

China risks missing multiple climate commitments as coal power approvals continue

A new survey of coal power projects in China shows that an estimated 114 gigawatts (GW) of capacity was approved and 70 GW started construction in 2023, accelerating further from the frantic pace of permitting two new coal power plants and starting construction on one new plant per week in 2022.¹

As a result of the increase in coal use and investment in coal power, China risks missing several climate targets it set for 2025, unless drastic action is taken soon. In 2021, the country committed to strictly limiting coal consumption growth; strictly controlling new coal power; reducing energy intensity; and reducing carbon intensity; it also set targets of increasing the share of non-fossil energy sources to 20%; and getting more than 50% of the increase in energy use from renewable sources. All of these targets are severely off track after 2023.

Following the 2021 pledge to “strictly control” new coal power, approvals of new coal power plants increased 4-fold in 2022-23, compared with the previous five-year period of 2016-20. Since the beginning of 2022, an estimated 218 GW of new coal power plants have been permitted. 89 GW of this capacity had already started construction by the end of 2023, but another 128 GW had yet to break ground.

Despite the rhetoric of coal power playing a “supporting” role, power generation from coal increased approximately 12% from 2020 to 2023, delivering 44% of the growth in power generation. The growth rate of coal power generation accelerated to 4%/year in 2021-23, from 3.5% in 2016-20. Growth in total coal consumption, including non-power sector uses,

¹ The size of coal-fired power generating units and power stations varies widely; this pace assumes a typical power station size of 1 GW. Global Energy Monitor’s January 2024 data release identified a 2022 permitting year for 102 GW of capacity (146 coal units at 72 power stations) and a 2023 permitting year for 106 GW of capacity (148 coal units at 77 power stations), for a total of 208 GW permitted since the beginning of 2022. Based on GEM’s coal unit status change history, an additional 9.7 GW of capacity without known permitting data but categorized as permitted, under construction, or operating was presumed as permitted for this analysis in the last two years (2.2 GW in 2022 and 7.6 GW in 2023). Some of this capacity may have been permitted during different years or entered construction without permission. Future Global Coal Plant Tracker releases will include refined data if more or better information is identified.

increased 8-fold from 0.5%/year in 2016-2020 to 3.8%/year, despite the pledge to “strictly control” coal consumption growth.

Almost half (46%) of the growth in energy use came from coal and 70% from fossil fuels, against a target of getting more than 50% of the growth from renewable energy, another target that is off track.

The approaching deadline for peaking CO₂ emissions “before 2030” seems to be leading many actors to pursue rapid emissions growth and a wave of carbon-intensive projects while the window for them is still open. The government has recently recognized the lagging progress on the targets and called for stronger control of such projects, along with accelerated deployment of renewable energy, to close the gap.

Statements from thermal power developers and government officials confirm that the 14th five-year plan period until 2025 is seen as a “policy window” for new coal power plants, rather than a period when new projects are strictly controlled. This is causing a rush to secure permits for new projects.

The positive news is that to meet the carbon intensity target for 2025, CO₂ emissions and coal consumption will have to fall in absolute terms from 2023 to 2025. Due to the dramatic acceleration in clean energy deployment seen in 2023, this reduction is also achievable, and could put China on track to peaking CO₂ emissions before 2025, provided that electricity demand growth returns to trend after exceptionally rapid growth in 2021-23².

² Myllyvirta, L. (13 November 2023). Analysis: China’s emissions set to fall in 2024 after record growth in clean energy. Carbon Brief. <https://www.carbonbrief.org/analysis-chinas-emissions-set-to-fall-in-2024-after-record-growth-in-clean-energy>. Article.

China's coal power boom accelerated in 2023

Permitting, construction starts and commissioning all accelerated further from the frenetic pace reached in 2022. 114 GW was permitted, up from 104 GW in 2022. Construction was started on 70 GW, compared with 54 GW the year before. 47 GW of coal-fired capacity was commissioned, up from 28 GW in 2022. At 108 GW, new project announcements declined slightly but remained at a far higher level than any year from 2015 until 2021.

The amount of coal power capacity permitted in 2022-23, 218 GW, comes very close to the record 233 GW permitted in 2014-15.³ This permitting boom was followed by suspension of new approvals and an order to 15 provinces to delay construction starts in March 2016⁴, and further measures to stop or delay projects already permitted and under construction in 2017⁵.

In addition to construction starts, which the Chinese government and GEM both define as pouring of first concrete, a long list of coal power projects held “construction start ceremonies” that didn’t involve pouring concrete. These ceremonies are likely carried out in order to show that the project is progressing, and possibly insure against any retroactive review of permits.

