric Generating Projects Demonstrates the New Advantages and Confidence.
https://www.efchina.org/Blog-zh/blog-20211012-zh

[35]National Development and Reform Commission. Person in charge of Bureau of Economic Operations Adjustment of the National Development and Reform Commission Answers the Work of Energy Supply This Winter and Next Spring When Meeting the Press.
https://www.ndrc.gov.cn/xwdt/xwfb/202109/t20210929_1298306.html?code=&state=123

[36]National Development and Reform Commission. Notice on Tasks to Guarantee Railway Capacity for Fulfilling Medium and Long Term Coal Purchase Contracts by Power Generation and Heat Supply Enterprises.
https://www.ndrc.gov.cn/xwdt/tzgg/202109/t20210929_1298126.html?code=&state=123

[37]National Development and Reform Commission. Notice on Further Deepening the Market-oriented Reform of on Feed-in Tariff for Coal-fired Electric Generation.
https://www.ndrc.gov.cn/xwdt/ztzl/jgjzgg/zcjd/202110/t20211027_1301157.html?code=&state=123

[38]www.gov.cn. CPC Central Committee and the State Council's Guidance on Implementing the New Development Concept in A Complete, Accurate and Comprehensive Way to Achieve Carbon Peaking and Carbon Neutrality.
http://www.gov.cn/zhengce/2021-10/24/content_5644613.htm

[39]www.gov.cn. Notice by the State Council of the Action Plan for Carbon Dioxide Peaking Before 2030.
http://www.gov.cn/zhengce/content/2021-10/26/content_5644984.htm