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Global Energy Monitor

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About CREA

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China puts coal on back burner as renewables soar

Introduction

A new survey of coal power projects in China suggests that massive renewable energy additions may be dampening the country's coal-based development. With new renewable energy build-outs now capable of meeting all incremental power demand in China, the need for new coal is waning, and there are signs the central government may be embracing this change.

Key findings

- Following the accelerated permitting of over 100 gigawatts (GW) of new coal power annually in 2022[1] and 2023[2], China has abruptly curtailed approvals for new coal power plants, approving just twelve projects totaling 9 GW in H1 2024, an 83% decline compared to H1 2023[3].
- New and revived proposals in H1 2024 totaling 37.4 GW are also trending lower than in H1 2023 (60.2 GW) and H1 2022 (47.8 GW), indicating a possible tapering of new project development – although not at the same pace as the permit slowdown.
- Since 2023, China has added over 400 GW of new solar and wind power, driving down China's coal power generation by 7% from June 2023 to June 2024.
- If renewables continue to cut into coal generation then a peak in China's CO2 emissions – pledged to happen before 2030 – is on the horizon, if not already here.

Addressing coal power projects permitted during the 2022-23 frenzy remains a challenge:

- Coal power construction activity in H1 2024 remained robust, with over 41 GW of projects initiated, nearly matching the total for all of 2022, and accounting for more than 90% of the total global new construction activities.

[1]GEM and CREA. (27 February 2023) China permits two new coal power plants per week in 2022 https://energyandcleanair.org/wp/wp-content/uploads/2023/02/CREA_GEM_China-permits-two-new-coal-power-plants-per-week-in-2022.pdf Analysis

[2] GEM and CREA. (22 February 2024) China risks missing multiple climate commitments as coal power approvals continue. https://energyandcleanair.org/wp/wp-content/uploads/2024/02/CREA_GEM_2023H2-coal-power-briefing_China-missing-climate-commitments.pdf Analysis

[3] The 9 GW figure for H1 2024 is based on the best available data at the time of this report. As more comprehensive data becomes available, it is possible that the actual number of permits issued may be slightly higher. Nonetheless, the overall trend of a significant reduction in coal power permits remains clear.

- While just over 8 GW of coal power was commissioned in H1 2024, the government's target of commissioning 80 GW[4] of coal-fired power capacity in 2024 suggests a potential surge in project completions in the second half of the year.