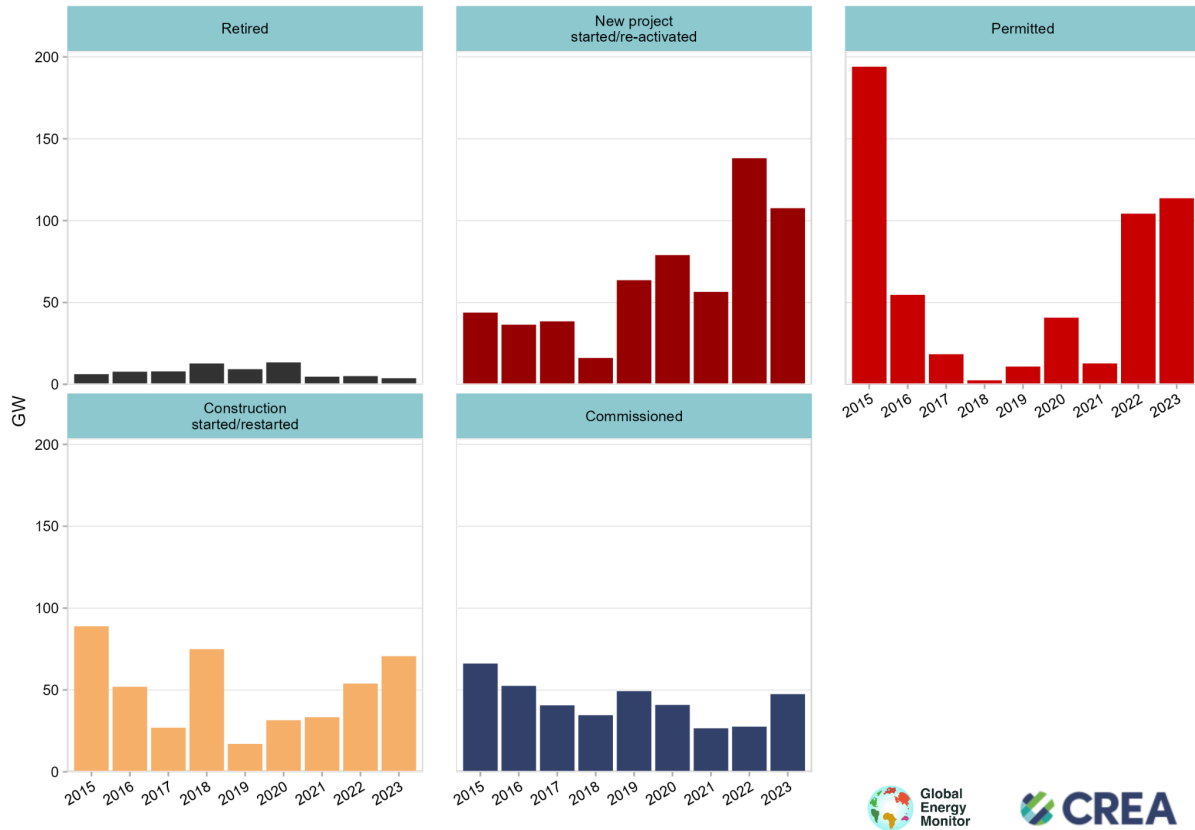
³ As GEM data starts from January 2015, approvals in 2014 are taken from Myllyvirta et al ([2015](#)): Is China doubling down on its coal power bubble?

⁴ Beijixing News. (24 March 2016). 【重磅】火电遭遇“当头棒喝”：13省暂缓核准项目、15省缓建(附火电大跃进路线图) . <https://news.bjx.com.cn/html/20160324/718971.shtml>. News report.

⁵ Beijixing News. (30 September 2017). 重磅 | 三部门正式印发《2017年分省煤电停建和缓建项目名单的通知》. <https://m.bjx.com.cn/mnews/20170930/853476.shtml>. News report.

Progress of new coal power projects and retirements in China

Changes in project status, annual

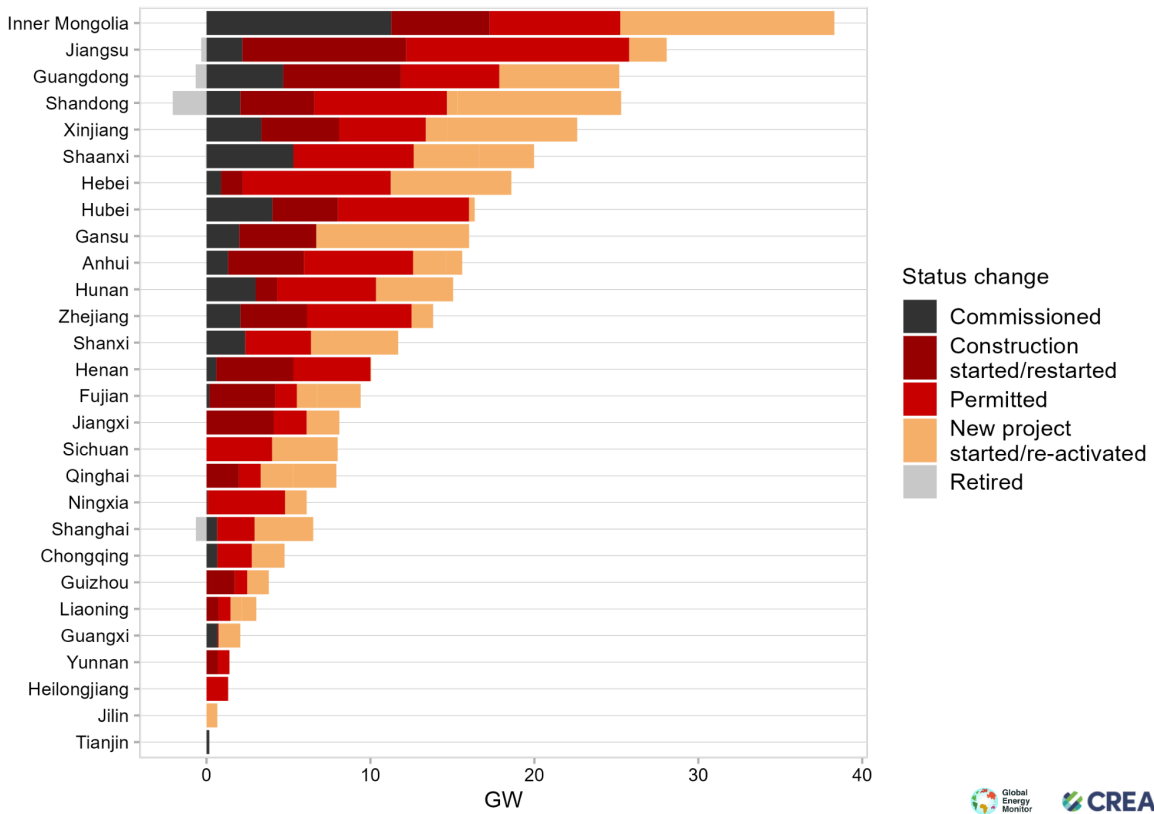


(Categories are not mutually exclusive–e.g. plants that both obtained permits and started construction in 2023H1 are included in both categories.)

