CLIMATE ENERGY FINANCE

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Combined solar and wind power capacity surpasses coal capacity for the first time in February 2025

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NEWLY INSTALLED CAPACITY IN CHINA

In Jan-Feb 2025, China added 53.7GW of new power capacity to the grid, a 3% yoy increase. Of this, new solar power additions were 39.6GW, accounting for 74%, with wind additions of 9.1GW or 17%, while thermal power only made up 7%, marking a 6% decline yoy – Figure 1. During the same period, China invested RMB44bn (US$6bn) in grid transmission expansion and modernisation projects, +34% yoy.

Figure 1. New Capacity Installed in China in Jan-Feb 2025

		Jan-Feb 25	% Share of total new adds	% yoy change	Jan-Feb 24	% Share of new adds
Thermal Power	GW	3.6	7%	-6%	3.9	7%
Hydropower	GW	1.3	2%	45%	0.9	2%
Nuclear Power	GW	-	0%	0%	-	0%
Wind Power	GW	9.1	17%	1%	9.0	17%
Solar Power	GW	39.6	74%	3%	38.4	74%
Total capacity added	**GW**	**53.7**	**100%**	**3%**	**52.2**	**100%**
Renewable Energy adds	GW	50.0	93%	4%	48.3	93%
Zero Emissions Capacity Adds	GW	50.0	93%	4%	48.3	93%
Total new spent on power grid investment	US$bn	6.0		34%		

Source: National Energy Administration, Climate Energy Finance Calculations

TOTAL CUMULATIVE INSTALLED CAPACITY

As of February 2025, China has total cumulative installed power capacity of 3,402GW, +14.5% yoy. Solar and wind power capacity totalled 1,456GW, surpassing thermal power capacity for the first time, and together renewables comprised 43% of total capacity cumulative capacity – Figure 2.

Figure 2. Total Installed Capacity as of February 2025 in China

		As of Feb-2025	Share of Capacity	Change (yoy %)	As of Feb-24
Thermal Power	GW	1,448	43%	3.9%	1,394
Hydro Power	GW	437	13%	3.5%	422
Nuclear Power	GW	61	2%	6.9%	57
Wind Power	GW	530	16%	17.6%	450
Solar Power	GW	926	27%	43.0%	648
Total Installed Capacity	**GW**	**3,402**	**100%**	**14.5%**	**2,972**
Renewable Energy Capacity	GW	1,893	56%	24.5%	1,521
Zero Emissions Capacity	GW	1,954	57%	23.9%	1,578

Source: National Bureau of Statistics, Climate Energy Finance Calculations

ELECTRICITY GENERATION MIX

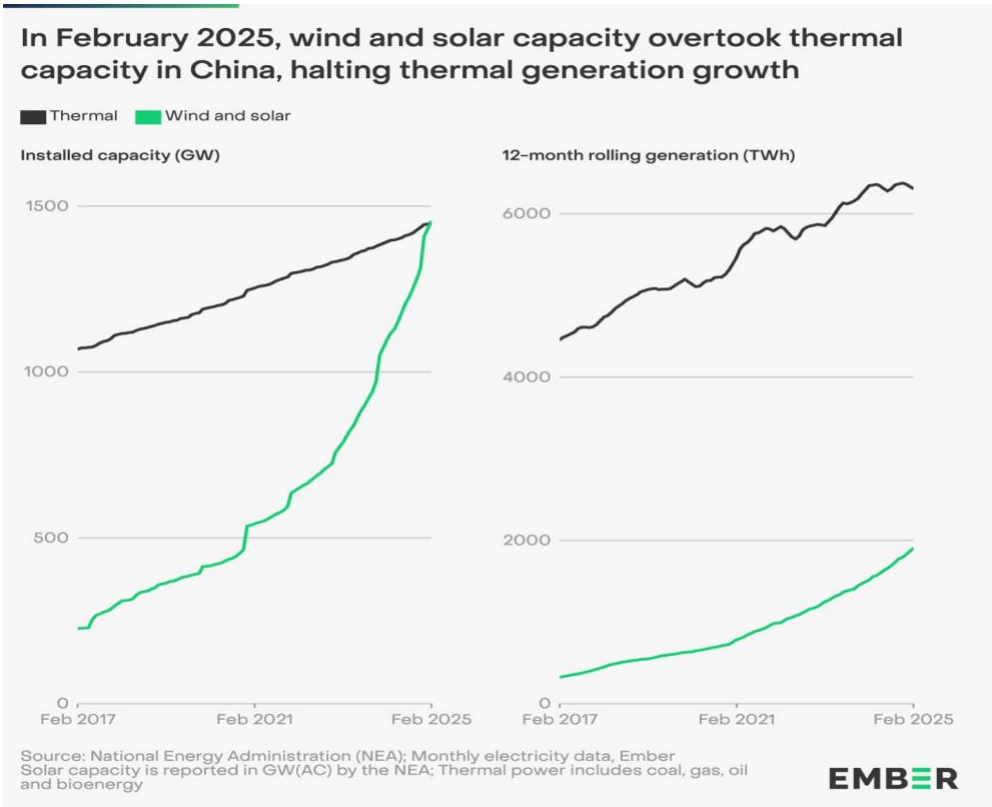
In January-February 2025, solar and wind power generation combined totalled 354TWh, up 13% yoy, and comprised a 22% share of total power generation for the two-month period, while thermal power generation at 996TWh dropped 2.7% yoy. Thermal power generation as a proportion of total energy generation was 62% in the same period, down 3 percentage points yoy, while solar and wind generation combined rose 3 percentage points yoy – see Figure 3.