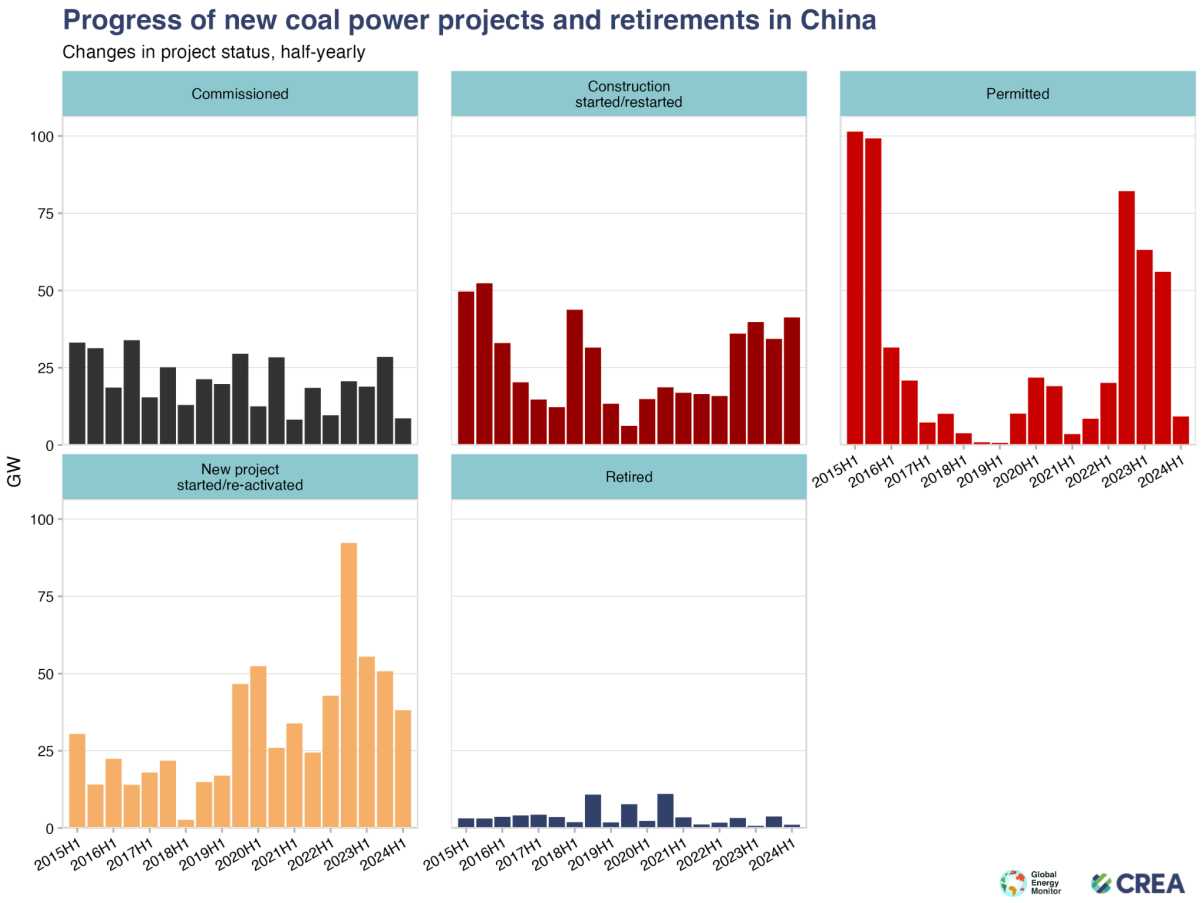

Figure 1 - Progress of new coal power projects and retirements in China

Note: Plants that both obtained permits and started construction in 2023 H1 are included in both categories.

China's new coal power projects, approved in contradiction to the government's stated policy of "strictly limiting" new coal power, pose a risk of overcapacity and wasted investment – particularly as the country's available baseload power capacity (1890 GW) is more than sufficient to meet its estimated peak energy needs (1450 GW), even without

[4] ChinaPower. (7 February 2023) 火电重启加速与设备投资. http://mm.chinapower.com.cn/zx/hyfx/20230207/186798.html Analysis

implementing the low hanging fruit of more flexible grid coordination and renewable power dispatching.

China's coal power industry appears to be undergoing a transformation driven by the rapid development of clean energy. This report examines the reasons behind the slowdown in coal power plant approvals in China, the implications for the country's emissions trajectory, the likelihood of continued coal power development, and the need for more ambitious climate commitments.

Why is the pace of permitting slowing down?

The permitting of coal power in China is slowing down primarily because the rapid development of clean energy is sufficient to meet the country's electricity demand growth. This shift has made clean energy a significant factor in shaping energy and economic policies, prompting changes in central government policy.