Among China’s provinces, Jiangsu issued the most permits for new coal power plants in 2023, followed by Shandong, Shaanxi, Hebei and Hubei. The most plants were commissioned in Inner Mongolia, Shaanxi, Guangdong and Hubei, and most new projects were announced in Inner Mongolia, Shandong, Gansu and Xinjiang.

Coal power pipeline in China

Changes in project status, 2023



China is off track to meet all of its key 2025 climate commitments

The pledge to “strictly control new coal power” is far from being the only climate commitment that China is struggling to meet.

China’s Nationally Determined Commitment under the Paris agreement, updated in 2021, makes commitments to strictly limit coal consumption growth, strictly control new coal power, reduce energy intensity, and reduce carbon intensity by 2025.⁶ The country’s five-year plans further set targets to increase the share of non-fossil fuels in the energy mix to 20% and derive more than 50% of the increase in energy use from renewable sources by 2025.^{7,8} All of these targets are severely off track after 2023.

This is a departure from China’s track record: when it comes to international commitments on climate, the Chinese have been known to take an ‘under-promise, over-deliver’ approach. Chinese government advisers take pride in saying that China is ‘definitely certain’ that published climate targets can be achieved⁹. Officials justifiably point to the country’s record of meeting commitments, even when they’ve required tough measures¹⁰.

China’s CO₂ emissions growth accelerated and GDP growth slowed down during and after the zero-COVID years from 2020 to 2023. During this time, economic growth was driven by the most carbon-intensive sectors, as the less energy-intensive service sectors were

⁶ UNFCCC. (2021). China’s Achievements, New Goals and New Measures for Nationally Determined Contributions. <https://unfccc.int/sites/default/files/NDC/2022-06/China%E2%80%99s%20Achievements%2C%20New%20Goals%20and%20New%20Measures%20for%20Nationally%20Determined%20Contributions.pdf>. Policy translation.

⁷ National Development and Reform Commission. (2021). 中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景. <https://www.ndrc.gov.cn/xxgk/zcfb/ghwb/202103/P020210313315693279320.pdf>

⁸ National Development and Reform Commission. (1 June 2022). “十四五”可再生能源发展规划(发布稿). <https://www.ndrc.gov.cn/xxgk/zcfb/ghwb/202206/P020220602315308557623.pdf>. Policy.

⁹ CarbonBrief. (10 December 2021). The Carbon Brief Interview: Prof Wang Yi and Prof Wang Zhongying. <https://www.carbonbrief.org/the-carbon-brief-interview-prof-wang-yi-and-prof-wang-zhongying/>. Article.

¹⁰ Ministry of Foreign Affairs of the People’s Republic of China. (26 September 2023). Foreign Ministry Spokesperson Wang Wenbin’s Regular Press Conference on September 26, 2023. https://www.fmprc.gov.cn/mfa_eng/xwfw_665399/s2510_665401/202309/t20230926_11150685.html. News report.

reeling. In 2023, energy sector CO₂ emissions increased by 5.2%, based on CREA analysis¹¹ of preliminary official data on energy consumption¹².

The centerpiece of China's 2020 and 2025 climate commitments has been reducing carbon intensity, or CO₂ emissions from energy use per unit of GDP. The country's carbon intensity reportedly fell 48% from 2005 to 2020. China committed to an 18% reduction from 2020 to 2025, and the country's 2030 target requires a further reduction of at least 17% from 2025 to 2030.

However, carbon intensity has only fallen 5% in 2020 to 2023, falling far behind the target of 18% from 2020 to 2025. In 2023, there was no improvement in CO₂ intensity as GDP growth was reported at 5.2%, increasing at the same rate as CO₂ emissions. The shortfall against the intensity target means that emissions have to come down in absolute terms from 2023 to 2025 in order for the target to be met, unless GDP growth accelerates to more than 7% in 2024-25.

Energy intensity increased 0.5% in 2023, the first increase since at least 2005. From 2020 to 2023, energy intensity only fell 2%. To meet the target of 13.5% reduction in energy intensity, energy consumption would have to fall even under a significant acceleration in GDP growth, an implausible combination. Energy intensity improvements came almost to a halt with the COVID-19 pandemic in 2020, with an improvement of only 0.1%. As a result, the energy intensity target for 2020 was also missed by almost 2 percentage points.

The share of non-fossil energy has only increased 1.8%-points from 2020 to 2023, against a target of a 4.1%-point increase by 2025, set in the country's five-year plan. This means that the rate of increase needs to double in the next two years. If energy demand growth continues at the exceptionally high rate of 2020 to 2023, the non-fossil energy production needs to grow at 11.3%/year, up from 8.5% in the past three years to meet the target. Alternatively, energy consumption growth rate has to slow down to its pre-COVID average.

Only 30% of energy consumption growth has come from renewable energy in 2020 to 2023, with the target being more than 50% by 2025. This target is highly implausible to reach

¹¹ Myllyvirta, L. (22 February 2024). Analysis: Record drop in China's CO₂ emissions needed to meet 2025 target. Carbon Brief. <https://www.carbonbrief.org/analysis-record-drop-in-chinas-co2-emissions-needed-to-meet-2025-target/>. Article.

