

## The development and operation mechanism of the green power market in China

In February 2023, the National Development and Reform Commission (NDRC), the Ministry of Finance (MoF), and the National Energy Administration (NEA) jointly issued the *Notice on Green Electricity Projects Subsidized by the Central Government to Participate in Green Electricity Trading* (CHN: 国家发改委 财政部 国家能源局关于享受中央政府补贴的绿电项目参与绿电交易有关事项的通知), encouraging renewable power projects under the national feed-in tariff subsidy to participate in green power market trading. The green power market is an independent medium-to-long-term market dedicated to renewable power generation. The main players are utility-scale wind power and solar PV projects with grid parity after 2017. This policy aims to include a stock of subsidised projects, which guarantees the payment of project subsidies while expanding the trading volume of green power.

### Background: The history of feed-in tariff subsidy, green certificate market and green power market

Feed-in tariff subsidy, green certificate market, and green power market are three important policy nodes related to the revenue of renewable power projects, primarily to support the non-hydro renewable power, mainly wind power and solar PV, from relying on economic incentives to market-based development. After the *Renewable Energy Law* came into effect in 2006, the central government established the "fixed feed-in tariff + guaranteed acquisition" policy for non-hydro renewable power projects. In other words, for every 1kWh of electricity generated, a fixed feed-in tariff higher than the local coal-fired benchmark tariff is paid, and the government subsidises the difference. At the same time, the grid enterprise guarantees the purchase of a minimum number of hours of power generation. The source of the subsidy is the renewable energy surcharge on consumers' electricity bills. As costs fall, the subsidies have gradually phased out during the 13th Five-Year Plan period (2016-2020). However, as renewable power generation is significantly higher than expected, more than the renewable energy surcharge is needed to cover the required subsidies. The subsidy gap expands year by year.

Therefore, in 2017, China launched the voluntary green certificate trading market to promote green electricity consumption while broadening the subsidy revenue channel. The initial participants in the green certificate market are subsidised wind power and solar PV projects, and there are two forms of trading: 1) electricity sold together with green certificates; and 2) electricity sold at the coal benchmark tariff while green certificates are sold separately. According to the policy, projects participating in voluntary green certificate trading will no longer receive feed-in tariff subsidies, directly leading to minimal trading volume. At the same time, with wind power and solar PV having achieved scaled-up and cost-efficient development in some regions, China launched price parity (i.e. subsidy-free) pilots for wind power and solar PV project in 2018 and 2019, respectively. Two to three years later, trading volume improved as the government allowed price parity wind power and solar PV projects to participate in the green certificate market.

To promote the "Integration of electricity and certificate" form of trading, China launched the green power market in 2021. Price parity wind power and solar PV projects became the major players. In August 2022, the government included other renewable energy sources, such as hydropower, biomass, and geothermal power, in the scope of green certificates and green power trading; in February 2023, the government clarified the rules of green power trading for subsidised renewable power projects, aiming to improve the green power market mechanism.

### Green power market trading mechanism

The power generation of renewable power projects contains two parts: guaranteed electricity and market-based electricity. Guaranteed electricity, i.e., the power grid uniformly buys a certain number of hours of power generation, and the price is the local baseline price of coal power<sup>11</sup>; market-based electricity is the power generation beyond the guaranteed amount, and the power generation enterprises directly participate in the power market transaction, and the transaction price is determined by the market, which is mainly medium and long-term contracts at present. The price formed under this trading mechanism is a single price, which cannot directly reflect the green premium of renewable electricity.

After the launch of the green power market, the amount of guaranteed electricity and market-based electricity can freely choose to participate in the general power market or green power market, the difference is that the transaction price in the green power market will reflect the green premium part, and the buyers will get a traceable green certificate. In the trading of guaranteed electricity, the amount of the transaction price higher than the coal power baseline price can be seen as a green premium; in the trading of market-based electricity, the part of the transaction price higher than the price obtained by participating in the general power market can be seen as green premium.

For grid parity projects, the green premium revenue goes to all power generation enterprises. For subsidised projects, the green premium goes to the government and is used as subsidy funds, but the subsidy the project ultimately receives remains unchanged. When the subsidised project's green power trading amount accounts for more than 50% of its annual feed-in electricity, and is higher than the average proportion of green power trading volume in the region, the government will prioritise granting subsidies.<sup>12</sup>

<sup>11</sup> From January 1, 2020, the coal power price has been changed from a fixed benchmark price to a "baseline price + floating price", with the current floating range being  $\pm 20\%$ .

<sup>12</sup> "国家发改委 财政部 国家能源局关于享受中央政府补贴的绿电项目参与绿电交易有关事项的通知," National Development and Reform Commission, Ministry of Finance, National Energy Administration, 15