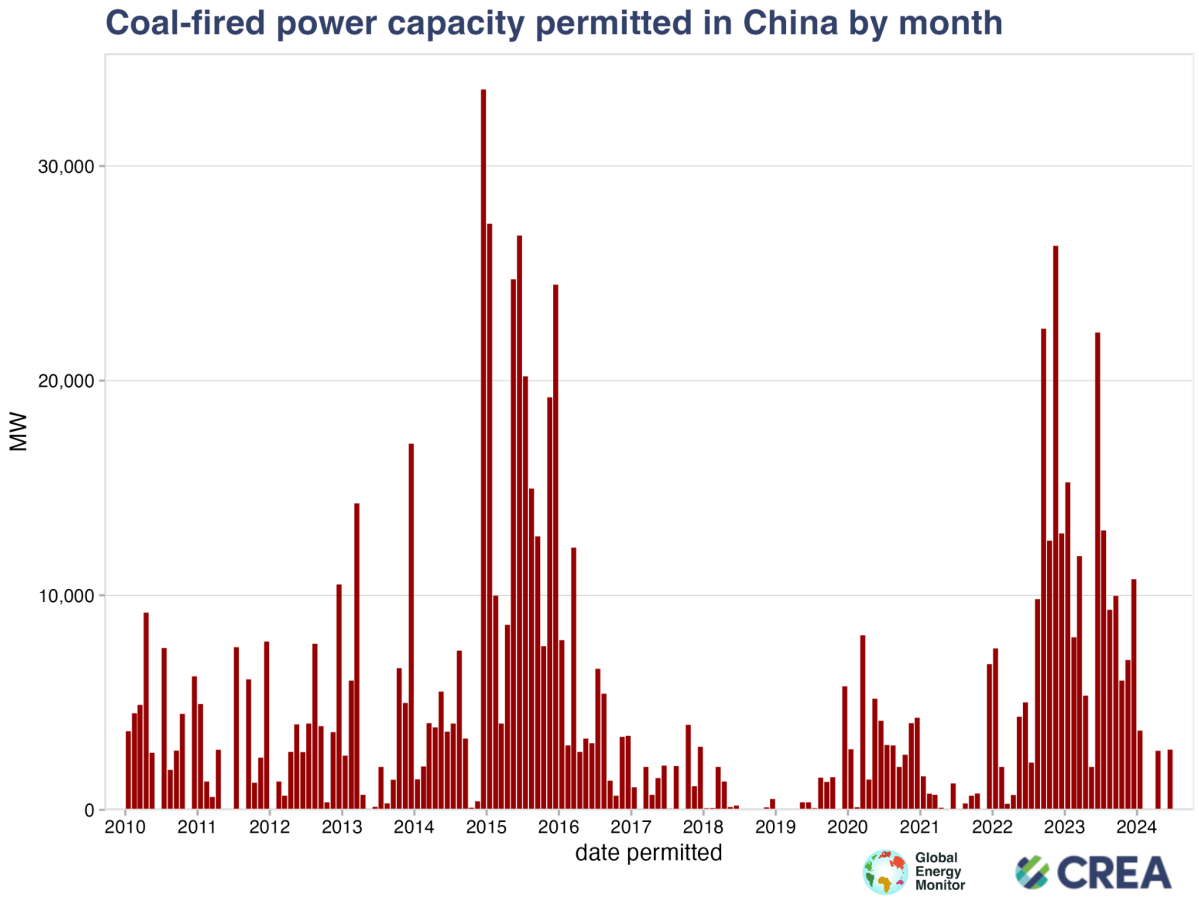

Figure 2 - Coal-fired power capacity permitted in China by month

China's coal power policy has seen many changes in recent years. In April 2021, President Xi Jinping announced[5] that China would 'strictly control coal power projects'. However, just a few months later, China's coal power policy shifted as the coal power installation target for the 14th Five-Year Plan period[6] was increased, demonstrating its role as a 'ballast stone'. From 2022 to 2023, China approved over 200 GW of coal power projects, accounting for more than 70% of the total coal power capacity permitted worldwide during this period, an amount equivalent to the total installed coal power capacity in North America. However, in the first half of 2024, China approved only 9 GW of coal power, a stark contrast to the previous frenzy.

Almost simultaneously, from 2023 to 2024, the development of clean energy in China has been remarkable. In 2023, China added 293 GW of new wind and solar power capacity, nearly equivalent to the total wind and solar capacity combined in the United States by the end of 2023, bringing China's share of renewable energy in its installed capacity to over 50%[7]. This trend continued in the first half of 2024, with China installing 133 GW of solar and wind power. Power generation from the country's newly added clean energy capacity in 2023-2024, coupled with the rebound in hydropower generation, has been sufficient to not only meet but exceed the growth in China's electricity demand. Any new coal plants built risk fighting for declining market share, with coal power generation already down 7% from June 2023 to June 2024.

[5] Chinese government. (22 April 2021) 习近平在"领导人气候峰会"上的讲话 https://www.gov.cn/xinwen/2021-04/22/content_5601526.htm Speech
[6] China Power News. (7 June 2024) "十四五"煤电规划目标能否顺利落地？ https://www.cpnn.com.cn/news/mt/202406/t20240607_1708004.html Analysis
[7] China State Council. (13 January 2024) China drives world renewables capacity addition in 2023 https://english.www.gov.cn/news/202401/13/content_WS65a22a99c6d0868f4e8e30aa.html News

