When coal won't step aside: The challenge of scaling clean energy in China

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New coal power projects in China in 2024

CREA
Centre for Research on Energy and Clean Air

Global Energy Monitor

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Authors
Qi Qin, CREA; Christine Shearer, GEM

Contributors
Belinda Schaepe, CREA; Xing Zhang, GEM; Mingxin Zhang, GEM

Data scientists
Lauri Myllyvirta, CREA; Hubert Thieriot, CREA

Designer
Wendi Wu

About CREA

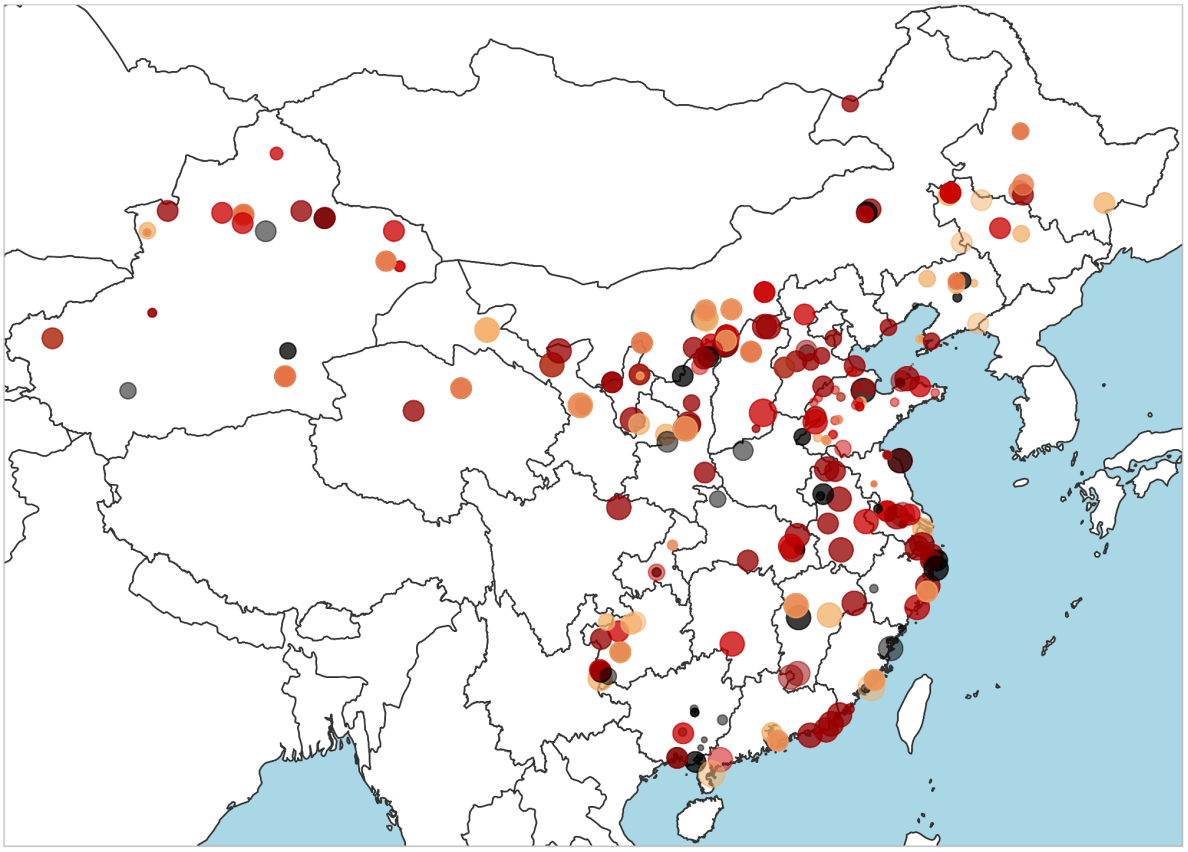
The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. CREA uses scientific data, research, and evidence to support the efforts of governments, companies, and campaigning organisations worldwide in their efforts to move towards clean energy and clean air, believing that effective research and communication are the keys to successful policies, investment decisions, and advocacy efforts. CREA was founded in Helsinki and has staff in several Asian and European countries.

About Global Energy Monitor

Global Energy Monitor (GEM) develops and shares information 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.

When coal won't step aside: The challenge of scaling clean energy in China

New coal power projects in China in 2024



Introduction

China approved 66.7 gigawatts (GW) of new coal-fired power capacity in 2024, with approvals picking up in the second half after a slower start to the year[1]. At the same time, 94.5 GW of new coal power projects started construction and 3.3 GW of suspended projects resumed construction in 2024, the highest level since 2015, signalling a substantial number of new plants will come online in the next 2-3 years, further solidifying coal's role in the power system.

While the clean energy sector has maintained rapid growth in recent years, emerging as a key driver of economic expansion in 2023–2024[2], the simultaneous large-scale expansion of coal power creates a conflicting dynamic. In 2024, China added 356 GW of wind and solar capacity – 4.5 times the EU's additions and nearly equivalent to the total installed wind and solar capacity in the U.S. by the end of the year. This record-breaking expansion highlights China's leadership in renewables, yet instead of replacing coal, clean energy is being layered on top of an entrenched reliance on fossil fuels.

This reality makes it increasingly difficult to achieve the principle of 'establish before breaking' which envisions scaling up clean energy before gradually phasing down fossil fuels. Although renewable powers have been deployed at an unprecedented pace, coal power has remained firmly in place, often limiting renewables integration and full utilisation. As a result, China's energy strategy increasingly resembles 'energy addition', rather than a fundamental shift toward clean energy and away from coal. This dual-track expansion raises critical questions about how effectively renewables can reshape the power system while coal power maintains its foothold.