Figure 3. China's Electricity Generation Mix in Jan-Feb 2025

		Jan-Feb 2025	% Share of Jan-Feb 25 generation	% Change yoy	Jan-Feb 2024	% Share of Jan-Feb 24 generation
Thermal Power	TWh	996	62%	-2.7%	1,024	65%
Coal	*TWh*	948	*59%*	*-2.7%*	974	61%
Gas	TWh	46	*3%*	*-2.1%*	47	3%
Other Thermal	TWh	3	*0%*	*0.0%*	3	0%
Bioenergy	TWh	31	2%	*-0.3%*	32	2%
Hydropower	TWh	148	9%	*2.7%*	144	9%
Nuclear Power	TWh	75	5%	*4.2%*	72	5%
Wind Power	TWh	193	12%	*7.2%*	180	11%
Solar Power	TWh	161	10%	*21.1%*	133	8%
TOTAL POWER GENERATION	**TWh**	1,604	**100%**	**1.2%**	1,585	100%
Variable Renewable Generation	TWh	354	22%	13.0%	313	20%
Zero Emissions Power Generation	TWh	607	38%	8.3%	561	35%

Source: Ember, CEF Estimates

Thermal generation still dwarfs wind and solar generation, but as Ember's co-founder Dave Jones points out, new zero emissions capacity is broadly meeting electricity demand growth, stemming further growth in thermal generation – see graph below.



According to the Centre for Research on Energy and Clean Air China energy and emissions trends: March 2025 snapshot, in February 2025, China's power generation declined for the first time since the pandemic; coal and gas power generation fell by 5.6 yoy.

Electricity consumption rate grew 1.5% yoy in January-February 2025

In February 2025, China's total electricity consumption was 743TWh, a 8.6% yoy increase. From January to February 2025, electricity consumption increased by 1.3% yoy, a slower growth rate, reflective of the very high 11% yoy growth in the same period last year. The China Electricity Council attributed the slowed growth in the first two months of the year to: 1) 2024 being a leap year, and excluding this leap year factor, the national average daily electricity consumption in January-February 2025 increased by 3.1% yoy, which is close to that in December last year; and 2) the warmer winter temperature which reduced heating demand, as the national average temperature in January was 1.5°C warmer than the multi-year average and 0.4°C warmer than the same period last year.

According to the monitoring and research of the National Climate Center, China's average temperature continues to rise, and its rate of warming is higher than the global average. According to the National Bureau of Statistics Statistical Communiqué of 28 February 2025, in 2024, China's average temperature was 10.9℃, which is 0.19 ℃ higher than the previous year. According to the Director of the China National Climate Centre in a recent interview, this is 1.01℃ higher than the annual global average, and sets a new record after 2023 (10.71℃).

