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Status and Trends: A Bird's-eye View of the Chinese Electricity Market

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In the past 20 years, China has undergone two rounds of market-oriented reform for its electricity industry. The reform was initiated by the State Council's issuance of the Power System Reform Program in April 2002 and followed by the State Council's issuance of the Several Opinions on Further Deepening Power Sector Reform in March 2015("**Several Opinions 2015**"). The first round of electricity market reform was launched in April 2002, aiming to change the mandatory planning system in Chinese electricity industry, and solve the problems of undistinguished functions between government and enterprise, and between power grid and power generation, and advance the diversification of the market players. Problems that emerged during the market-oriented reform of the electricity industry, such as the lack of a trading system and a market pricing mechanism, and difficulties in the development and use of new and renewable energy, prompted the Chinese government to launch the second round of market-oriented electricity market reform in March 2015. After a series of reform and development, Chinese electricity market has formed a sizable market scale and plays an increasingly important role in optimizing the allocation of resources. However, the Chinese electricity market still faces problems such as incomplete market system, underdeveloped functions, no unified trading rules, market barriers in trans-provincial and trans-regional electricity trading and so on. Therefore, on 18 January 2022, the National Development and Reform Commission ("**NDRC**") and the National Energy Administration ("**NEA**") issued the Guiding Opinions on Accelerating the Establishment of a Unified National Electricity Market System ("**Guiding Opinions 2022**"), targeting at accelerating the construction of unified and multi-layer national electricity market systems and consolidating the trading rules and technical standards, to boost the buildup of a electricity market compatible with the transformation of energy structure. This article seeks to briefly analyze and introduce the status and trends of the Chinese electricity market by reference to Opinions 2022.

1. CURRENT STATUS OF CHINESE ELECTRICITY MARKET

Fostered by the Several Opinions 2015, China has established an electricity market system consisting of regional power exchange centers and provincial power exchange centers. According to the statistics released by China Electricity Council ("**CEC**"), as of 31 December 2021, there are 2 regional power exchange centers (i.e., Beijing Power Exchanger Center and Guangzhou Power Exchange Center) and 32 provincial power exchange centers in China. China as the world's largest energy producer and consumer has a robust electricity market. According to the statistics released by CEC, in 2021, all the power exchange centers nationwide have aggregately contributed to an electricity trading volume of 3,778.74 billion kWh, accounting for 45.5% of the total electricity consumption in that year.

1.1. PARTICIPANTS IN THE ELECTRICITY MARKET

China has not yet established a unified national electricity market, but the entities participating in electricity market transactions in the regional power exchange centers are generally the same as those in provincial power exchange centers. By functions, the participants in the electricity market can be divided into trading entities and market operators. The former includes power generation enterprises, power grid enterprises, power retail enterprises and power consumers, etc., and the latter includes power exchange institutions (e.g., Guangzhou Power Exchange Center, etc.) and power dispatching institutions (e.g., State Electric Power Dispatching and Control Center, etc.). By roles, market participants of Chinese electricity market play the role of power sales, power purchase, power transmission and market operation.

1.2. MAIN TRADING TYPES

Generally speaking, the main trading types in the Chinese electricity market consist of trading of power energy, trading of transmission rights, trading of generation rights as well as ancillary services, etc.

a) Trading of Power Energy

Trading of power energy accounts for majority of the total amount of electricity trading in Chinese electricity market. According to the statistics released by CEC, in 2021, power energy trading including direct electric power trading and green electric power trading reaches 2,852.008 billion kWh, accounting for 92.72% of the total amount of intra-provincial electricity trading (longer-term trading only) (i.e., 3,076.03 billion kWh) in that year.