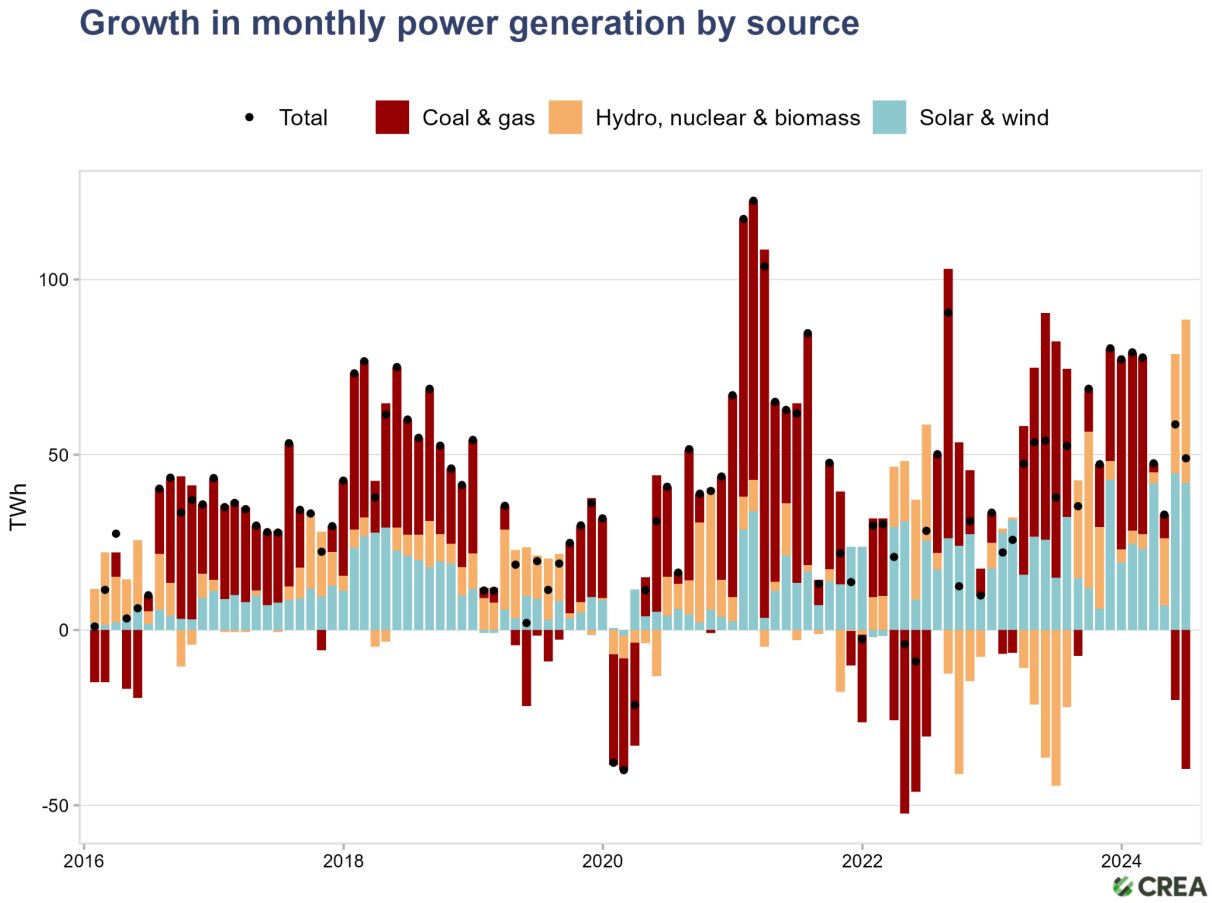

Figure 3 - Growth in monthly power generation of China by source

Driven by the private sector, the clean energy boom has led to a bottom-up shift in central government policy. In 2023, the clean energy sector contributed an estimated 40% of GDP growth[8], while exports of new energy vehicles, lithium batteries, and photovoltaics—the "new three"—increased 30%[9]. This economic powerhouse has transformed clean energy from a climate policy component into a cornerstone of China's broader energy and economic strategies. Reflecting this shift, Xi Jinping's statement has shifted from "holding the rice bowl of energy in our own hands" (i.e. holding on to fossil fuels)[10] to acknowledging that "energy development faces challenges such as rising demand, supply

[8] Carbon Brief. (25 January 2024) Clean energy was top driver of China's economic growth in 2023 https://www.carbonbrief.org/analysis-clean-energy-was-top-driver-of-chinas-economic-growth-in-2023/ Analysis.
[9] Xinhua News. (13 January 2024) 2023年进出口总值达41.76万亿元 中国货物贸易有望保持全球第一 http://www.xinhuanet.com/fortune/20240113/2b52c87aec624c85bc13f7144ced8c0c/c.html News
[10] Bloomberg. (22 October 2021) Xi says China must secure energy supply in "its own hands"https://www.bloomberg.com/news/articles/2021-10-22/xi-says-china-must-secure-energy-supply-in-its-own-hands News

constraints, and green transformation. The solution to these challenges lies in vigorously developing new energy sources."[11]

The apparent shift away from coal is similar to the permitting boom of 2015-2016, after the central government gave provincial governments the authority to permit coal power projects, resulting in nearly 250 GW of new permits. In response, the central government suspended already permitted projects and only allowed many of them to come online in the 2020s, claiming demand for coal-fired power had grown to justify the capacity additions. However, this time there is little space under China's CO2 emission commitments for coal-fired power generation to grow. The National Development and Reform Commission's (NDRC) Mid-term Evaluation Report[12] of the 14th Five-Year Plan highlighted a lag in achieving the binding targets for reducing energy and carbon dioxide emissions per unit of GDP. While a subsequent modification to the energy intensity metric may ease pressures in this area, meeting the carbon emission intensity target remains a significant challenge. To achieve this goal, an annual emission reduction of 7% is necessary during the 2024-2025 period. The continued construction of coal power plants and their increased power generation will undermine China's efforts to achieve the goal.

In July 2024, the 20th Central Committee of the Communist Party of China released the communiqué[13] of its Third Plenary Session, which mentioned "carbon reduction" for the first time. This mention highlights China's commitment to addressing carbon emission issues as part of its development strategy. Concurrently, China's 2024-2025 energy saving and emission reduction plan[14] underscores a renewed emphasis on controlling emissions and meeting climate targets. The permitting of new coal-based steelmaking has been suspended[15], and the approval rate for new coal power plants has significantly declined, indicating a broader shift in central government policy.