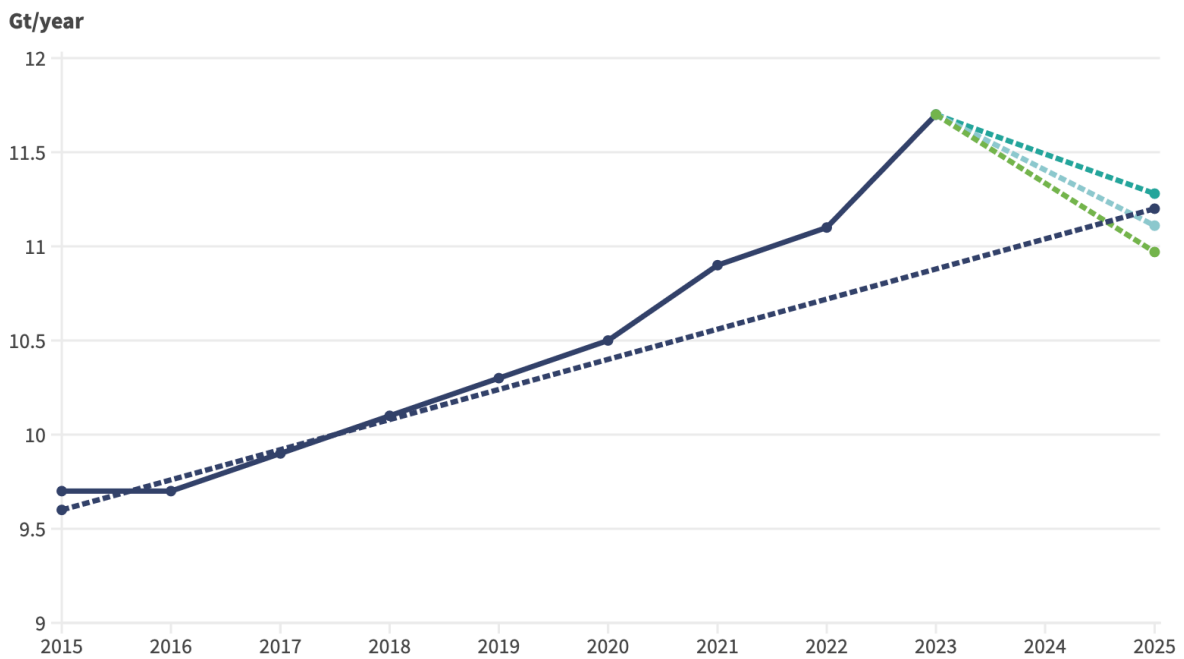
¹² National Bureau of Statistics. (18 January 2024). 胡汉舟: 能源保供有力有效 绿色低碳转型进程加快. https://www.stats.gov.cn/sj/sjjd/202401/t20240118_1946697.html. Article.

without a slowdown in energy consumption growth, as the growth in renewable energy production would have to accelerate to 20%/year, from 8.9% in the past three years.

Despite the pledge to “strictly limit” growth in coal consumption, the growth rate increased 8-fold from 0.5% in 2016-20 to 3.8% in 2020-23.

China's CO2 emissions from energy under the carbon intensity target

■ Historical ■ high GDP growth (6%) ■ medium GDP growth (5.2%) ■ low GDP growth (4.5%) ■ pre-Covid trend



China's 2025 climate commitments and targets in the energy sector: progress until 2023 and acceleration needed to meet targets

| Indicator | 2025 Target | Progress in 2020-23 | Acceleration needed in 2024-25 |
|--|-------------------------|--|---|
| Carbon intensity | -18% | -4.6% (-1.5%/year) | -7%/year; reduce emissions in absolute terms |
| Energy intensity | -13.5% | -2% (-0.6%/year) | -6%/year; reduce in absolute terms |
| Coal consumption growth | “strictly limit” | growth rate increased 8-fold from 0.5% in 2016-2020 to 3.8% | negative growth to limit increase to the same rate as previous five-year period |
| New coal power projects | “strictly control” | permits increased 4-fold, from 25 GW/year in 2016-2020 to 110 GW/year in 2022-23 | restrict new permits and review permits already granted |
| Non-fossil energy share | increase by 4.1%-points | increased by 1.8%-points (0.6%-points/year) | rate of increase has to double to 1.2%-points/year |
| Share of renewables out of energy consumption growth | Above 50% | 30%, down from 42% in 2016-2020 | renewable energy production growth needs to double and energy consumption growth needs to slow down to pre-COVID rate; total consumption of fossil fuels needs to fall. |

The coal power boom will lead to overcapacity and complicate China's energy transition

China's power sector coal consumption has to fall substantially over the next two years to allow the country to meet its 2025 climate targets. Thereafter, China has committed to peaking CO₂ emissions before 2030 and reducing coal consumption in the 2026-30 period. In the U.S.-China Sunnylands climate statement, the country also pledged to achieve "post-peaking meaningful absolute power sector emission reduction in the 2020s." After 2030, CO₂ emissions are targeted to fall in an orderly way by 2035.

These commitments leave little to no space for coal-fired power generation to increase over any timescale, and require a significant reduction over the next 10 years to get on track to carbon neutrality.

At the same time, China has approximately 284 GW permitted and under construction, and another 123 GW in preparation. Retirements have almost stopped¹³ and there is no plan for dealing with this overcapacity by retiring older plants en masse.

Carbon neutrality pathways generally project coal-fired power generation below 4000 TWh in 2035,¹⁴ down from 5200 TWh in 2023. If the new plants are completed and retirements continue at current rates, China's coal-fired power capacity could reach 1400-1500 GW while utilization would fall from 51% in 2023 to less than 30% in 2035.

China has spent the past seven years digesting the overcapacity from the 2015 wave of permitting. Coal-fired power generation still grew rapidly over this period. As power generation from coal begins to fall, dealing with overcapacity will be far tougher.