Power energy trading in Chinese electricity market mainly includes longer-term trading and spot trading. Longer-term electric power trading is a wholesale trading conducted on yearly, quarterly, monthly, weekly and daily basis by power generation enterprises, power consumers, power retail enterprises and other market participants through bilateral consultation, centralized trading and other market-oriented ways. Spot trading mainly consists of day-ahead, intra-day and real-time electric power trading, and is currently only under pilot implementation in such 8 areas as the South (initiated by Guangdong), Western Inner Mongolia, Zhejiang, Shanxi, Shandong, Fujian, Sichuan and Gansu. The pilot areas have established day-ahead market, intra-day market, real-time market or real-time balancing market synchronously or step by step according to their own situations.

b) Trading of Power Generation Rights

Presently, the power generation rights trading in Chinese electricity market refers to the trading whereby power generation enterprises transfer the contractual electric power specified in the base electric power contract, priority electric power generation contract and other contractual electric power to other power generation enterprises, through the trading platform established by electric power exchange institutions by bilateral consultation, centralized bidding, listing and other market-oriented methods.

Trading of power generation rights in China is now mainly conducted between power generation enterprises that fail to meet the contracted electric power quantity due to their own reasons or that need to supply each other with their power generation units for power generation due to limited consumption of clean energy. According to the statistics released by CEC, in 2021, the trading of electric power generation rights in China has reached 203.88 billion kWh, accounting for 5.40% of the total nationwide electricity trading amount in that year.

c) Trading of Electric Ancillary Services

Electric ancillary services refer to the services provided by grid-connected power-generating entities, new types of energy storage, adjustable loads that can respond to power dispatching instructions and etc., to maintain the safe and stable operation of the power system and promote the consumption of clean energy. Electric ancillary services include active power balance services, reactive power balance services, and emergency response and restoration services.

Nowadays, the main participants in the trading of electric ancillary services in the electricity market include power plants, public

electrochemical energy storage plants and power grid enterprises, etc. The subject matter of the trading is paid ancillary services, which includes deep peak shaving trading, on-off peak shaving trading, thermal power mediation reserve trading and demand-side resource trading, etc. And multiple provinces in China have also formulated their own trading rules for electric ancillary services in line with the features of their respective electricity ancillary services markets, which provides the rules for such transactions.

d) Trading of Power Transmission Rights

As early as in 2005, trading of the power transmission rights has been a recognized trading in the Basic Operating Rules of the Electricity Market. But so far, actual trading of the power transmission rights does not happen in Chinese electricity market. In the Measures for the Pricing of Transmission Prices for Trans-provincial and Trans-regional Special Projects issued by the NDRC in October 2021, it is proposed for the first time that "for qualified trans-provincial and trans-regional special projects, efforts may be made to form transmission prices through power transmission rights trading". We shall wait and see how the transmission rights transaction will take shape.

2. PROBLEMS FACED BY CHINESE ELECTRICITY MARKET AND PERTINENT SOLUTIONS

2.1. PROBLEMS FACED BY CHINESE ELECTRICITY MARKET

As pointed out by the NDRC in the Guiding Opinions 2022, although the current Chinese electricity market has formed a pattern of diversified competition, there are still problems such as incomplete market system, lack of unified trading rules, market barriers in trans-provincial and trans-regional electricity trading, and insufficient consumption of new energy.

a) Incomplete Market System

A mature electricity market normally has a complete market system. Taking the Nordic electricity market as an example, its electricity market system encompasses financial market, spot market, real-time market and retail market. So far, China has preliminarily established spot market and longer-term trading market, and is also attempting to promote electricity ancillary services trading, but its electricity market systems are yet to be improved.

Although the Beijing Power Exchange Center and the Guangzhou Power Exchange Center, as regional electricity markets, have integrated regional electricity trading, and the provincial power exchange centers have optimized the allocation of electricity resources, China has not yet established a national power exchange center, and the electricity market system is incomplete.

The incomplete market system to some extent restricts the development of trans-provincial and trans-regional electricity trading. For instance, “Three North Area” (Northeast China, Northwest China and North China) of China has abundant electricity resources, but the electricity resources in such area are not sufficiently transmitted to the eastern areas of China where electricity demand is high, due to incomplete electricity market system. What’s more, the incomplete market system also affects the synergy and cooperation among electricity markets at different levels. For example, the insufficient construction of longer-term market makes it difficult for the electricity markets at all levels to form time-of-use electricity prices, and the gap between peak and valley prices cannot be widened.

b) Lack of Unified Trading Rules

Currently, 2 regional power exchange centers and 32 provincial power exchange centers have formulated their own trading rules, covering market access and exit, types of trading, trading timing, trading execution and settlement, etc. But the trading rules of each power exchange center are different, which brings a lot of inconvenience to the market players engaging in the trading between different provinces and regions.

