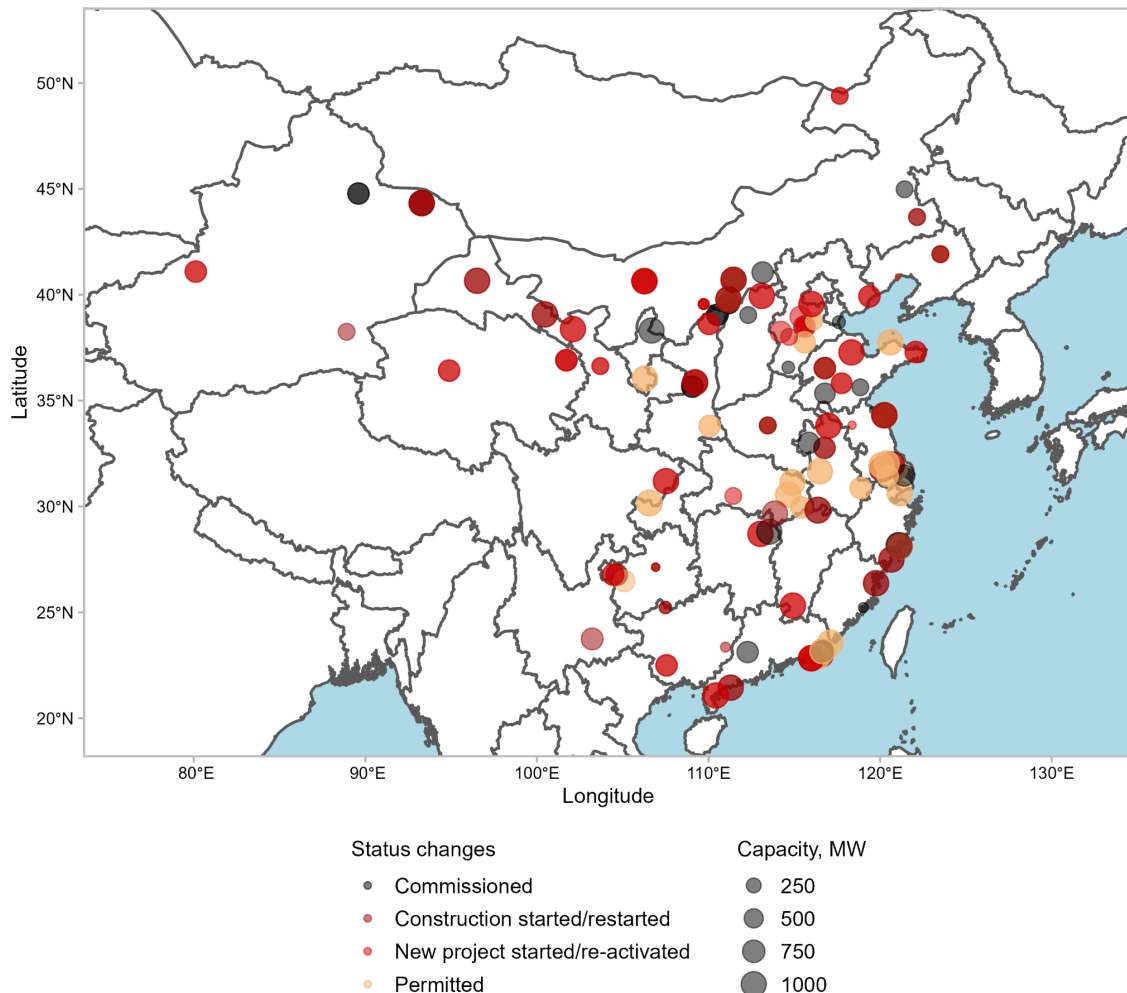


Briefing, August 2023

China's new coal power spree continues as more provinces jump on the bandwagon

New coal power projects in China in the first half of 2023



Key findings

- The coal power plant permitting spree that started in summer 2022 has continued in the first half of 2023 and into July. From January to June, construction was started on 37 GW (gigawatts) of new coal power capacity, 52 GW was permitted of which 10 GW already moved into construction, while 41 GW of new projects were announced and 8 GW of previously shelved projects were revived. All of these parts of the project pipeline are currently running at a pace of more than one coal power plant per week.
- Most of the new projects don't meet the central government's requirements for permitting new coal: the provinces building most new coal aren't 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; and most new project locations already have more than enough coal power to "support" existing and planned wind and solar capacity. This shows that there is no effective enforcement of the policies limiting new project permitting.
- 152 GW has been permitted and 169 GW announced since the start of the current spree in early 2022¹. This means that China is accelerating the additions of new coal power capacity during the current five-year plan period (2021–25) compared to either of the preceding two five-year plan periods.
- China now has 243 GW of coal power under construction and permitted. When projects currently announced or in the preparation stage but not yet permitted are included, this number rises to 392 GW. This means that coal power capacity could increase by 23% to 33% from 2022 levels, implying either a massive increase in coal power generation and emissions or a massive drop in plant utilization, implying financial losses and potentially asset stranding.
- Unless permitting is stopped immediately, China won't be able to reduce coal-fired power capacity during the 15th five-year plan (2026–30) without subsequent cancellations of already permitted projects or massive early retirement of existing plants.

¹ After updates to the data, we have revised the number of permitted plants in 2022: 148 units with a total capacity of 100 GW.

Frantic permitting and construction continued in the first half of 2023

In the first half of 2023, construction was started on 37 GW of new coal power capacity, 52 GW was permitted, while 41 GW of new projects were announced and 8 GW of previously shelved projects were revived (see Figures 1 and 7). Of the permitted projects, 10 GW of capacity has already moved to construction.