¹³ The January 2024 Global Coal Plant Tracker release identifies 3.7 GW of coal-fired power capacity retired at units above 30 megawatts (MW) in 2023. Global Energy Monitor considered the data available for [Anhui](#), [Guangdong](#), [Heilongjiang](#), [Jiangsu](#) (and [here](#)), [Shaanxi](#) (and [here](#)), Shandong, ([1](#), [2](#), [3](#), [4](#), [5](#)), and [Shanghai](#) as of early February 2024 to determine this figure. Based on known provincial Development and Reform Commission and NDRC data as of early February 2024, 4.8 GW of coal capacity retired at units both above and below 30 MW in 2023.

¹⁴ E.g. the 2-degree scenario in ICCSD's China's Long-Term Low-Carbon Development Strategies and Pathways (<https://www.efchina.org/Reports-en/report-lceg-20210711-en>), the Announced Policies Scenario in the IEA [World Energy Outlook 2023](#) and multi-model projections in Energy Foundation China and University of Maryland Synthesis Report 2022 on China's Carbon Neutrality (<https://www.efchina.org/Attachments/Report/report-lceg-20221104/Synthesis-Report-2022-Electrification-in-Chinas-Carbon-Neutrality-Pathway.pdf>)

What's behind the drive for more coal power?

Statements from thermal power developers and government officials confirm that the 14th five-year plan period until 2025 is seen as a “policy window” for new coal power plants, rather than a period when new projects are strictly controlled. This is causing a rush to secure permits for new projects. The Deputy Manager of China Shenhua highlighted that “the 14th five-year period is an opportune time for thermal power construction, therefore the company’s capital spending over the next three years is primarily focusing on this area”.¹⁵ The province’s state-owned enterprise supervisor boasts of Inner Mongolia Energy Group “achieving a flying start” to 2023 and “seizing the policy window” for coal power projects, concentrating efforts and resources on these initiatives.¹⁶ The Zhejiang Energy Bureau emphasized seizing the time window for thermal power construction during the 14th five-year period.¹⁷ Power China has officially confirmed rumors of the “three 80GW” plan, aiming to approve and commission 80 GW annually from 2022 to 2024, totalling an anticipated 200 GW.¹⁸ The company’s Vice Chairman called for joint efforts with local government officials to “seize the ‘three 80 GW’ coal power development window effectively.”¹⁹

Why are China’s planners promoting the construction of coal-fired power despite the obvious problem of future overcapacity? The fundamental issue is rigid and outdated grid management. China has more than enough capacity to cover electricity demand under all circumstances, but it is not used efficiently, especially across provincial borders.

On the national level, China’s peak power demand was 1340 GW in the summer 2023. The country has 1390 GW thermal power, 420 GW hydropower and 57 GW nuclear, for a total of 1870 GW of controllable (dispatchable) generating capacity. This means that currently, dispatchable capacity exceeds peak load by 40%, when in a well-managed grid, around 15% would be sufficient. Yet, there are recurring concerns about power shortages in the summer, showing the failure to put existing capacity to efficient use.

¹⁵ Sina Finance. (5 May 2023). 中国神华：未来三年的资本开支仍会主要集中于火电建设上。
<https://finance.sina.com.cn/jjxw/2023-05-05/doc-imysttks3392734.shtml>. News report.

¹⁶ State-owned Assets Supervision and Administration Commission of the State Council. (9 May 2023). 蒙能集团实现首季“开门红”. <http://www.sasac.gov.cn/n16582853/n16582893/c27863659/content.html>. Government release.

¹⁷ National Energy Administration. (27 October 2023). 浙江能源监管办赴国能北仑电厂开展现场调研。
https://www.nea.gov.cn/2023-10/27/c_1310747699.htm. Government release.

¹⁸ PowerChina. (1 August 2023). 康建民与华亭市委书记景晓东会谈。
http://www.gsnytz.com/art/2023/8/1/art_8855_1753310.html. Corporation release.

¹⁹ PowerChina. (1 August 2023). 康建民与华亭市委书记景晓东会谈。
http://www.gsnytz.com/art/2023/8/1/art_8855_1753310.html. Corporation release.

Looking at capacity in the pipeline, there is 170 GW of pumped hydro storage under construction and additions of battery storage capacity reached 22 GW in 2023, more than doubling on year. Combine this with the 280 GW of coal power permitted and under construction, and China's operating dispatchable capacity could reach 2300 GW in 3-4 years while peak load would be at 1600-1700 GW, assuming 6% annual growth.

While it's not realistic for a country of China's size to operate as one national grid, the picture is similar for most grid regions, as shown by our earlier analysis.²⁰ Over 50% of the projects permitted and 75% of coal power plants commissioned in 2023 were in regions that already have overcapacity in coal power.

Building and maintaining this vast power capacity is a major economic drag. Curbing new coal power could cut national stranded asset risks by 120 to 350 billion yuan according to a Renmin university study.²¹

“We'll deal with that later”

China's policymakers have sought to reconcile the buildout of new coal power now with the CO₂ peaking and carbon neutrality goals, which require a steep reduction in coal-fired power generation over the next decade, by introducing a new slogan. Several provinces, including Guangdong, Shandong, and Jiangsu, have approved new coal power projects under the slogan of “build first and modify later”. This phrase suggests that the stranded asset risk will be addressed through some, largely unspecified, future “modifications”.