Key findings

- **Coal power permits and new project activity remain high despite some signs of slowing.** In 2024, 66.7 GW of new coal power capacity was permitted – lower than previous years but still well above the levels seen in the first half of the year.

[1] GEM and CREA (22 August 2024) China puts coal on back burner as renewables soar https://energyandcleanair.org/publication/china-puts-coal-on-back-burner-as-renewables-soar/ Analysis.
[2] 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.

Meanwhile, new and revived coal power proposals totalled 68.9 GW, down from 117 GW in 2023 and 146 GW in 2022, suggesting a potential cooling in project initiation.

- **Coal power construction starts reached their highest level since 2015.** 94.5 GW of new coal capacity began construction, the most since 2015, highlighting continued momentum in project development despite President Xi Jinping's pledge in 2021 to 'strictly control coal power projects'. However, actual commissioning has slowed, with 30.5 GW coming online so far, down from 49.8 GW last year but in line with 2021 and 2022 levels.
- **China's coal power expansion contrasts with global trends.** While China continues to add new capacity, the global coal fleet outside China shrank by 9.2 GW in 2024, reinforcing China's dominant role in shaping the future of coal power. China now accounts for 93% of global construction starts for coal power in 2024.

Coal and clean energy are increasingly competing for space in China's power system. In the fourth quarter of 2024, despite slowing electricity demand growth, fossil fuel generation remained high, while solar and wind utilisation dropped sharply. The record decline in solar output and the unexpected drop in wind utilisation was not explained by weather conditions, indicating rising curtailment – much of which may be unreported.

- **Long-term coal power contracts are reinforcing coal's dominance at the expense of renewables.** Electricity buyers locked into long-term coal power contracts face penalties if they fail to purchase contracted volumes, discouraging them from prioritising clean energy. With new coal capacity coming online, guaranteed operating hours under pre-signed agreements further limit grid space for renewables, delaying the transition to a cleaner energy mix.
- **Coal mining companies are playing a dominant role in financing new coal power projects.** In 2024, more than **75% of newly approved coal power capacity** was backed by coal mining companies or energy groups with coal mining operations, artificially driving up coal demand even when market fundamentals do not justify it. This not only reinforces reliance on coal but also risks undermining central government policy targets for curbing coal consumption and accelerating the energy transition.
- **Despite policy intentions for coal power to support renewable integration, 2024 approvals show a shift away from this role**, with many projects justified by local governments based on economic development and local energy security instead. While some policies promote coal power flexibility retrofits, **long-term contracts and the inherent limitations of coal plants regarding low-load**

operation and intra-day cycling discourage coal plants from performing a true regulating function.