New project activity accelerated most dramatically in the coastal provinces of Jiangsu, Shandong and Hebei, and in the inland provinces of Inner Mongolia, Shaanxi and Gansu (see Figure 5). Guangdong, which led the charge in 2022, continued initiating and permitting more new projects than any other province. Permitting processes often continued to occur at [record](#) speeds.

Permitting continued apace in the second quarter, despite critical [public statements](#) on new coal plant permitting from senior officials. Permit issuance accelerated further in July, with no less than [10 GW](#) approved according to Southwest Securities. In early August, Shandong revised its list of [key provincial projects](#) for the year 2023, with five major coal power projects added and only one coal power project removed from the list.

In some provinces, newly permitted power plants are moving rapidly into construction, while in others developers might be securing permits “just in case” and not hurrying to break ground. Of plants permitted in 2022, about half (52 GW) had started construction by summer 2023.

The push for new coal is seeing some long-dormant projects revived. For example, Huaneng Shanyin 2 × 1,000 MW coal-fired power project was [proposed](#) in 2011 but had no progress until March 2020. Even after being revived in 2020, the project had been progressing slowly. However, Shanxi province’s Development and Reform Commission suddenly [granted](#) it a permit on 29 July.

Coal power plant commissioning doubled year-on-year, with 17.1 GW added to the grid in the first half of 2023. This is the first time that the results of the accelerated permitting of new projects and restarting of suspended projects in 2020 are seen. Permitting was increased after the start of the COVID-19 pandemic in early 2020, and projects that had been suspended earlier were restarted as overcapacity policies expired at the end of 2020. The restarted projects were suspended under overcapacity policies issued in 2017, after a

massive glut of permits issued by local governments in 2015–16. Half of the plants starting operation were permitted in 2020, and most of the rest were projects restarting construction in 2020, showing that construction progressed at a rapid clip. Much more coal power is usually commissioned in the second half of the year, but the number of plants commissioned in the first half of 2023 is striking for the period, especially as the acceleration only happened in May–June. The capacity additions were driven by Inner Mongolia, Shaanxi, Guangdong and Zhejiang.