There is however no policy that lays out what the modifications might be that would solve this contradiction, and no technical requirements for power plants built under this slogan that would differ from the general coal power plant standards for flexibility, thermal efficiency or other parameters. The modifications are generally thought to comprise improved thermal efficiency and flexibility, but not CCUS.²² Such retrofits could lead to

²⁰ CREA and GEM. (29 August 2023). China's new coal power spree continues as more provinces jump on the bandwagon. <https://energyandcleanair.org/publication/chinas-new-coal-power-sprees-continues-as-more-provinces-jump-on-the-bandwagon/>. Analysis.

²¹ People's Daily. (27 March 2023). 防范资产搁浅风险，煤电需稳妥有序转型. http://paper.people.com.cn/zgnyb/html/2023-03/27/content_25973612.htm. Article.

²² Beijixing News. (20 March 2023). 煤电“先立后改”破解电力供应难题. <https://m.bjx.com.cn/mnews/20230320/1295493.shtml>. Article.

reduced thermal efficiency due to lower and more varied operating rates, increase operational costs by over 30%, and accelerate equipment aging.²³

Small steps forward for CCUS

One possible mitigating factor is that the first carbon capture, utilization and storage (CCUS) projects at coal power plants have started moving ahead. The first project began operations at the 2 GW Taizhou power station²⁴ in Jiangsu, and at least two more are under construction. Shanwei Haifeng power station,²⁵ Guangdong 2.1GW: 1 Mt, offshore EOR. Gansu Zhengning power station²⁶ 2GW: 1.5 Mt, EOR. Taizhou captures 0.5 Mt CO₂ per year while Shanwei Haifeng plans to capture 1 Mt and Gansu Zhengning 1.5 Mt. This is a fraction of the total CO₂ emissions of each plant, approximately 5-20%. The use cases reflect the fact that there is no meaningful economic incentive for carbon storage at the moment: the Taizhou project sells CO₂ to industrial uses, which is a very limited market. The two other projects supply CO₂ for enhanced oil recovery, which is still tied to fossil fuel production.

CCUS could in principle allow coal power plants to operate under the emission pathway required to meet the carbon neutrality target, but the costs are very high compared with other low-carbon power sources.

Coal power has not moved to a “supporting” role

The official policy on coal power is that clean energy should become the “mainstay” of the power system while coal moves to a “supporting” role. New coal power plants should not be permitted for the purposes of bulk power generation, but only to support grid stability and renewable energy integration.

What makes the resurgence of coal plant construction remarkable is that it flies in the face of a policy pledge that President Xi Jinping personally announced. Just months before the

²³ People’s Daily. (27 March 2023). 防范资产搁浅风险，煤电需稳妥有序转型.

http://paper.people.com.cn/zgnyb/html/2023-03/27/content_25973612.htm. Article.

²⁴ GEM Wiki. Taizhou Power Station. https://www.gem.wiki/Taizhou_power_station.

²⁵ GEM Wiki. Shanwei Haifeng CCS power station.

https://www.gem.wiki/Shanwei_Haifeng_CCS_power_station.

²⁶ GEM Wiki. Gansu Zhengning Power Station. https://www.gem.wiki/Gansu_Zhengning_power_station.

current spree began, Xi pledged²⁷ to “strictly control new coal-fired power generation projects” in China. This new policy target was unveiled at an event organized by the White House — the Leaders Summit on Climate²⁸ in April 2021 convened by President Biden.

After the commitment to “strictly control” new coal power projects, China’s top leadership dispatched inspectors to the National Energy Administration (NEA), admonishing the agency for failing to control new coal power buildup, among other things. As a response to the inspectors’ report, the NEA introduced a policy that set strict conditions for new coal power projects. New plants will not be allowed for the purpose of “bulk power generation”, but only for “supporting” roles: supporting grid stability and supporting the integration of variable renewable energy into the grid.

However, an assessment of the coal power projects permitted in 2022–23 makes it clear that this policy is not being enforced.

- The provinces building most new coal power have been getting the majority of their new power generation from coal and are not using it to “support” a correspondingly large buildout of clean energy
- The majority of projects are in provinces that have no shortage of generating capacity to meet demand peaks
- Most new project locations already have more than enough coal power to “support” existing and planned wind and solar capacity

This shows that the rhetoric of “coal power playing a supporting role” is without basis.

An example of how the “supporting role” of coal power is used as a smokescreen is the Anhui province. The province initially approved “supporting” coal power projects²⁹ without specifying what they were meant to “support”, let alone providing an assessment of why this additional capacity would be needed. As an apparent afterthought, the province recently issued a notice³⁰ encouraging the developers of these “supporting coal power projects” to also develop bundled wind and solar projects and offering rewards for doing

²⁷ Xinhua News. (22 April 2021). Full Text: Remarks by Chinese President Xi Jinping at Leaders Summit on Climate. http://www.xinhuanet.com/english/2021-04/22/c_139899289.htm. News Report.