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[11] China Daily. (2 March 2024) Xi highlights key role of new energy https://www.chinadaily.com.cn/a/202403/02/WS65e261d7a31082fc043ba21a.html News

[12] National Development and Reform Commission. (27 December 2023)《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年远景目标纲要》实施中期评估报告 https://www.ndrc.gov.cn/fzggw/wld/zsj/zyhd/202312/t20231227_1362958.html Report

[13] Xinhua News Agency. (18 July 2024) CPC Central Committee adopts resolution on further deepening reform comprehensively https://english.www.gov.cn/news/202407/18/content_WS6698d829c6d0868f4e8e93d1.html News report

[14] State Council. (29 May 2024) 2024-2025年节能降碳行动方案 https://www.gov.cn/zhengce/content/202405/content_6954322.htm Action Plan

[15] CREA. (11 July 2024) Turning point: China permitted no new-coal based steel projects in H1 2024 as policies drive decarbonisation https://energyandcleanair.org/publication/turning-point-china-permitted-no-new-coal-based-steel-projects-in-h1-2024-as-policies-drive-decarbonisation/

What do the new developments mean for China's emission trajectory?

The slowdown in coal power approvals in China reflects a strategic pivot towards prioritizing emission reductions and accelerating the deployment of clean energy. By limiting new coal power projects and focusing on grid reforms, energy storage, and other clean solutions, China can set the stage for significant emission reductions. However, the transition is challenged by the need to phase down the existing massive coal power fleet and address the interests of coal power groups as it is necessary to accelerate retirements and cancel previously permitted projects to meet long-term emission targets.

In July 2024, an action plan[16] for the low-carbon transformation of coal power was released, setting the carbon emissions targets from electricity generated using gas as the benchmark for the coal power sector. This benchmark will allegedly be met by mixing coal with either green ammonia or biomass and by employing carbon capture, utilization, and storage (CCUS) technologies. The action plan, along with the subsequent *Work Plan for Accelerating the Establishment of a Dual Carbon Emission Control System*[17], mark China's shift from focusing primarily on energy efficiency to prioritizing carbon emissions reduction. While it is logical to reduce emissions from coal plants that will remain operational for a significant period through these technical means, the primary solution for reducing emissions and achieving carbon neutrality must be to shift away from coal altogether – particularly since biomass, ammonia, and CCUS have yet to deliver emission reductions at the scale necessary for decarbonization.

The significant number of coal power approvals from 2022 to 2023 followed widespread droughts in 2021-2022, which led to a decline in hydropower generation and caused power shortages during peak summer demand. The central government then believed that coal power was necessary to guarantee energy security. However, China already has sufficient dispatchable capacity to meet its energy needs. In 2024, China's peak electricity demand during the summer will require an estimated 1,450 GW of dispatchable generation[18]. Yet the country's installed thermal power capacity has already reached 1,405 GW, in addition to 427 GW of hydropower and 58 GW of nuclear power, bringing the total dispatchable

[16] National Development and Reform Commission. (24 June 2024) 煤电低碳化改造建设行动方案（2024-2027年）https://www.ndrc.gov.cn/xwdt/tzgg/202407/P020240715559357737744.pdf Action Plan
[17] China State Council. (30 July 2024)加快构建碳排放双控制度体系工作方案 https://www.gov.cn/zhengce/content/202408/content_6966079.htm Work Plan
[18] Beijixing News. (25 July 2024) 中电联预计2024年最高用电负荷增加1亿千瓦 https://m.bjx.com.cn/mnews/20240725/1391072.shtml News

generation capacity to 1,890 GW[19]—exceeding peak power demand by 30%. Furthermore, China has an additional 713 GW of solar power and 466 GW of wind power, which significantly contribute to the total power generation. Effective grid coordination and dispatching could ensure a secure power supply with a dispatchable generation capacity exceeding peak demand by an additional 15%. Therefore, if China can effectively enhance grid flexibility, accelerate spot pricing, and promote other related grid reforms, it can ensure energy security even under extreme weather conditions and truly shift coal plants to a supporting role.