Progress of new coal power projects and retirements in China

Changes in project status, half-yearly

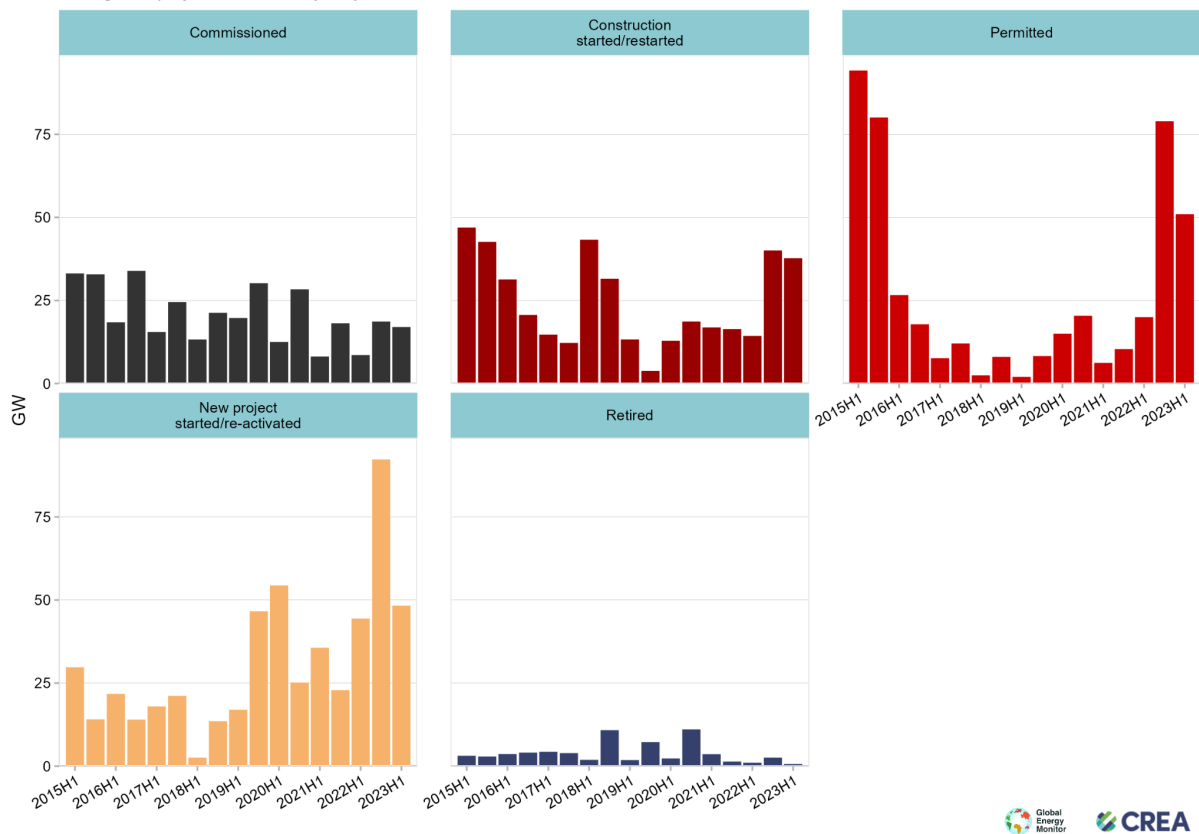


Figure 1: Surge in coal power continued in the first half of 2023: an average of two coal power plants received permits and more than one started construction per week. Changes in coal power status by half year (Global Coal Plant Tracker). Categories are not mutually exclusive–e.g. plants that both obtained permits and started construction in 2023H1 are included in both categories.

Permitting needs to stop in order for installed coal power capacity to fall in the next five-year period

The current spree of new projects and permitting is building up an increase in coal power capacity in the 2026–30 period (see Figure 2) when China’s coal consumption is supposed to be reduced, based on a pledge made by President Xi. It is possible for coal consumption to peak while coal-fired power capacity continues to rise rapidly, but this outcome would mean rapidly falling utilization of the plants.