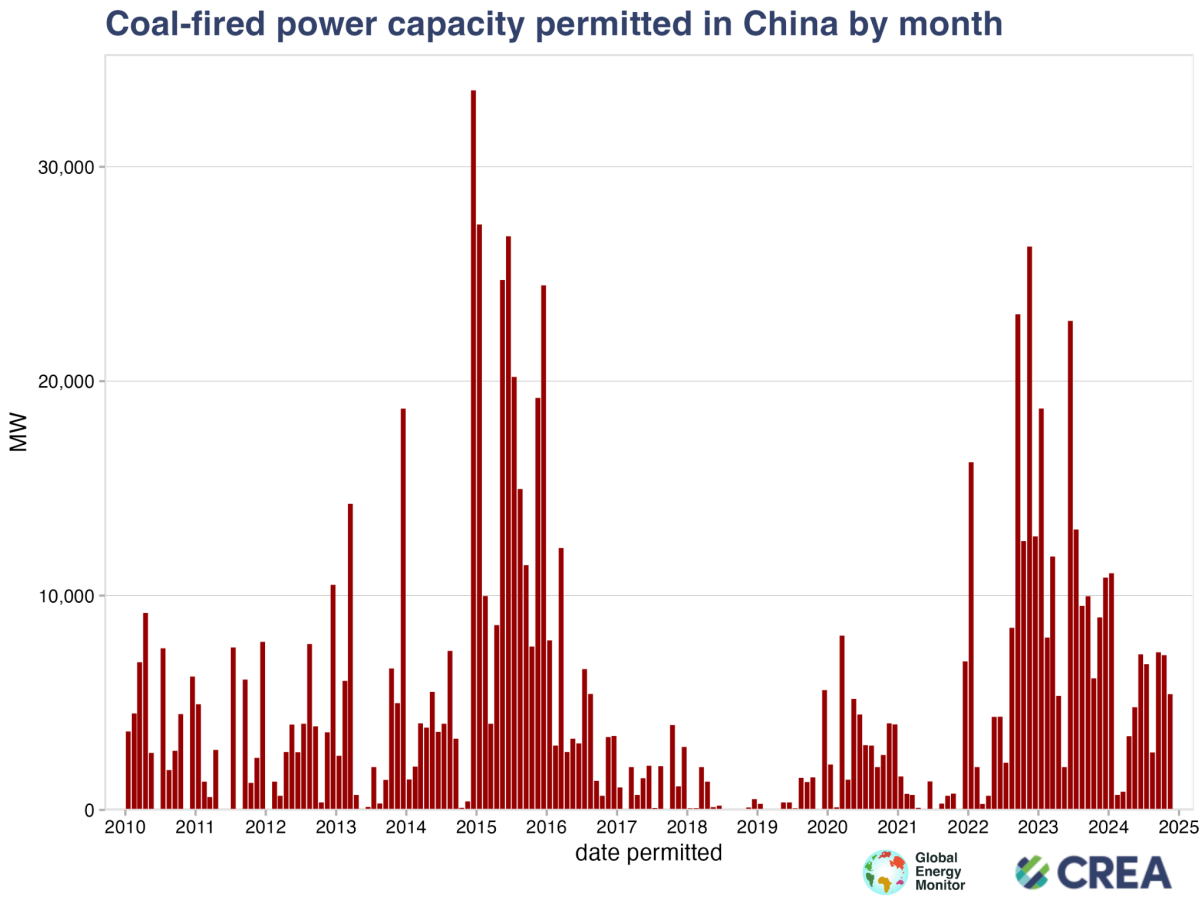


Figure 1 – Coal-fired power capacity permitted in China by month

These trends stand in direct conflict with President Xi's 2021 pledge[3] and the targets outlined in China's *2030 Carbon Peaking Action Plan*[4], a key policy framework that serves as the top-level design for achieving the country's carbon peaking and neutrality goals. The plan explicitly calls for strictly limiting the increase in coal consumption during the 14th Five-Year Plan period and gradually reducing it during the 15th Five-Year Plan period, with a clear mandate to strictly limit new coal power projects.

Looking ahead, the policy direction set in China's updated climate targets for 2035 under the Paris Agreement and the upcoming 15th Five-Year Plan will be critical to determining

[3] Xinhua (2021) 共同构建人与自然生命共同体——在领导人气候峰会上的讲话 http://www.xinhuanet.com/politics/leaders/2021-04/22/c_1127363132.htm News
[4] State Council. (2021). The Action Plan for Carbon Peaking Before 2030 https://www.gov.cn/zhengce/content/2021-10/26/content_5644984.htm Policy.

the trajectory of China's coal power sector and with that, its emissions trajectory. To implement President Xi's pledge to phase down coal consumption in the coming five years, China's coal power and coal mining sector will have to urgently change gears and enable the country to fully capitalise on its renewables boom.

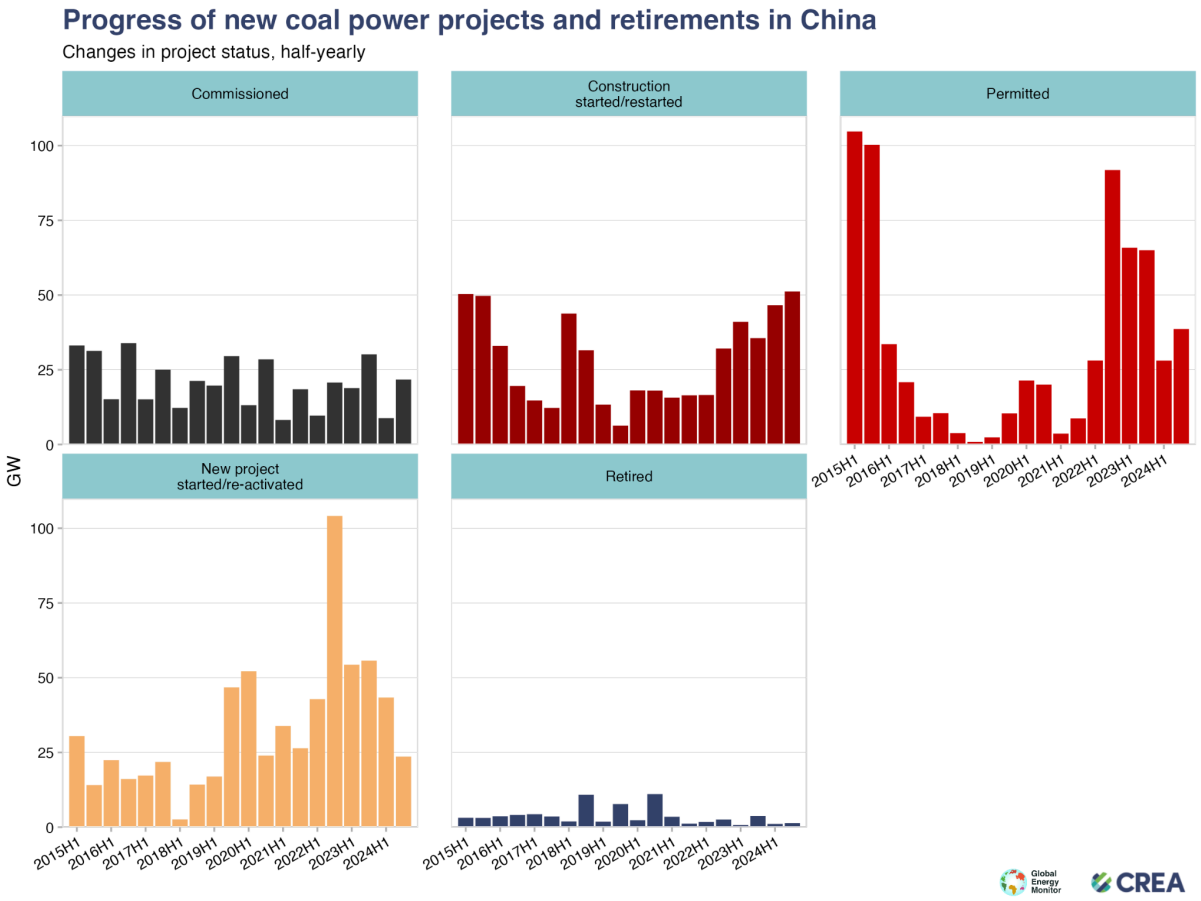


Figure 2 – Progress of new coal power projects and retirements in China

Note: In 2024, 66.7 GW of new coal power capacity was permitted, a decline from previous years but still above the subdued pace seen earlier in the year. New and revived coal power proposals totaled 68.9 GW, down from 117 GW in 2023 and 146 GW in 2022, indicating a potential slowdown in project initiation. Meanwhile, construction started on 94.5 GW of new coal capacity—the highest since 2015—suggesting continued momentum in project development. However, the pace of new coal plants entering operation has been more moderate, with 30.5 GW commissioned so far in 2024, down from 49.8 GW last year but in line with 2021 and 2022 levels. Plants that both obtained permits and started construction in H2 2024 are included in both categories.