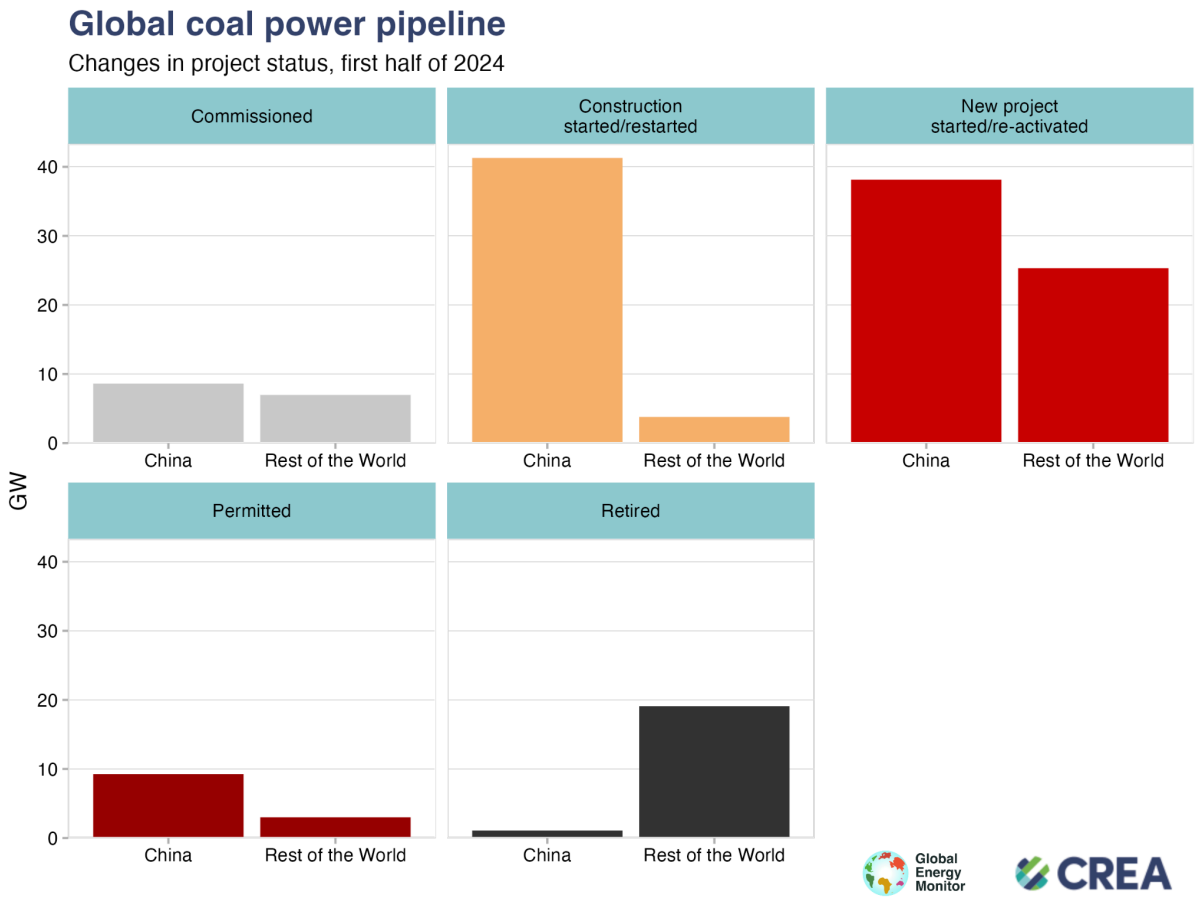

Figure 4 - Global coal power pipeline

[19] National Energy Administration. (20 July 2024) 国家能源局发布2024年1-6月份全国电力工业统计数据 https://www.nea.gov.cn/2024-07/20/c_1310782235.htm News

Will China continue to build coal power?

Given China's strategic shift towards reducing carbon emissions and the rapid development of clean energy, the country is unlikely to witness another surge in coal power approvals similar to that of 2022-2023. Nevertheless, China's technical plans to reduce carbon emissions from coal power and the insistence on coal as a baseload power source indicate that coal power will continue to play a significant role in the near-term energy landscape. The third plenary session continues to highlight the 'efficient and clean utilization of coal'. Vested interest groups will likely advocate for the prolonged retention of coal power within the energy system.

In the first half of 2024, a significant proportion of newly proposed energy projects were concentrated in large-scale clean energy bases situated in northwestern and northeastern China. During the coal power approval surge over the past two years, a similar trend was observed with the growth of wind and solar power generation accompanied by continued reliance on coal power in provincial energy plans. Even within carbon peak pilot cities' plans[20], such as Yancheng and Zhangjiakou, coal power is considered a key construction project to ensure energy security.

[20] Beijixing News. (5 July 2024) 9各地区出台碳达峰试点方案！提出哪些能源电力重点任务？ https://m.bjx.com.cn/mnews/20240705/1387311.shtml News