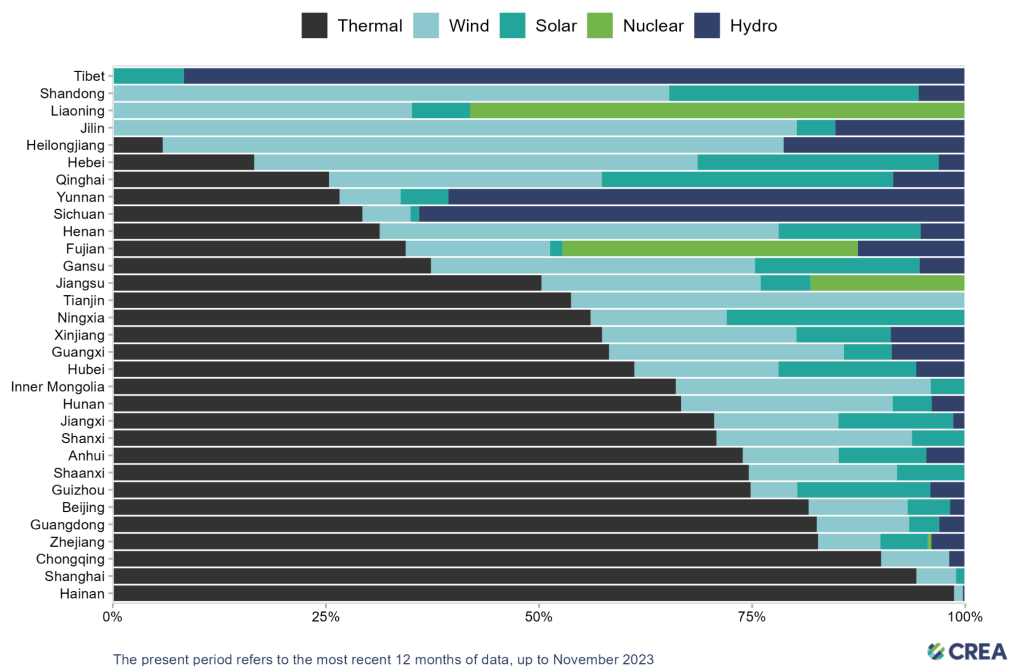
²⁸ White House. (23 April 2021). Leaders Summit on Climate Summary of Proceedings. <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/23/leaders-summit-on-climate-summary-of-proceedings/>. Government Statements and Releases

²⁹ Sohu News. (11 December 2023). 安徽省支撑性电源项目推进现场会在淮河能源控股集团召开. https://www.sohu.com/a/743264281_121123745. News Report.

³⁰ Beijixing News. (12 January 2024). 安徽印发煤电项目配套风光项目通知. <https://m.bjx.com.cn/mnews/20240112/1355600.shtml>. News Report.

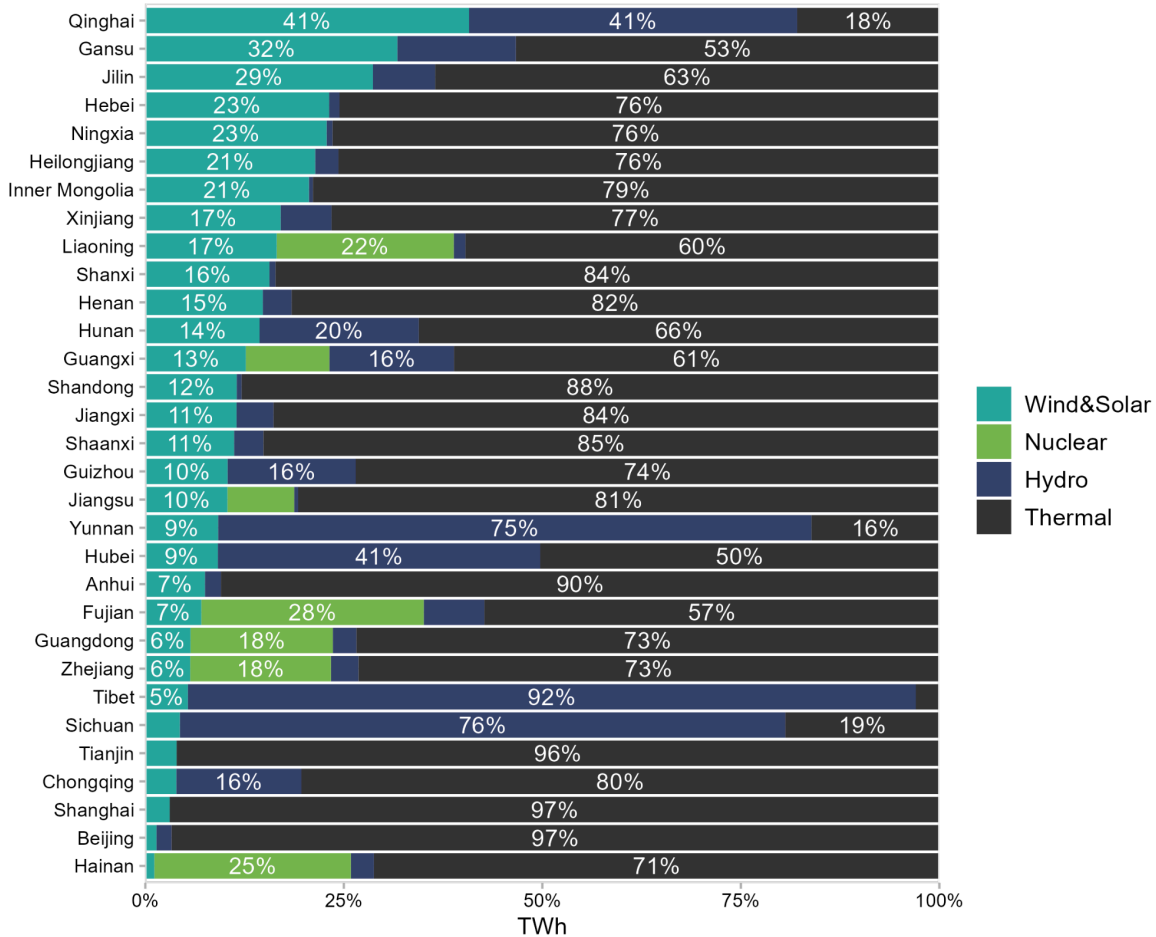
so. This approach blurs the lines between whether new coal power is meant to support renewable energy or if, conversely, it's the renewables that provide nominal legitimacy for constructing new coal power.

Shares of power generation sources in growth from 2020 to present



The top provinces developing new coal power have a power mix where variable renewable energy sources (wind and solar) represent less than 25% of the generation mix, and thermal power makes up at least 75%. At these levels, additional thermal power should definitely not be needed to enable the renewable energy buildout.