Clean energy growth overshadowed by coal power commitments

From March to December 2024, following the end of COVID-19's lingering impact in early 2023, China's clean energy growth fully covered the country's electricity demand growth, helping stabilise CO_2 emissions[5]. Yet, commitments to coal power continued to overshadow clean energy progress, exposing fundamental challenges in China's energy transition. Even as electricity demand growth slowed in the final quarter of 2024, fossil fuel generation – particularly coal – remained high, driven by significant curtailment of solar and wind capacity. Based on installed capacity and utilisation hours, solar power generation in 2024 was expected to reach 882.3 TWh, yet annual generation announced by NEA was only 834.1 TWh[6] – a shortfall of 48.2 TWh. This implies an actual curtailment rate of 5.47%, compared to the official figure of 3.2%. The discrepancy suggests that curtailment was more severe than reported, reinforcing concerns that structural constraints, rather than resource availability, are limiting renewable energy integration. Meanwhile, long-term power purchase agreements (PPAs) favouring coal power entrenched its dominance, leading to regional oversupply and limiting the use of low-cost clean energy. With guaranteed operating hours for coal plants under these agreements, clean electricity faced mounting obstacles, underscoring a growing tension between China's renewable energy expansion and its ongoing reliance on coal.

This tension was particularly evident in November 2024[7], when favourable weather provided ideal conditions for solar and wind power generation to meet all power demand growth. Despite this, coal power provided nearly 40% of the month's increase in total electricity generation. While official curtailment rates for solar and wind were low, their utilisation hours declined significantly. This phenomenon was not due to weather or technical constraints but rather the need to fulfil long-term PPAs for coal power signed earlier in the previous year, many of which required completion by 2024 year-end. These agreements not only distorted the electricity market by prioritising coal but also created artificial barriers to clean energy utilisation, amplifying inefficiencies in China's power system.

[5] Carbon Brief (2025). Record surge of clean energy in 2024 halts China's CO2 rise. https://www.carbonbrief.org/analysis-record-surge-of-clean-energy-in-2024-halts-chinas-co2-rise/ Analysis.
[6] Nationalee (2025). 国家能源局发布2024年可再生能源并网运行情况. https://www.nationalee.com/newsinfo/7995235.html News.
[7] 北极星(2024) 31省份2024年度发电量数据出炉！火电/水电/核电/风电/光伏增长几何？ https://news.bjx.com.cn/html/20250122/1424060.shtml