After the permitting spree of the past year, China now has 243 GW of coal-fired capacity currently permitted and under construction. With all of these plants coming online, stopping the increase in coal power capacity in the 2026–30 period will require a significant acceleration in the retirement of existing plants. Retirements have, to the contrary, slowed down in recent years.

If the permitting rush is not stopped until projects that are currently announced or in pre-permit stages have gained permits as well, there will be a total of 392 GW of new coal-fired power capacity in the pipeline.

Unless permitting is stopped immediately, China won’t be able to reduce coal-fired power capacity during the 15th five-year plan without subsequent cancellations of already permitted projects or massive early retirement of existing plants (see Figure 2).

Coal-fired power capacity in China

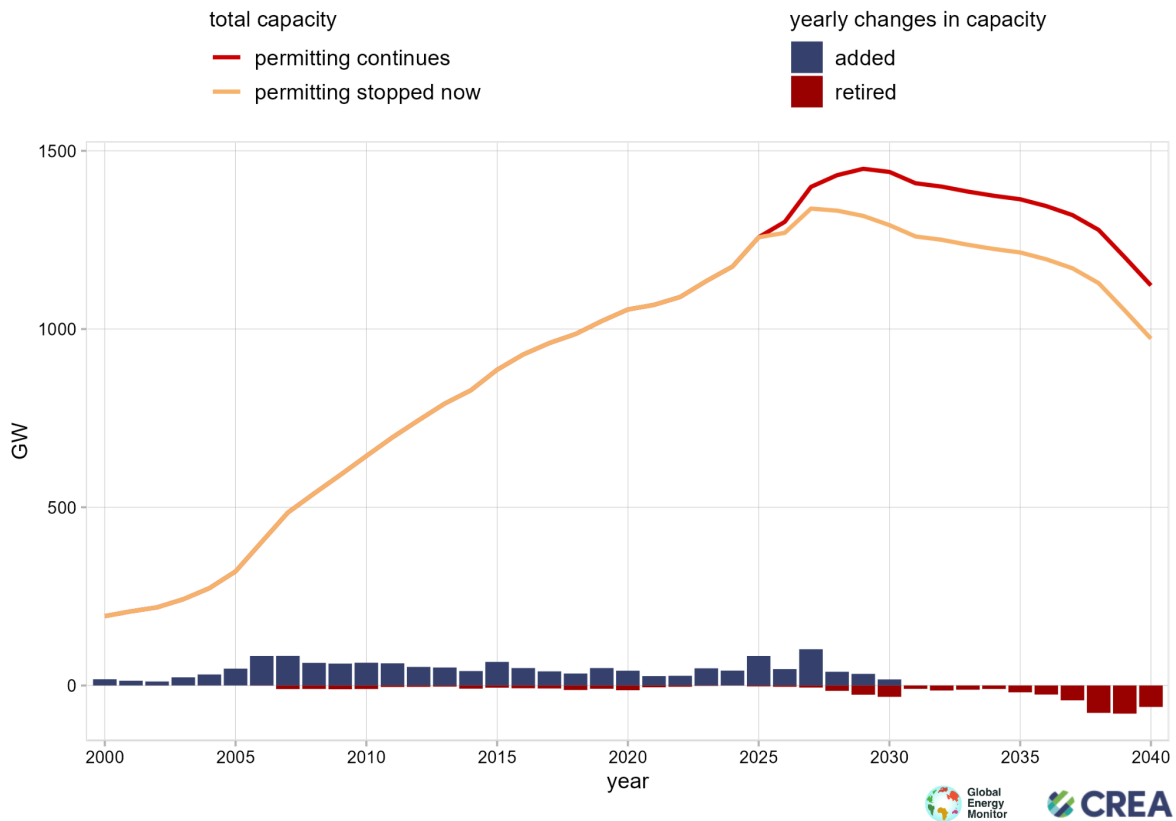


Figure 2: Coal Power Capacity Trajectories in China: how China’s decisions on permitting will shape the installed coal-fired power capacity landscape in the crucial period leading up to 2030 and 2040. If the announcements and permitting processes underway continue, total installed capacity is projected to peak at 1,450 GW in 2029, and if permitting is stopped now, it is projected to start falling sooner, peaking at 1,340 GW by 2027.