Energy security and economy prioritised over decarbonisation in 2025

At this year's Two Sessions (两会) on 4 -11 March 2025, the annual meeting of China's top legislature, the National People's Congress (NPC), and the top political advisory body, the National Committee of the Chinese People's Political Consultative Conference (CPPCC), climate and energy took a backseat to economic priorities, with a focus on boosting domestic consumption to meet the stated GDP growth target of 5% in 2025.

China set a target of reducing fossil fuel consumption per unit of GDP by "around 3%" in 2025. Lauri Myllyvirta of CREA explained that the government has "stealthily" redefined "energy intensity target" to include only fossil-fuel consumption, excluding renewable energy and nuclear power. CEF would like to see China re-prioritise the importance of strong annual energy efficiency improvements, alongside deployment of zero emissions energy additions.

The NDRC report stated that in 2024 "the reduction in carbon emissions per unit of GDP also fell short of expectations mainly due to rapid growth in the energy consumption in industries and the civilian sector as a result of post-Covid economic recovery and frequent extreme weather events". Carbon Brief's Anika Patel provides a comprehensive explainer of the implications of the Two Sessions on energy and climate policy.

Enhancing energy security is top priority in the 2025 Energy Work Plan

Enhancing energy security or "supply guarantee" is top priority in the NEA's Guiding Opinions on Energy Work in 2025 (2025 年能源工作指导意见) released on 27 February 2025. There are no surprises in this – it reiterates existing overarching government policy direction, as articulated in China's Energy Law introduced in January 2025. This requires promoting "the construction of coal supply guarantee bases, orderly approve a number of large-scale modern coal mines, accelerate the construction of approved coal mine projects, and continue to promote coal production capacity reserves" and "strengthening the management and control of major energy security risks", such as extreme weather events.

After energy security, other priorities in descending order are:

- Promoting the green and low-carbon transformation of energy, including building zero-carbon industrial parks and factories, accelerating construction of bases for new energy sources in desert areas, the Gobi, and other arid areas, developing offshore wind bases, and coordinating local grid integration and the construction of power transmission routes;
- deepening energy system reform, including building a unified national power market, improving the energy legal system, and establishing a carbon emission accounting mechanism for the energy industry;
- accelerating the promotion of energy science and technology self-reliance, including improving the energy science and technology innovation system; and

- Deepening international energy cooperation, including:
    - continuing to enhance overseas resource supply guarantee capabilities
        - strengthen conventional and unconventional oil and gas cooperation with key countries and regions, actively and steadily promote the construction of cross-border oil and gas import channels, actively promote the stable supply of gas from Central Asian countries, and
        - consolidate and expand cooperation with major coal resource countries.
    - Coordinate energy cooperation with key countries and regions, including promoting practical energy cooperation between China and Europe, deepen cooperation with the countries along the Belt and Road in the fields of wind power, photovoltaics, hydrogen energy.

It is interesting to observe the shift in prioritisation compared with that found in China's Energy Transition White Paper released 6 months ago in August 2024, where energy security was listed as third priority, after 1) the 'people-first principle' and 2) green and low-carbon development, and there was no mention of a deteriorating international environment.

Since then, the US, EU, Brazil and India have imposed or increased tariffs on Chinese imports such as EVs, solar modules and batteries, with Trump's re-entry into the Whitehouse resulting in additional tariffs, heightened geopolitical uncertainty and accelerated fragmentation of the world order. The Government Work Report acknowledged that "unilateralism and protectionism are on the rise" and that "an increasingly complex and severe external environment may exert a greater impact on China in areas such as trade, science, and technology".

The deteriorating international environment is impacting Chinese exports and its economy, vindicating President Xi's warning in May 2023 to officials of the National Security Commission to be prepared for "worst-case and most extreme scenarios" in the context of US-China competition. According to Xie Maosong, senior researcher at Tsinghua University's National Strategy Institute, these include "Western sanctions on China's energy, finance and food supply". Ensuring national energy security and self-reliance are part of national efforts underway to prepare for such scenarios. Countries around the world are scrambling to respond to the US Administration's radical transnationalism and undermining of traditional alliances and multilateralism.

China releases electricity carbon footprint factor data

The Government Work Report also stated that the Government will take active steps to respond to green trade barriers by launching carbon emissions statistics and accounting initiatives, and developing systems for carbon footprint management and carbon labelling and certification. CEF would suggest a far more positive framing, that China is preparing for the inevitable need for carbon emissions accountability and carbon pricing in international trade,

leveraging the leadership of the EU and UK's development of the progressive widening sector coverage of their ETS and CBAM mechanisms. China already hosts the largest national ETS globally (by volume), and is expected to broaden this by ~50% over 2025 to encompass the aluminium, cement and steel sectors.