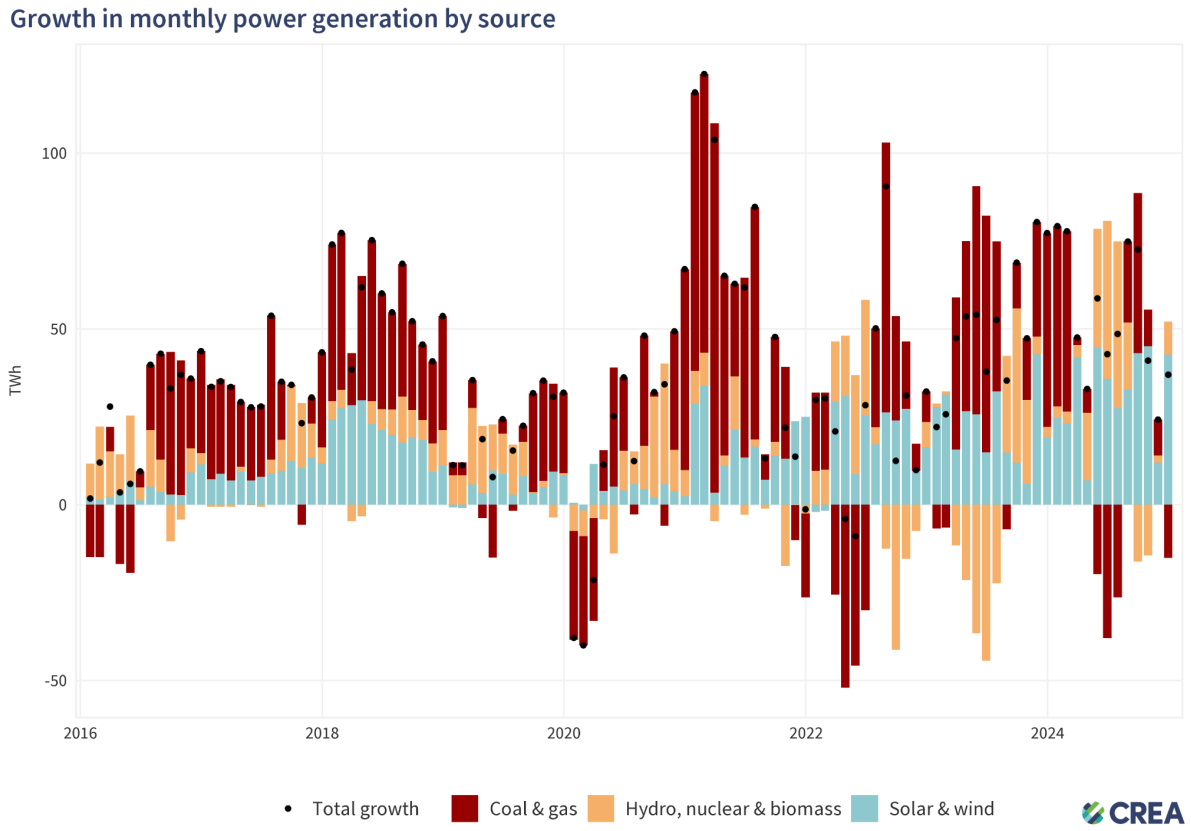


Figure 3 – Growth in monthly power generation of China by source

Since 2020, long-term PPAs have required coal power plants to secure contracts covering at least 80% of their projected annual output, effectively guaranteeing baseline utilisation rates[8]. As a result, electricity buyers are compelled to fulfil their coal power obligations under these agreements, even when cleaner and cheaper energy options like solar and wind are available. This dynamic has led to the unnecessary curtailment of solar and wind power, as buyers prioritise meeting their contracted coal power volumes to avoid breaching agreements. In regions like Sichuan, this has directly reduced clean energy utilisation, further entrenching coal's dominance and undermining the competitiveness of renewables[9].

The growing reliance on long-term PPAs has also fueled the construction of new coal power plants. Nearly all new coal plants secure purchase agreements before becoming

[8] National Development and Reform Commission. (2019). 关于做好2020年电力中长期合同签订工作的通知. https://www.ndrc.gov.cn/xxgk/zcfb/tz/201912/t20191230_1216857.html Policy.
[9] Caixin. (2024).电力保供和成本疏导陷两难 四川外购高价电结算引争议 https://companies.caixin.com/2024-12-30/102273704.html News.

operational, ensuring a guaranteed market for their output[10]. Once operational, these plants prioritise meeting contractual commitments, even when electricity demand is weak, further displacing clean energy generation. The oversupply of coal power is aided by low closures, with just 2.5 GW retired in China in 2024.

The simultaneous expansion of coal and clean energy capacity in the past few years has created a significant regional oversupply of coal power, particularly in provinces where electricity demand growth has slowed. Guangdong is a clear example of this dynamic. As the province with the most coal power permits during the 14th Five-Year Plan period[11] and the largest capacity additions from 2022 to 2024[12], Guangdong struggled to meet its coal power long-term PPAs in 2024[13]. From January to September, 43 billion kWh of contracted coal power went unsold, prompting multiple coal power companies to petition the local government to 'ensure stability in annual long-term transactions'.

Falling coal prices have made it even harder to fulfil long-term PPAs. When coal power prices in the spot market fall below long-term contract prices, electricity buyers are less willing to commit to high-percentage long-term PPAs, opting instead for the cheaper and more flexible spot market. Despite this, most local governments have not reduced the required proportion of coal power in long-term PPAs. Instead, they have adjusted by lowering contract prices to ensure these agreements remain in place.[14] This continued policy support reinforces coal's role in the power system, limiting opportunities for renewables to expand their share.

Additionally, in 2024, the National Development and Reform Council's (NDRC) capacity payment mechanism came into effect, offering a guaranteed annual payment for coal plants per megawatt of available capacity regardless of how many hours a generation unit operates. While the plan helps ensure coal plants are available when needed, in effect, the criteria for inclusion under the plan for coal plants is loose while alternatives like batteries and flexible demand do not qualify, further risking the build out of excess coal power. Also, issuing capacity payments universally rather than concentrating on those large, modern,

[10] Guangxi Energy Bureau. (2024). 广西壮族自治区能源局 国家能源局南方监管局关于2025年广西电力市场化交易工作有关事项的通知 http://fgw.gxzf.gov.cn/zfxxgkzl/wjzx/tzgg/t19450555.shtml Policy.
[11] Energy Magazine (2024). 电力长协降价，低电价周期来了？ https://mp.weixin.qq.com/s/ICwsHL0eFnnti0Hwnz8Wiw Analysis
[12] TF Securities (2024).火电核准窗口期已过 开工与投产规模仍然可观 https://finance.sina.com.cn/stock/hkstock/ggscyd/2024-11-09/doc-incvnnvh2618337.shtml Analysis.
[13] 21st Century Business Herald (2024). 广东省内11家发电公司发函建言：设置年度交易电量比例限制 优化月度供需比机制 https://www.21jingji.com/article/20241031/herald/810132940eba697e5400185b27ba4444.html News.
[14] Sxcoal (2025). 长协电价普遍下行2025年获奖持续走低 https://m.sxcoal.com/news/detail/18765429125605785 62 Analysis

high-efficiency, low-emission plants may delay the retirement of small, old, low-efficiency, high-emission plants.

Coal mining companies deepen investments in coal power

Coal mining companies have become significant investors in coal power projects, reinforcing coal consumption and hindering progress in the energy transition. In 2024, more than 75% of newly approved coal power projects were financed by coal mining companies or energy groups with coal mining operations, ensuring a steady demand for their coal production. This dynamic is further supported by long-term coal supply agreements facilitated by the NDRC, which require coal mines to allocate the majority of their output to coal power. While most large, state-owned energy groups have expanded their investments in renewables, their dependence on coal as a stable and secure market remains a priority, increasing coal demand and jeopardising the country's goal to limit coal consumption through 2025.

As China moves closer to its 2030 carbon peaking target, coal mining companies are increasingly expanding downstream into coal power and coal-to-chemical industries to secure stable demand for their output through 2030 and beyond. In 2024, approximately 30% of newly approved coal power capacities were integrated coal mine-to-power or pithead plants, while another 45% were financed by energy groups with substantial coal mining operations.

China Coal Group, the largest state-owned coal mining company, has emphasised the importance of integrating coal mines with coal power at its 2024[15] and 2025[16] annual company conferences, framing this approach as a strategy to maintain coal's strategic role in the energy system. The group has also promoted combining coal power with renewable energy, presenting it as an innovative model. However, these strategies primarily aim to secure a consistent market for coal production, further entrenching coal's position in the energy mix.