The projections assume that coal power plants retire at the current median age of 32 years, and that all new projects currently under construction or permitted are realized. Retirement of plants that are currently older than 32 years is spread across the period 2024–30. The lead time from project announcement, permitting and construction start to commissioning is based on the averages for projects in the GEM dataset in the period 2015–23: 4.5 years from announcement, 3.5 years from permitting and 3.0 years from construction start to commissioning.

Most new coal power projects don't meet the central government's requirements

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. However, an analysis of the projects permitted in 2022–23 shows that:

- The provinces adding most coal power plants are getting most of their power generation from coal, not from clean energy sources. This shows that all of these provinces are still rapidly increasing bulk power generation from coal, rather than using coal as a “supporting” source. Among the top 10 provinces for new coal power projects (see Figure 5), the share of thermal power in power generation growth was high in seven: Zhejiang (85%), Guangdong (80%), Anhui (75%), Shaanxi (75%), Xinjiang (65%), Inner Mongolia (60%), and Gansu (50%). Hebei and Shandong have been reducing thermal power recently, and Jiangsu has gotten 45% of its power generation growth from thermal power (see Figure 3).²
- Most locations in which new coal power plants are being built already have a lot of existing coal-fired capacity, and not enough planned solar or wind capacity to justify the addition of new coal power (see Figure 4). For instance, Hubei has 24 GW of wind and solar power, compared to 36 GW of coal and 36 GW of hydropower, for almost three times as much dispatchable capacity as there is variable capacity. For Guangdong, this ratio is four. Jiangsu has a staggering 105 GW of coal and gas-fired capacity compared to its 52 GW of wind and solar capacity. Similarly, Fujian possesses a coal and gas-fired capacity of 37 GW, overshadowing its 14 GW of wind and solar power capacity.³
- Only 47 out of the 216 coal power units permitted in 2022–23, representing about 16% of the permitted capacity, are in locations where the existing and planned large-scale solar and wind capacity exceeds existing and planned coal power capacity based on best available information. In more than half of the locations, there is more than three times as much coal as known large-scale wind and solar capacity.⁴

² Province-level generation data from China National Bureau of Statistics via Wind Financial Terminal.

³ Data as of end of May 2023 from Wind Information.

⁴ This result was obtained by identifying all existing and new coal, solar and wind power plants within a given distance of each newly permitted coal power project, from the GEM [Global Wind Power Tracker](#) and [Global](#)

- 60% of newly permitted plants and plants starting construction are in grid regions that [already have overcapacity](#) in coal-fired power.