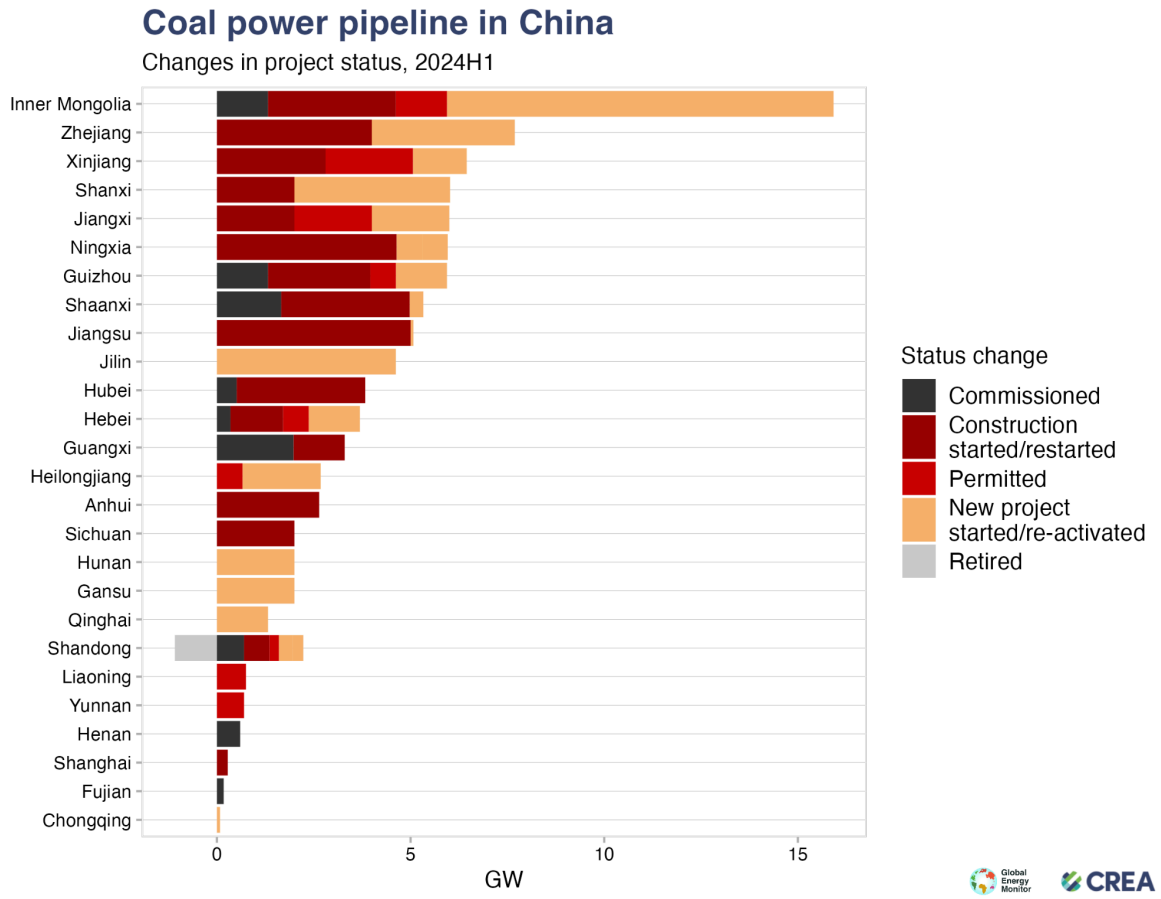

Figure 5 - Coal power pipeline in China

However, the policy[21] promoting the utilization of clean energy, introduced in June of this year, marked a potential turning point. This policy prioritizes investments in grid construction and reform, notably omitting any mention of constructing bundled supporting power sources, which traditionally included coal power plants. Instead, the policy emphasizes the need to evaluate the effectiveness of retrofitting existing coal-fired power units for greater flexibility and the regulatory performance of energy storage facilities. A report by the People's Daily[22] suggests that the combined cost of energy storage and renewable energy generation has the potential to decrease below 0.3 yuan per kilowatt-hour, making it a more competitive option compared to coal power. The cost of

[21] National Energy Administration. (28 May 2024) 关于做好新能源消纳工作 保障新能源高质量发展的通知 https://zfxxgk.nea.gov.cn/2024-05/28/c_1310777105.htm Policy
[22] People's Daily. (22 May 2024) 新型储能产业发展步伐加快 http://paper.people.com.cn/rmrb/images/2024-05/22/18/rmrb2024052218.pdf News

coal power, including peak-shaving retrofit[23] and fuel costs[24] alone, is approximately 0.31-0.36 yuan per kilowatt-hour, excluding other operational expenses. Due to the high cost of CCUS and green ammonia, and limited biomass supply, the latest coal-power low-carbon transformation action plan will only increase the retrofit cost further.

In the first half of 2024, the reduced demand for coal power generation directly led to a decline in domestic coal production[25]. Since last year, domestic coal miners have been actively seeking cooperation with power companies to ensure a stable demand for their coal production. The long-term coal purchase agreements organized by the NDRC in 2022 and 2023 aimed to ensure that coal power plants could secure sufficient fuel. However, this year's agreements have relaxed the compliance requirements for coal miners[26]. To maintain their market share, coal miners have begun acquiring and investing in coal power plants and renewable power projects to develop integrated coal power projects and boost coal demand[27]. This trend is most evident among central state-owned enterprises such as China National Coal Group (China Coal)[28] and local energy groups with coal resources like Shaanxi Coal and Chemical Industry Group (Shaanxi Coal)[29]. In addition, China's five major power generation groups all possess large-scale coal production capacities. Although these state-owned companies primarily focus on clean energy in their development strategies, their coal resources make coal power an indispensable part of their interests.