On February 24, a Ministry of Ecology and Environment spokesperson announced the "Release of Electricity Carbon Footprint Factor (ECFF) Data in 2023". This is the first time that China released domestic ECFF data and is an important milestone for the construction of China's product carbon footprint management system. The data will be used to calculate the carbon footprint generated by electricity production and consumption of mid- and downstream products in various industries.

The ECFF measures the total emissions of electric energy products from a life cycle perspective. It reflects not only the direct carbon dioxide emissions in the electricity production process, but also the overall carbon emissions from fuel acquisition such as coal mining, equipment manufacturing, engineering construction, production operation, power grid construction and transportation.

This development is a positive response to the EU CBAM building trade barriers with carbon footprint traceability mechanisms, requiring photovoltaic modules, batteries, auto parts and other products to provide full life cycle carbon footprint certification or self-declaration data, and extending to upstream industries such as steel and aluminium to levy carbon tariffs.

Increasing extreme weather events increase risks to the power sector

The frequency and intensity of extreme weather events in China have increased significantly, including rainstorms, floods, droughts, typhoons, and heat waves. In 2024, a total of 9 typhoons made landfall, 3 more than 2023. The total area of crops affected by disasters was 10.09 million hectares, of which 1.24 million hectares (13.5%) were completely lost, up 27% yoy. Various natural disasters in 2024 caused direct economic losses of 401bn yuan (US$55bn), up 16% yoy.

The direct economic losses were:

Hazard type	Direct economic losses
Floods and geological disasters	263 billion yuan (+7% yoy)
Droughts	8.4 billion yuan
Low temperatures and snowstorms	25.6 billion yuan
Marine disasters	10.9 billion yuan
Earthquakes of all levels	3.8 billion yuan

Frequent and severe extreme weather events are increasing risks to the booming renewable energy industry. Wind and solar power stations are put to the test wherever typhoons hit. During the landfall of super typhoon Makar in September 2024, wind turbines in operation in

the south of China were directly or indirectly affected. Among them, multiple wind turbines in a wind power project in Wenchang, Hainan were damaged, and photos of the collapsed wind turbine tower were widely circulated on social media. JinkoSolar also disclosed that due to the impact of the super typhoon "Makar", the 40MW fish farming + solar power station in Longtang, Guangdong Province, suffered certain asset losses.

Speaking with China Energy News, Peng Peng, secretary general of the China New Energy Power Investment and Financing Alliance said, “The impact of extreme weather on wind and solar power generation projects cannot be underestimated. The frequency and intensity of extreme weather have actually increased”. “Although the new energy industry has gained a lot of experience in dealing with typhoons over the years, as typhoons intensify, they may have exceeded the typhoon resistance standards originally designed for many wind and solar power projects. There are still great risks in the face of super or larger typhoons."

The Chinese Government has recently introduced policy measures to address these risks. China’s Energy Law provides that the State will establish an energy emergency management system (Article 52) and formulate a national energy emergency plan (Article 53). In February 2025, the CPC Central Committee and the State Council issued the "National Emergency Response Plan". The plan requires that the “NDRC, the National Energy Administration, the State Grid Corporation of China and other relevant departments and units establish and improve the power emergency response system, strengthen power safety operation monitoring and emergency response, enhance the safety assurance capabilities of important power transmission channels, and ensure emergency power generation, lighting and on-site power supply repair and restoration in extreme situations.”

China’s Great Green March across the globe, The Straits Times

CEF recently collaborated with The Straits Times in its publication “China’s Great Green March across the globe”. It provides an in-depth account of the rapid expansion of China's clean tech industry globally since the start of 2023, including in South-East Asia, with a focus on solar panels, wind turbines, EVs and battery manufacturing, as well as investments in wind and solar power generation.

CEF has been tracking Chinese clean-tech firms ‘going global’. Since the start of 2023, more than 180 deals worth more than US$141 billion have been announced – and the number grows by the week. They include joint ventures and direct investments in energy projects.

Previous Monthly China Energy Updates here.

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