Shares of power generation sources in growth from 2020 to present

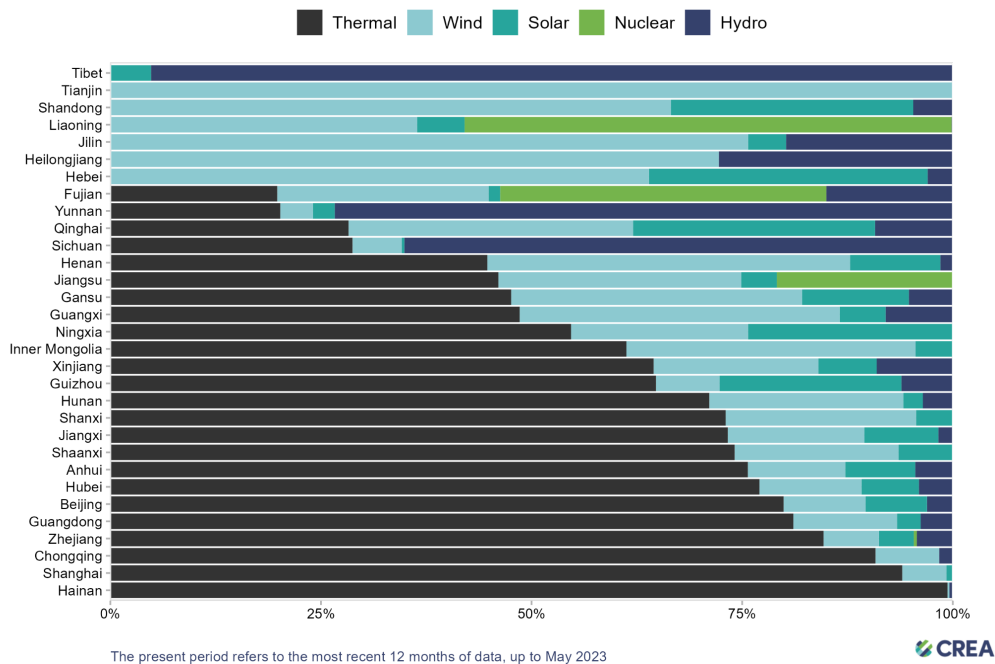


Figure 3: Sources of growth in power generation, comparing the period from June 2022 to May 2023 to the period from January to December 2020.

[Solar Power Tracker](#) (May 2023 releases). GEM catalogs all solar installations greater than 20 MW and all wind installations greater than 10 MW (see, e.g., [data gaps and future research](#)). The results are reported here for a distance of 100 km, but are robust to the use of any distance from 10 to 300 km, with the share of projects having more new large-scale wind & solar than coal around them varying from 0 to 20% depending on the distance chosen.