This approach is not unique to China Coal Group. Several regional coal and energy companies have similarly intensified their investments in coal power, aligning their

[15] China Coal (2024). 中国中煤召开2024年工作会议暨职工代表大会、安全工作会议 https://www.chinacoal.com/col75/art/2024/art_75_786645.html News
[16] China Coal (2025). 中国中煤召开2025年工作会议暨职工代表大会、安全工作会议 https://www.chinacoal.com/col/col31/art/2025/art_717690217.html News

strategies to sustain coal's dominance at the provincial level[17]. In 2024, provinces with the most active coal power pipelines, including Xinjiang, Inner Mongolia, Shaanxi, and Gansu, also ranked among China's top coal-producing regions. This close alignment between coal power expansion and coal resource distribution underscores the deeply entrenched role of coal in both provincial and national energy systems.

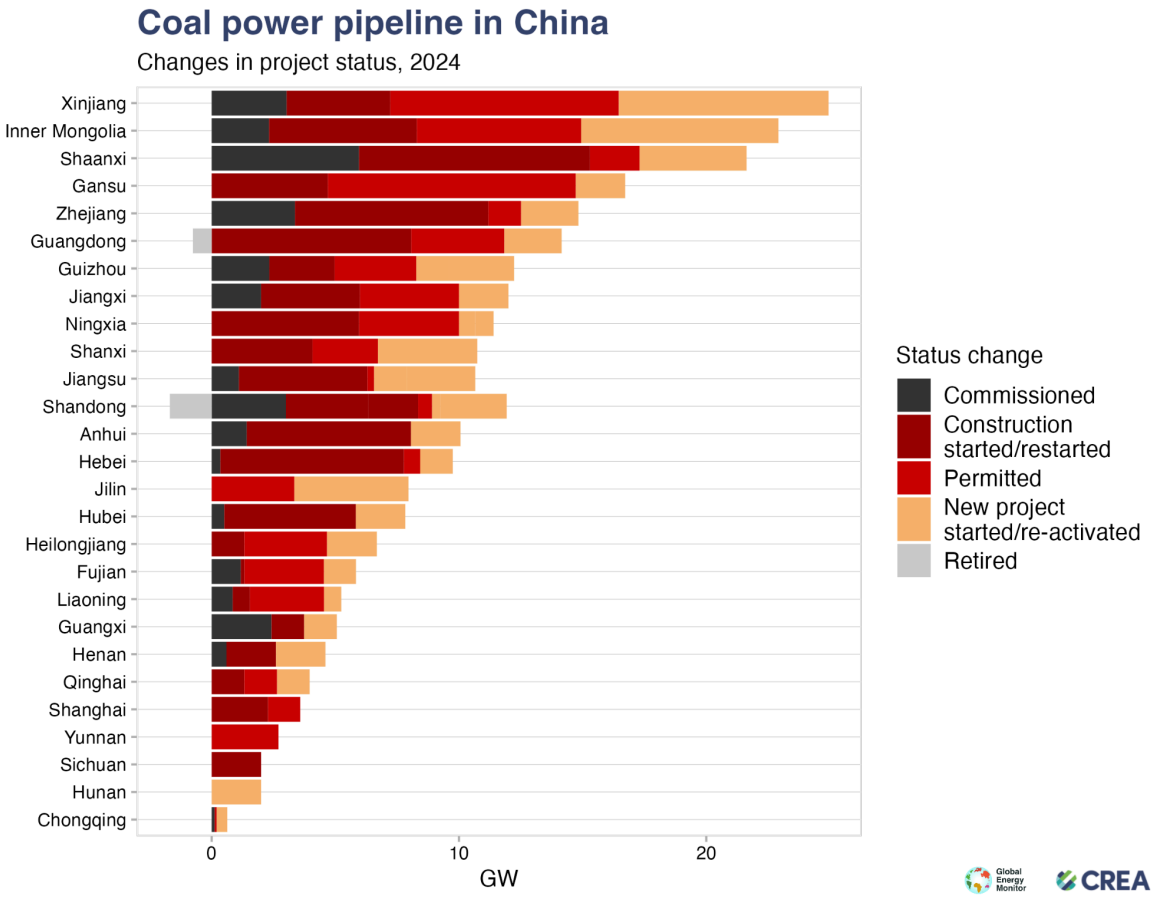


Figure 4 – Coal power pipeline in China

Beyond coal mining companies, large state-owned energy groups also reflect a similar pattern of dependence on integrated operations. For instance, the State Energy Group sourced 72% of its thermal coal consumption from its own mines in 2023, ensuring stable demand within its network[18]. While these groups have made significant investments in wind and solar, coal remains at the core of their operations, often justified as essential for

[17] BJX (2024) "煤电一体化"新巨头将诞生 https://m.bjx.com.cn/mnews/20241210/1415894.shtml News.
[18] China Energy Observation (2024) 煤电协同运营发展策略与应用模式研究 https://mp.weixin.qq.com/s/Jq_YMZr3e_4QoMrfKvWzsQ Research.

energy security. This reliance not only stabilises their financial performance by creating demand for coal but also reduces the urgency to embrace cleaner energy solutions, effectively locking in coal power capacity for the foreseeable future.

The NDRC has facilitated long-term coal supply agreements between coal mining and coal power companies since 2016[19], aiming to stabilise coal prices and ensure energy security by relying on domestic resources. Under the updated 2025 policy framework[20], coal mines are required to allocate at least 75% of their resources to these agreements, slightly reduced from the previous 80% requirement. Power generation companies must contract a minimum of 80% of their projected coal needs, with greater flexibility now encouraged based on market conditions. Compliance requirements have also been eased, allowing fulfilment rates to drop to 90%, compared to the earlier mandate for full completion.