Taking the trans-provincial and trans-regional longer-term electricity trading as an example, we can see the longer-term electricity trading rules formulated by the Beijing Power

Exchange Center and the Guangzhou Power Exchange Center contain different provisions in respect of the types of trading, trading organizing, handling of deviation in electricity, pricing mechanisms, etc.

In terms of the implementation of spot trading of power energy in the first batch of pilot regions (namely South China (initiated by Guangdong), West Nei Mongol, Zhejiang, Shanxi, Shandong, Fujian, Sichuan and Gansu), the spot trading rules of power energy formulated by these regions are different in terms of market modes, trading organizing and trading settlement because of the differences on some key common issues[i].

c) Market Barriers to Trans-provincial and Trans-regional Electricity Trading

The establishment of the Beijing Power Exchange Center and the Guangzhou Power Exchange Center has done some useful exploration for the trans-provincial and trans-regional electricity trading including spot trading and longer-term trading. In 2021, Beijing Power Exchange Center has completed trans-provincial electricity trading in a total amount of 1.24 trillion kWh, a 7.3% increase over the former year[ii]. The trans-regional and trans-provincial market-oriented electricity trading of Guangzhou Power Exchange Center in 2021 has reached a record high of 67 billion kWh, a year-on-year growth by 90.9%[iii].

While the trans-regional and trans-provincial electricity trading is growing, we still see some market barriers restricting the further development of the trans-provincial and trans-regional electricity trading. On the one hand, the difference in trading rules among the power exchange centers in different regions or provinces, and the inconsistency in trading technical standards and data interface standards disenable the direct connection among the exchange centers and increase the costs for market players in different provinces and regions to participate in electricity trading. On the other hand, the imbalance in generator set configuration and transmission network construction between different provinces, as well as the differences in the structure of costs and the utilization efficiency of transmission channels for the trans-provincial and trans-regional electricity transmission also create obstacles for the trans-provincial and trans-regional electricity trading.

The market barriers to the trans-provincial and trans-regional electricity trading have, to some extent, also cause the power energy generated by the new energy industry in China cannot be effectively consumed, and curtailment of wind and solar power due to transmission constraints is still a serious problem. According to the data released by the NEA, in the year of 2020 alone, the amount of wind energy curtailed nationwide has reached around 16.6 billion kWh, and the amount of solar energy curtailed nationwide has reached 5.26 billion kWh[iv].

d) Insufficient Consumption of New Energy

In accordance with the Report on the Forecast and Analysis of the Nationwide Electricity Supply and Demand for Year 2021 and 2022, which is released by the CEC, by the end of 2021, the installed capacity for China's overall non-fossil power generation has transcended that for the coal power generation, while coal power generation still accounts for 60% of the overall electricity generated. Coal power generation is still China's main electric power source. Currently, most of the electric power traded in China's electricity market is coal power, and green electricity such as solar power and wind power, etc. has not been fully involved in the electricity market transactions. The electric power generated by new energy has not been fully consumed and adopted.

The imbalanced distribution of power resources in the eastern and western regions of China, as well as the mismatch of power generation capacity and power demand, lead to the insufficient consumption capacity of new energy power to some extent. Western China and the “Three North Area” are abundant in solar and wind power and other new energy power resources. However, due to the imbalance of regional economic development, Western China and the “Three North Area” have insufficient capacity to consume new energy power, which together with other

factors results in serious curtailment of solar power and wind power. On the other hand, the mismatch between the growth of new energy generation and the growth of electricity demand also restricts the consumption of new energy electricity. According to statistics, in the five years preceding 2021, China's electricity consumption has been increasing by an average of 5% annually, while the installed capacity of new energy has been increasing by more than 30% annually[v].