Power generation mix by province



most recent 12 months of data, up to November 2023



Western provinces: coal power built in “clean energy” bases

The issue in the western provinces is that existing coal-fired power capacity is not used to balance the output of the wind and solar power bases, which are separate from the provincial power grid. These bases are planned as if they were separate grids, with their own coal-fired power plants for balancing, even though they feed power to long-distance transmission lines and to the provincial grid.

There is a technical requirement for a small amount of thermal power or storage in a grid dominated by wind and solar to provide frequency and voltage control. However, the amount of coal-fired power being built to “support” the clean energy bases in the west goes far beyond this technical requirement, reflecting electricity system and institutional shortcomings.

Earlier CREA analysis found that there was already sufficient coal-fired power capacity in place to balance the vast majority of clean energy bases. The clean energy bases are also contractually required to supply power at steady rates to the east, regardless of variations in wind and solar output, which leads to a much higher share of coal power in their power generation than would be attained with more flexible dispatch. This model of building designated “supporting” coal power plants at each large wind and solar development locks China’s power system into a much higher reliance on coal power than would be necessary, and, in particular, dilutes benefits and increases the costs of the clean energy bases.

Two western provinces, Qinghai and Gansu, already have fairly high shares of wind and solar in their power generation, at 41% and 32% respectively. However, their total generation volumes are quite small compared with Xinjiang and Shaanxi, to which they are connected through high-voltage transmission lines, and especially to the eastern provinces they transmit power to. Having sufficient transmission capacity to the east and flexible operation of the transmission lines would enable renewable energy buildout without requiring additional coal-fired power in these provinces.

Eastern provinces: protectionism and over-engineering

In the east, the motivation for building new coal power plants appears to be mainly “supporting grid stability”, i.e. ensuring sufficient dispatchable capacity is in place to meet peak electricity demand. The issue here is that every province is planning its power capacity as if it were an island, without the ability to import from other provinces. Comparison of peak loads to existing capacity of thermal, hydro and nuclear power generation in place on the level of grid regions, comprising multiple provinces, as well as on the national level, shows that if electricity transmission across provincial borders worked in a flexible way, there would be no need to add more generating capacity to meet peak demand. In addition, vast investments are being made in pumped storage: 167 GW was under construction in 2023,³¹ and 51 GW already in operation³². Grid-connected battery storage is also taking off, with 21.5 GW added in 2023, an almost five-fold increase year-on-year. These investments are further reducing the need for coal- and gas-fired power plants to cover peak loads, and making the new coal power projects redundant before they even break ground.

³¹ NEA. (17 July 2023). 抽水蓄能已建在建装机规模达1.67亿千瓦.
https://www.nea.gov.cn/2023-07/17/c_1310732786.htm.

³² China Electricity Council. (30 January 2024). 2023-2024年度全国电力供需形势分析预测报告.
<https://www.cec.org.cn/detail/index.html?3-330280>

Out of the top provinces for new coal power projects, Jiangsu and Guangdong have very little variable renewable capacity or development.

Shandong has been a frontrunner in distributed solar, but the coal boom is running far ahead of that. The province is developing a total of 170 GW of dispatchable capacity allegedly to “support” some 82 GW of variable renewable energy at the end of 2023,³³ with 50 GW of utility-scale wind and solar in the pipeline according to GEM’s Global [Wind Power](#) and [Solar Power](#) Trackers.

³³ People’s Daily. (11 January 2024). 山东电网风电与光伏装机容量突破8000万千瓦。
http://paper.people.com.cn/rmrb/html/2024-01/11/nw.D110000renmrb_20240111_4-17.htm#:~:text=%E6%88%AA%E8%87%B32023%E5%B9%B412%E6%9C%88,%E7%9C%81%E7%BA%A7%E7%94%B5%E7%BD%91%E7%AC%AC%E4%B8%80%E3%80%82. News Report

Meeting 2025 commitments is possible but requires determined action

It is possible for China to meet the commitments it has made for 2025, including “strictly controlling new coal power”, reducing CO₂ intensity and deriving half of new energy supply from renewable sources. With less than two years to go, meeting the targets does require immediate and determined action, however. The required actions include:

- Continue clean energy and storage deployment: this will achieve commitments on carbon neutrality reduction, non-fossil energy share, contribution of renewable energy to energy consumption growth and controlling coal consumption growth.
- Carry out electricity market reforms to reduce the need for “supporting” coal power.
- Introduce a competitive capacity market mechanism allowing diverse energy projects (including coal, gas, storage, and renewable energy) to vie for capacity payments, possibly with a premium for low-carbon solutions. Abandon blanket payments to all coal power plants regardless of objectively assessed capacity requirements in the grid.
- Strictly enforce the policy of only permitting “supporting” coal power and review permits that have been already granted

About the data

The changes in coal power project status analyzed for this briefing are based on the January 2024 update of Global Energy Monitor's [Global Coal Plant Tracker](#) (GCPT) and the historical 2014–2023 information available upon request. The GCPT is an online database that identifies and maps every known coal-fired generating unit and every new unit proposed since January 1, 2010 (30 MW and larger). The tracker uses footnoted wiki pages to document each plant and is updated biannually, with partial quarterly supplements.

About Global Energy Monitor

Global Energy Monitor (GEM) develops and shares information on energy projects in support of the worldwide movement for clean energy. By studying the evolving international energy landscape, and creating databases, reports, and interactive tools that enhance understanding, GEM seeks to build an open guide to the world's energy system.

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CREA is an independent research organization focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. We use scientific data, research and evidence to support the efforts of governments, companies and campaigning organizations worldwide in their efforts to move towards clean energy and clean air.

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