These adjustments reflect an effort to balance energy security with operational challenges, such as fluctuating demand. However, these measures fall short of meaningfully addressing the entrenched dominance of coal in the energy system. Meanwhile, the China National Coal Association continues to advocate for the institutionalisation of long-term coal supply agreements, emphasising their role as a 'ballast' for price stability and reliable supply. It reinforces the coal sector's grip on the power market, limiting competition and delaying the shift toward cleaner energy sources. Despite China's pledge to limit coal consumption until 2025 and phase it down between 2026 and 2030, production has risen steadily—from 3.9 billion tons in 2020 to 4.76 billion tons in 2024. The China National Coal Association expects coal consumption to continue to increase slightly in 2025[21]. Without stronger measures to contain coal mining companies, the path to transitioning away from coal remains uncertain.

Coal power's limited role as a 'regulating' power source

Since 2022, the National Energy Agency (NEA) has mandated that new coal power plants should not prioritise large-scale generation but instead focus on supporting peak load and

[19] National Development and Reform Commission (2016)发改委介绍鼓励签订中长期合同、促进煤炭和相关行业持续发展情况 https://www.gov.cn/xinwen/2016-11/09/content_5130581.htm News
[20] BJX (2024) 国家发改委：做好2025年电煤中长期合同签订履约工作 https://m.bjx.com.cn/mnews/20241220/1418244.shtml News
[21] China National Coal Association (2024) 2025年煤炭市场走势如何？中国煤炭工业协会预计：2025年煤炭消费需求平稳增长 https://finance.sina.com.cn/money/future/fmnews/2024-12-18/doc-inczwues0937581.shtml News

regulating renewable energy[22]. However, this principle has been increasingly sidelined. While most coal power projects approved in 2022–2023 were framed as necessary for 'supporting' or 'regulating' capacity, fewer than 30% of newly permitted coal power projects aimed at facilitating solar and wind integration in 2024. Instead, the majority cited ensuring local energy supply, driving economic development, meeting heating demands, or supporting industrial parks as objectives.

In 2024, the NDRC unveiled a decarbonisation plan for coal power[23], focusing on co-firing with biomass or green ammonia and deploying carbon capture, utilisation and storage (CCUS). Provincial governments and central state-owned enterprises were tasked with proposing retrofits to lower coal power emission intensity to gas power levels. However, the plan lacked clarity on the scale of retrofits and raised concerns about feasibility. These technologies are unlikely to offer a sustainable or cost-effective pathway for decarbonising China's coal power system, instead risking higher costs and financial strain on the power sector, which could erode the competitiveness of Chinese manufacturing.

In early 2025, the NDRC released another plan to improve the power system's regulating capacity[24], prioritising energy storage over coal for balancing renewables. While the plan highlighted the importance of coal power retrofits, it again avoided specific targets and instead recommended limiting large coal power plants operating at low loads and discouraging intra-day start-stop operations. These restrictions further weaken coal power's role in supporting renewable energy integration.

Despite the policy shift towards prioritising energy storage as a key tool for integrating renewables, broader market structures continue to favour coal power, making it difficult for renewables to displace it. Industry experts argue that storage, when combined with renewables, could provide a more cost effective and flexible alternative to coal power for balancing the grid.[25] However, coal power remains shielded from competition through long-term PPAs and long-term coal supply agreements. At the same time, a growing number of provinces have signalled that in 2025, they will no longer set minimum requirements for the share of wind and solar in long-term PPAs[26], further skewing the

[22] National Energy Administration (2021) 对十三届全国人大四次会议第2047号建议的答复 https://zfxxgk.nea.gov.cn/2021-08/04/c_1310486060.htm Policy
[23] National Development and Reform Commission (2024) 煤电低碳化改造建设行动方案(2024—2027年) https://www.ndrc.gov.cn/xxgk/zcfb/tz/202407/P020240715557072565689.pdf Policy
[24] National Development and Reform Commission (2025)电力系统调节能力优化专项行动实施方案（2025-2027年）https://www.ndrc.gov.cn/xxgk/zcfb/tz/202501/P020250106570227369979.pdf Policy
[25] Jiemian News (2023) 中国能源研究会常务副理事长周大地：非化石能源发电早晚得扔掉"煤电拐棍" https://www.jiemian.com/article/8853309.html Interview
[26] Energy Observer (2025) 新能源入市"分省地图"2.0 https://mp.weixin.qq.com/s/XahN4zeKV6hIED8P1F0sbg Analysis

market in favour of coal. This creates an uneven playing field where coal power remains insulated from risk while wind and solar developers face price fluctuations and uncertain demand. Rather than relying solely on market forces to phase out coal, a more effective approach would be to mobilise existing coal plants to fulfil their intended role as a regulating power source rather than running at consistently high capacity. Ensuring this transition will be essential for maintaining both grid stability and an efficient energy transition.