2.2. MAIN PATH TO SOLVE THE PROBLEMS FACED BY CHINESE ELECTRICITY MARKET

The Guiding Opinions 2022 has directed the main path to solve the above-mentioned problems. On one hand, the Chinese government will (A) improve the multi-level unified electricity market system by accelerating the development of the national electricity market, promoting the development of provincial (district-level/municipal) or regional electricity markets and promoting the opening up and cooperation among trans-provincial and trans-regional electricity markets, and (B) break the market barriers for trans-provincial and trans-regional electricity trading by standardizing the basic market trading rules and technical standards, and strengthening information sharing and disclosure. On the other hand, in order to adapt to energy transformation and achieve the goals of double carbon (i.e., carbon peaking and carbon neutrality), it has been put forward to expedite the development of green electricity trading, prioritize green electricity in such aspects as trade organizing and power grid scheduling, encourage the connection and interplay between the Green Certificates trading and carbon emissions allowance trading, encourage local and nearby consumption of the distributed power generation, guide new energy power generation enterprises and power consumers to enter into longer-term contracts with longer terms and encourage new energy enterprises to engage in electricity spot market via making quotations on quantity and price, etc.

In addition, the overall objectives of the Guiding Opinions 2022 also point the way to solve the current problems in China's electricity market. According to the Guiding Opinions 2022, by 2025, the national unified electricity market system shall be formed at its early stage. The national electricity market shall operate in coordination with the provincial (district-level/municipal) / regional electricity market. The electricity markets for longer-term trading, spot trading and ancillary services trading shall be integrated and operated jointly, and the scale of trans-provincial and trans-regional resource allocations and green electricity trading will be largely increased. A market trading and pricing mechanism conducive to the development of new energy and energy storage will take its preliminary shape. Meanwhile, by 2030, the unified national electricity market system shall have been built up to adapt to the requirements of new electric power system. The national electricity market and the provincial (district-level/municipal) / regional electricity market will operate jointly. New energy shall be fully involved in the market trading and market players will compete on the basis of equality and independent choice. The allocation of electric power resources across the nation shall be further optimized.

3. NOTABLE DEVELOPMENT TRENDS IN CHINESE ELECTRICITY MARKET

Under the goals of achieving carbon peaking and carbon neutrality, China’s new energy industry is bound to achieve rapid development. The combination of new energy and information technology will also bring the development of new energy industry to the next level. In this context, we can foresee vast development potential of the Chinese electricity market in the following areas.

3.1. MORE DIVERSIFIED MARKET PARTICIPANTS

The NDRC and the NEA has raised in the Guiding Opinions 2022 to “cultivate competitive and diversified market participants” and “guide new participants such as user-side adjustable load resources, energy storage, distributed energy, and new energy vehicles to participate in the market trading”.

Prior to the release of the Guiding Opinions 2022, NDRC and NEA jointly with other competent authorities issued the Implementation Opinions on Further Enhancing the Service Guarantee Capacity of Electric Vehicle Charging Infrastructure on 10 January 2022, emphasizing the need to actively promote pilot projects, explore the implementation path for new energy vehicles to participate in the spot market, and study to improve the trading and dispatch mechanism for new energy vehicles to consume, store and release green electricity.

Subsequently, On 30 January 2022, the NDRC and the NEA jointly issued the Opinions on Improving the

Systems, Mechanisms, Policies and Measures for Green and Low-carbon Energy Transformation, which supports the customer-side adjustable resources such as user-side energy storage, electric vehicle charging facilities and distributed power generation, as well as the participation of load aggregators, virtual power plant operators and integrated energy service providers in electricity market trading and system operation regulation. It can be seen that the Chinese government is committed to diversify the participants in the new energy electricity market via policy making.

Previously, new market participants have been participating in the electricity market trading in various provincial or regional electricity markets. For example, on 17 December 2021, Guangdong Provincial Energy Administration issued the Implementation Plan for the Development of the Electricity Spot Market in Southern China (started from Guangdong) (Draft for Comment), which proposes the gradual participation in the electricity market trading by third-party resources such as renewable energy power generation, electricity generated from western China and outside, pumped storage power stations, and energy storage demonstration application projects and adjustable loads, etc., and the trading of renewable energy power in the spot market shall be studied when conditions permit.