More ambitious goal is needed for China's climate commitment

While China has made strides in renewable energy development, its current climate commitments, which have been rated as "highly insufficient" by Climate Action Tracker[30],

[23] Wallstreet CN. (23 November 2023) 煤电容量电价来了，未来电价是涨还是跌？ https://wallstreetcn.com/articles/3702669 Analysis
[24] Beijixing News. (11 May 2024) 1度煤电，燃料成本多少？ https://m.bjx.com.cn/mnews/20240511/1376239.shtml Analysis
[25] National Bureau of Statistics. (15 July 2024) 2024年6月份能源生产情况 https://www.stats.gov.cn/sj/zxfb/202407/t20240715_1955612.html
[26] Caixin News. (6 December 2023) 2024年电煤中长期合同启动签约 供应充足长协比例下降 https://companies.caixin.com/2023-12-06/102143352.html
[27] CITIC Securities. (17 July 2024) 煤电一体化已经从防风险手段演化为企业成长手段 https://finance.eastmoney.com/a/202407173132775211.html Analysis
[28] Beijixing News. (12 April 2024) 干翻五大发电？中煤集团明确这一战略！ https://m.bjx.com.cn/mnews/20240412/1371223.shtml News
[29] CNWEST News. (21 January 2024) 陕煤集团2023年成绩单继续领跑陕西国资 http://m.cnwest.com/sqkb/a/2024/01/21/22264769.html News
[30] Climate Action Tracker. (22 November 2023) China Overall Rating https://climateactiontracker.org/countries/china/

fall short of aligning with the Paris Agreement. To mitigate the global climate crisis, China's upcoming Nationally Determined Contributions (NDCs) and 15th Five-Year Plan must include ambitious targets for both coal consumption reduction and renewable energy expansion.

China is responsible for 30% of the world's yearly greenhouse gas emissions and has contributed to 90% of the increase in CO2 emissions since the Paris Agreement was implemented in 2015[31]. Between 2021 and 2023, the country's emissions growth sped up[32]. Consequently, achieving a peak and subsequent reduction in China's emissions is crucial for aligning global emissions with the targets set by the Paris Agreement.

However, although China's recent policy announcements demonstrate a certain level of commitment to carbon reduction and green development, the current energy policy still permits the growth of fossil fuels and carbon emissions. National Energy Administration director Zhang Jianhua stated that from 2026 to 2030, clean energy should cover 70% of the increase in energy consumption[33]. This target implies that 30% of the energy consumption growth will still rely on fossil fuels, leading to continued increases in carbon dioxide emissions.

If China maintains the trend of increasing renewable power capacity observed in 2023-H1 2024, it will lead to a 20% reduction in coal power generation and a 35% reduction in overall coal consumption by 2035[34]. To support this, China should integrate specific coal consumption reduction targets and new renewable energy targets into its updated NDCs and the forthcoming 15th Five-Year Plan, providing industry certainty and complementing emission reduction goals.

Policy recommendations

China appears to be moving away from new coal permits, and is making impressive strides in its clean energy development. Yet as this briefing outlines, these developments are not

[31] Global Carbon Atlas. (2022) https://globalcarbonatlas.org/emissions/carbon-emissions/ Data
[32] Carbon Brief. (13 November 2023) China's emission set to fall in 2024 after record growth in clean energy https://www.carbonbrief.org/analysis-chinas-emissions-set-to-fall-in-2024-after-record-growth-in-clean-energy/ Analysis
[33] NEA. (23 February 2024) 加快构建清洁低碳、安全高效的能源体系 https://www.nea.gov.cn/2024-02/23/c_1310765179.htm
[34]Dialogue Earth. (13 June 2024) China's 2035 targets can be a climate breakthrough https://dialogue.earth/en/climate/chinas-2035-targets-can-be-a-climate-breakthrough/ Analysis

enough to ensure a transition away from coal at the scale and speed required to meet the country's climate commitments.

To help China peak emissions and avoid a costly build-up of new coal plants, our analysis proposes the following policy recommendations.

- Limit the construction of new coal power plants; speed up retirements, cancel projects that were already permitted in violation of policy.
- Stop organizing the signing and fulfillment of medium- to long-term coal purchase agreements between coal miners and coal power plants.
- Prioritize grid reform, energy storage solutions, and other clean technologies to pave the way for significant emission reductions. Expediting the development of a robust spot market can further optimize China's power grid, allowing the integration of more renewable energy sources.
- Support the rapid and continuous expansion of clean energy generation to accelerate the transition towards a low-carbon energy future.
- Establish ambitious and measurable coal consumption reduction targets and new renewable energy expansion targets in China's next Nationally Determined Contributions (NDCs) and 15th Five-Year Plan.

About the data

The changes in coal power project status analyzed for this briefing are based on the July 2024 update of Global Energy Monitor's Global Coal Plant Tracker (GCPT) and the historical 2014–2024 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 1 January 2010 (30 MW and larger). The tracker uses footnoted wiki pages to document each plant and is updated biannually, with partial quarterly supplements.