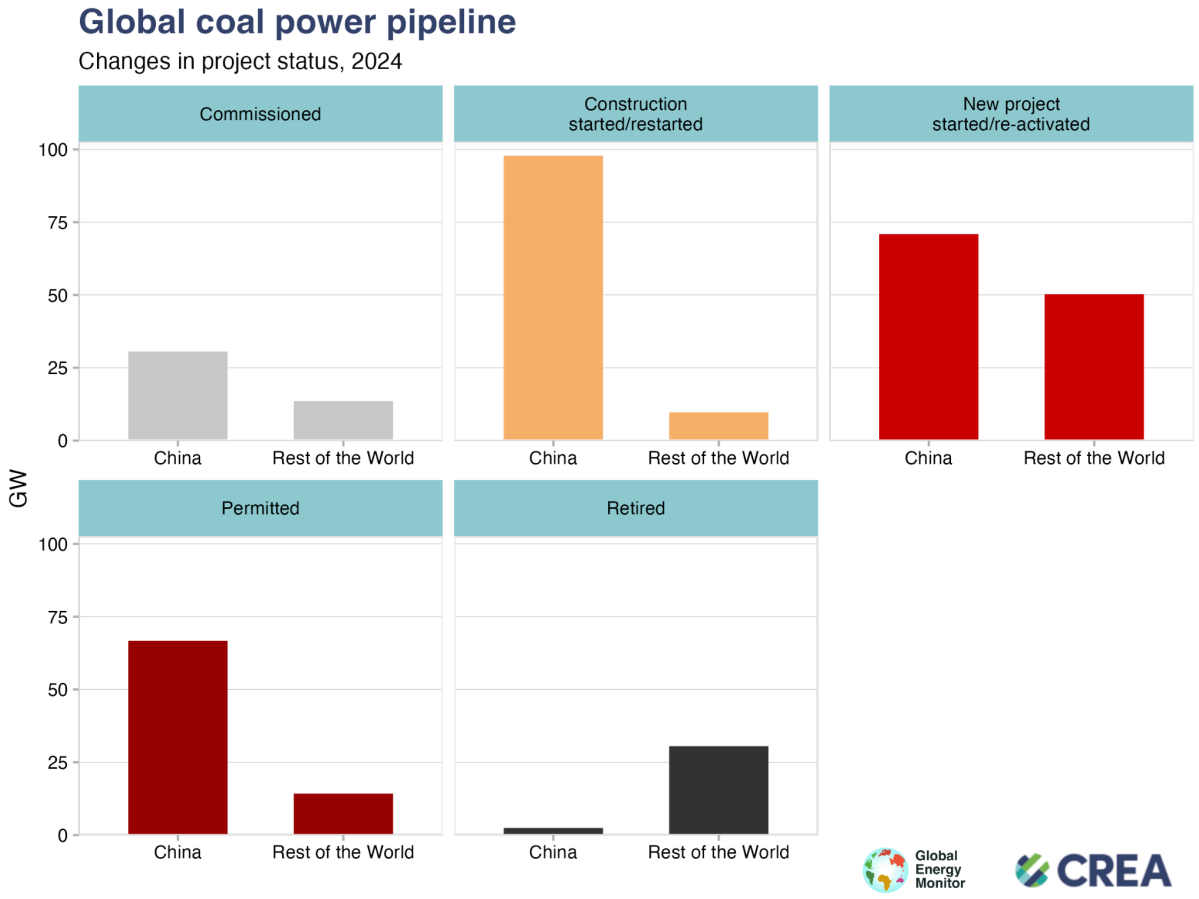


Figure 5 – Global coal power pipeline

Note: While China continues to add new capacity, the global coal fleet outside China shrank by 9.2 GW in 2024, reinforcing China's dominant role in shaping the future of coal power. China now accounts for 93% of global construction starts for coal power in 2024.

Policy recommendations

Despite record-breaking clean energy additions, China's power sector remains structurally misaligned with its decarbonisation goals. The parallel expansion of coal and renewables risks undermining China's clean energy transition. Many provincial governments, such as Shanxi[27] and Hebei[28], still include large coal power projects in their 2025 key projects, reinforcing coal's entrenched role. Economic stimulus policies could drive rapid energy demand growth, creating room for further coal power expansion. Conversely, if power demand growth slows in 2025 while record clean energy additions continue, the contradiction between coal and renewables will become even more pronounced. Coal-fired power generation could decline, yet the coal industry continues to expect growth, setting the stage for an increasingly unsustainable conflict between coal investments and the need to decarbonise the power system.

To prevent coal power from undermining renewable energy growth and to align China's power sector with its carbon reduction goals, the following policy measures should be prioritised:

- **Include ambitious and measurable coal consumption reduction targets, coal power phase down targets, and renewable energy expansion goals** in China's upcoming Nationally Determined Contribution to the UNFCCC and its 15th Five-Year Plan, ensuring a clear pathway toward decarbonisation.
- **Reduce the share of coal power covered by long-term PPAs** to prevent guaranteed coal generation from crowding out renewables in the power market.
- **Lower the mandated share of coal resources allocated to long-term supply agreements and the minimum contract coverage for power generators,** limiting the ability of coal mining companies to lock in demand from power plants and ensuring a more market-driven approach to coal procurement.
- **Set explicit targets to reduce the average utilisation hours of coal power plants**, ensuring coal power plays a supporting role rather than serving as baseload generation.
- **Stop new coal power plant approvals** and focus on repurposing existing plants for grid balancing to support renewable energy integration.

[27] China Coal Processing and Utilization Association (2025) 2025年山西省重点工程项目名单：煤炭项目24个 https://mp.weixin.qq.com/s/gLt8VHdEO8dW7_jJ-FKkoA News
[28] BJX (2025) 河北省16个重点火电项目名单 https://mp.weixin.qq.com/s/Hque6Y_1TQUsR9XOT32ZJQ News

- **Accelerate coal power retirements and cancel projects that were approved in violation of policy**, reducing overcapacity and unnecessary coal investment.
- **Prioritise policies and market rules for grid reform, energy storage deployment, and clean energy solutions** to enhance system flexibility and support the large-scale integration of renewables.
- **Expedite the development of a robust spot market** to further optimise the power system and reduce reliance on coal.

These steps will help implement China's ambition to phase down coal, create space for renewables, and drive a cleaner, more efficient energy system.

About the data

The changes in coal power project status analysed for this briefing are based on the January 2025 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.