In August 2021, Zhejiang Province introduced independent third-party entities to participate in the trial operation of the electric ancillary services market for the first time. 21 electricity consumers and four load aggregators consisting of Zhejiang Tower Co., Ltd. and other electric vehicle companies, have participated in the trading of rotating reserve products, and jointly perform the obligation of system rotating reserve services with Zhejiang Province's centralized dispatching power plants through bidding. It is expected that there will be more qualified new energy participants engaging in the electricity market trading in the future.

3.2. FURTHER DEVELOPMENT OF GREEN ELECTRICITY TRADING FEATURED BY "INTEGRATION OF CERTIFICATE AND POWER"

In order to solve the problems of new energy industry's excessive reliance on fiscal subsidies and the unreasonable new energy power system consumption mechanism, in January 2017 the NDRC and NEA jointly issued the Notice on the Trial Implementation for Issuance of Green Electricity Certificate for Renewable Energy and Voluntary Subscription and Trading System. Under such trail implementation mechanism, the National Renewable Energy Information Management Center shall issue Green Electricity Certificates ("**Green Certificates**") to land-based non-hydroelectric renewable energy (wind, solar, etc.) power generation enterprises, and electricity consumers shall purchase the Green Certificates from power generation enterprises. The power generation enterprises shall no longer receive fiscal subsidies for the part of proceeds generated from the sale of the Green Certificates. In addition, the NDRC and the NEA issued the Notice on the Establishment and Improvement of Renewable Energy Electricity Consumption Guarantee Mechanism, also designating Green Certificates as one of the accounting indicators for new energy consumption.

However, since the introduction of the Green Certificates system, due to the insufficient consumption of new energy electricity, Green Certificates trading is not active. According to the data of the Chinese Green Electricity Certificate Subscription and Trading Platform, as of 15 March 2022, Hebei Province, which has the largest cumulative number of wind power Green Certificates, has issued 5,428,315 wind power Green Certificates, but the trading volume is only 66,094, accounting for 1.22% of the issued ones. Heilongjiang Province, who has the largest cumulative number of solar power Green Certificates, has issued 1,909,901 Green Certificates, but the trading volume is only 123,466, accounting for 6.46% of the issued number.

In order to further solve the problem of new energy consumption, in September 2021, the NDRC approved the Work Plan for the Pilot Trading of Green Electricity jointly formulated by the State Grid Corporation of China and the China Southern Power Grid. According to the plan, the pilot program will allow electricity consumers or electricity retail companies and green electricity power (i.e., the on-grid electricity generated by renewable energy such as wind power and solar power) generation enterprises to synchronously carry out longer-term electricity trading and Green Certificates subscription and trading. The plan also clarifies the connection between green electricity trading and Green Certificates, aiming to realize the "integration of certificate and electricity trading". That is to say, the national energy authorities will organize the National Renewable Energy

Information Management Center to issue Green Certificates and transfer them to the power exchange center, which will distribute the Green Certificates to electricity consumers according to the results of green electricity trading. Such “integration of Green Certificates trading and electricity trading” mechanism can ensure that the generation, trading and use of green energy are traceable, measurable and verifiable. [vi]

Meanwhile, after the NDRC has put forward in the Guiding Opinions 2022 to “explore the trading of green electricity” and “discover the environmental value of green electricity in a market-oriented way”, the Guangzhou Power Exchange Center and various power exchange institutions in the South Region (i.e. Guangdong, Guangxi, Hainan, Yunnan and Guizhou) have jointly formulated and promulgated the Trading Rules for Green Electricity in the South Region (for Trial Implementation) (to be implemented as of 25 February 2022), specifying that the electricity retailers participating in the trading of green electricity shall mainly be renewable energy enterprises meeting the conditions for issuing Green Certificates, and the subject matter of the green electricity trading is on-grid electricity of the wind power, solar and other green power generation enterprises with Green Certificates.

According to the statistics on the Trading Profile of the National Electricity Market in 2021 issued by the CEC, the trading volume of green electricity in all regional trading markets nationwide in 2021 has reached 630 million kWh, only accounting for 0.017% of the market electricity trading volume in the same year. It is conceivable that with the introduction and improvement of relevant trading rules and the increase of trading entities, the trading of green electricity will see greater development under the "integration of certificate and electricity trading" mode in the next few years.

3.3. MORE ACTIVE MARKET-ORIENTED TRADING FOR DISTRIBUTED GENERATION

For a long time, distributed generation in China followed the mode of “self-generated for self-consumption, surplus to be consumed via the grid” or the mode of “all the generated power to be consumed via the grid”. Normally, the electricity generated from distributed generation projects, excluding the electricity for self-consumption, will be purchased by the grid enterprises at benchmark on-grid tariffs, and there is no market-oriented trading implemented therefor.

In October 2017, the NDRC and the NEA jointly issued the Circular on Carrying out the Pilot Program for Market-oriented Trading for Distributed Generation (“**Circular for Pilot Program**”), deciding to carry out market-oriented trading for distributed generation. After the issuance of the Circular for Pilot Program, the NDRC and NEA approved the first batch of 26 pilot projects for market-oriented trading for distributed generation in 2019, which involved Hubei, He’nan, Shanxi and other provinces.

According to the Circular for Pilot Program, sub-modules for trading of distributed generation in pilot areas may be established by utilizing the provincial-level power exchange platform, and the competent local counterparts of NDRC and NEA shall be responsible for drafting the market-oriented trading rules for the distributed generation in their respective areas, specifying the trading modes, trading conditions and processes.

According to the Market-oriented Trading Rules for Distributed Generation in Jiangsu Province (for Trial Implementation) and the Outline of the Pilot Rules for Market-oriented Trading for Distributed Generation in Guangdong Province (Draft for Comments), the current market-oriented trading for distributed generation relies on the longer-term electricity trading[vii], and electricity consumers can participate in both market-oriented trading for distributed generation and longer-term electricity trading. The settlement of electricity volume for former one shall take precedence over the same settlement for the latter one.

According to currently available public information, as of 1 March 2022, among the first batch pilots of market-oriented trading for distributed generation, only the 5MW Pilot Project located in Zhenglu Industrial Park in Tianning District, Changzhou City, Jiangsu Province has been successfully put into operation. Transmission and distribution costs, wheeling charges, ancillary services and other factors have to some extent hindered the development of market-oriented trading of distributed generation.

In order to promote the development of market-oriented trading of distributed generation, the NDRC and the NEA both accentuate the need to establish a market-oriented trading mechanism for distributed generation, promote the integration of distributed

generation into green electricity trading, encourage entities such as distributed photovoltaic plants to conduct direct trading with surrounding electricity consumers, and establish corresponding trading platforms, according to the Guiding Opinions 2022 and the Implementing Opinions on Deepening the Reform of "Streamlining Administration, Delegating Powers and Improving Regulation and Services" and Optimizing the Business Environment in Energy Field.

At the local level, the Market-oriented Trading Rules for Distributed Generation in Jiangsu Province (for Trial Implementation) formulated in 2019 clarifies the organization and settlement of market-oriented trading of distributed generation. The Revised Opinions on Promoting High-quality Development of New Energy in Zhejiang Province issued by the Zhejiang Provincial Development and Reform Commission also points out the need to support direct trading between wind power and solar power projects and electricity consumers. It also encourages the parties to enter into long-term power purchase and sales agreements, and to specify the wheeling charge pricing.

In summary, with the dual policy support of central and local governments, we can foresee the market-oriented trading of distributed generation is likely to become an important mechanism in the Chinese electricity market for promoting local consumption of new energy and resolving the problem of wind and solar power curtailment caused by system constraints.

3.4. RISE OF ELECTRONIC TRADING PLATFORM WITH ELECTRICITY CONSUMERS' DIRECT PARTICIPATION

The NDRC and the NEA proposed in the Guiding Opinions 2022 to "encourage and support power generation enterprises to carry out direct trading with electricity retail companies and electricity consumers, etc.". Direct trading requires more flexible trading platform and trading mode. Direct trading between power generation enterprises, electricity retail companies and electricity consumers through electronic trading platform has been widely applied in overseas electricity markets. For instance, in the United States, through PowerToChoose.com, an electricity sales platform sponsored by Public Utility Commission of Texas, consumers can select electricity packages provided by different electricity retail companies. In Finland's electricity market, an information exchange system (Datahub) has been created in 2014, via which electricity consumers and electricity retail companies or distribution operators can directly create or modify electricity retail contracts[viii].

Since 2020, China has explored electronic trading platform in its electricity market. In October 2020, Kunming Power Exchange Center launched the "LaiTaoDian" trading platform (https://mall.kmpex.com), combining electricity trading with e-commerce. Electricity retailers can display electricity packages on the "LaiTaoDian" platform, and electricity consumers can choose and purchase different electricity packages or negotiate with electricity retailers to customize electricity packages. The launch of the "LaiTaoDian" trading platform provides a reference for the development of electricity trading platforms in other provinces and regions of China.

In view of the market demand for direct participation by electricity consumers in electricity trading and the reform vision of "exploring the development of trading platforms based on blockchain and other technologies" as emphasized by the NEA in the Implementing Opinions on Deepening the Reform of "Streamlining Administration, Delegating Powers and Improving Regulation and Services" and Optimizing the Business Environment in Energy Field, it is foreseeable that there will be more internet-based power trading platforms to be established in the Chinese electricity retail market.

[i] Please refer to the *Reply to Press Queries by the Principals of the Legal Affairs Department of the NEA and the General Affairs Department of the System Reform of the NDRC re the Opinions on Deepening the Pilot Program for the Development of the Electricity Spot Market* (http://www.nea.gov.cn/2019-08/12/c_138303139.htm) for details.

[ii] Please refer to *Trans-Provincial Electricity Trading Amount of Beijing Power Exchange Center Reached 1.24 trillion kWh in 2021* (https://shoudian.bjx.com.cn/html/20220221/1205279.shtml) for details.

[iii] Please refer to *Trans-Regional and Trans-Provincial Market-Oriented Trading of Guangzhou Power Exchange Center Reached a Record High of 67 billion kWh in 2021* (https://shoudian.bjx.com.cn/html/20220111/1198769.shtml) for details.

[iv] Please refer to the *Verbatim Record of NEA's Online Press Conference for 1st Quarter of 2021* (http://www.nea.gov.cn/2021-01/30/c_139708580.htm) for details.

[v] Please refer to the Thoughts on the New Energy Consumption and Adoption During the Period of 14th Five Year Plan (https://baijiahao.baidu.com/s?id=1694478677412638119&wfr=spider&for=pc) for details.

[vi] Please refer to *Work Plan for Pilot Green Electricity Trading Release to Anchor the Double-Carbon Target: Interpretation of the Work Plan for Pilot Green Electricity Trading*, (http://www.ndrc.gov.cn/fggz/fgzy/xmtjd/202109/t20210927_1297840_ext.html) for details.

[vii] According to Articles 1 and Article 2 of the *Market-oriented Trading Rules for Distributed Generation in Jiangsu Province (for Trial Implementation)*, the *Trading Rules for Longer-term Electricity Trading in Jiangsu Province* is one of the basis on which the market-oriented trading rules for distributed generation are formulated, and any matters not covered in the *Market-oriented Trading Rules for Distributed Generation in Jiangsu Province (for Trial Implementation)* shall be subject to the *Trading Rules for Longer-term Electricity Trading in Jiangsu Province*. While, Article 1 of the *Outline of the Pilot Rules for Market-oriented Trading for Distributed Generation in Guangdong Province (Draft for Comments)* explicitly points out that the purpose of these rules is "to enrich the varieties of longer-term market trading in Guangdong Province".

[viii] See *Ideas on the Construction of Electricity Retail Market under the Spot Market Mode* (https://shoudian.bjx.com.cn/html/20210909/1175781.shtml) for details.

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