Distribution of coal, solar and wind capacity in China

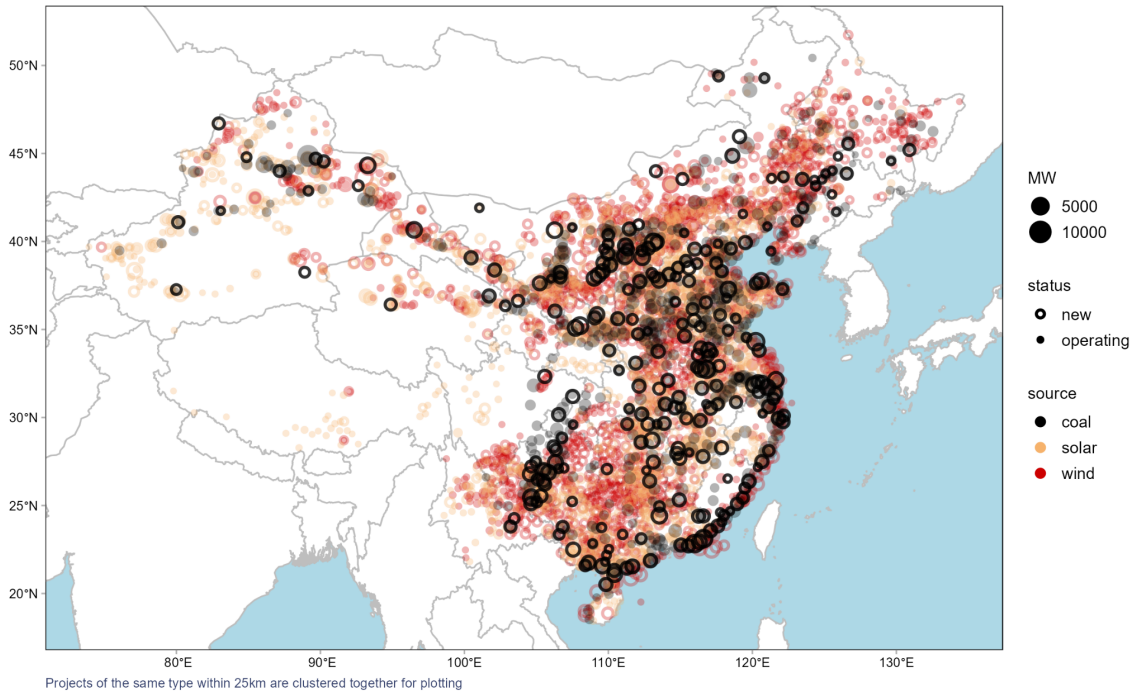


Figure 4: Existing and new coal, solar and wind power capacity overlaid on the map. Most locations where solar and wind are being added already have a lot of coal-fired power, and only bureaucratic hurdles prevent its use to support the integration of variable power generation. There are areas, particularly in western China, where no operating coal power exists at the moment in locations with large wind and solar developments, but these represent a small fraction of China's total coal power buildout.

The official justifications for the coal power spree are supporting grid stability, which refers above all to meeting momentary peak loads, especially during summer; as well as supporting the integration of variable wind and solar power generation. However, these justifications apply at most to a minority of the projects permitted since the beginning of 2022. This shows that there is no effective enforcement of the policies limiting new project permitting.

On the national level, China has enough generating capacity to meet power demand, also during summertime demand peaks. The reason that there are shortages is the inflexible and outdated way that the grid is being operated. This has been highlighted implicitly also

by some Chinese experts who have [called](#) for [more efficient](#) use of existing coal power capacity rather than construction of new capacity.

While power shortages are frequently cited as a major reason for the construction of new coal power plants, the rationale is often misused. 60% of new coal power projects are in grid regions where there's already an excess of coal-fired power capacity. Take, for example, provinces like Shandong and Guizhou. Despite these areas already having a high reserve margin, indicating an overcapacity, they continue to champion the construction of additional coal power plants. For example

- The North China region had 364 GW of thermal power against a peak load of 251 GW. Yet western Inner Mongolia, Shandong and Hebei, regions that are a part of the North China grid, are among the ones pursuing the largest amount of new coal power capacity.
- The Central China grid region had 200 GW of thermal power capacity and 159 GW of hydropower capacity at the end of 2022, to cover the highest reported peak load of 139 GW. Yet several provinces, particularly Hubei, are greenlighting more coal.
- The Northwestern China grid region had 185 GW of thermal power and 36 GW of hydropower against a peak load of 115 GW. Yet, Xinjiang and Gansu are building new coal power plants. On the regional level, only two grid regions, the eastern and southern grids, have a tight capacity situation and are at risk of power shortages. These grid regions would need improvements to grid operation, including increased imports from other regions, and/or investment in flexibility and storage solutions, to avoid the need for new coal-fired power plants.

Our analysis makes it clear that new projects are not being scrutinized and the conditions for new coal projects specified in central government policies are not being enforced in practice. It appears that the central government is encouraging coal power investment with few if any preconditions, as a part of efforts to offset the weakness in other parts of the economy.

What is driving the new projects?

Coal power permitting was first loosened in early 2020, as the COVID-19 pandemic broke out and the government was looking to use major investment projects to prop up economic activity. The venerable rush of permits started after electricity shortages in the summer of 2022.

However, as discussed above, most of the newly permitted projects cannot be justified by shortages of power generating capacity. Rather, the electricity supply scare opened up a window of opportunity to push new coal power projects past government regulators, as the electricity supply scare in a few provinces led to a shift in central government policy.

In 2023, new project activity has accelerated most dramatically in the inland provinces of Inner Mongolia, Shaanxi and Gansu, and coastal provinces of Hebei and Shandong. Guangdong, which led the charge in 2022, continued initiating and permitting new projects (see Figure 5).

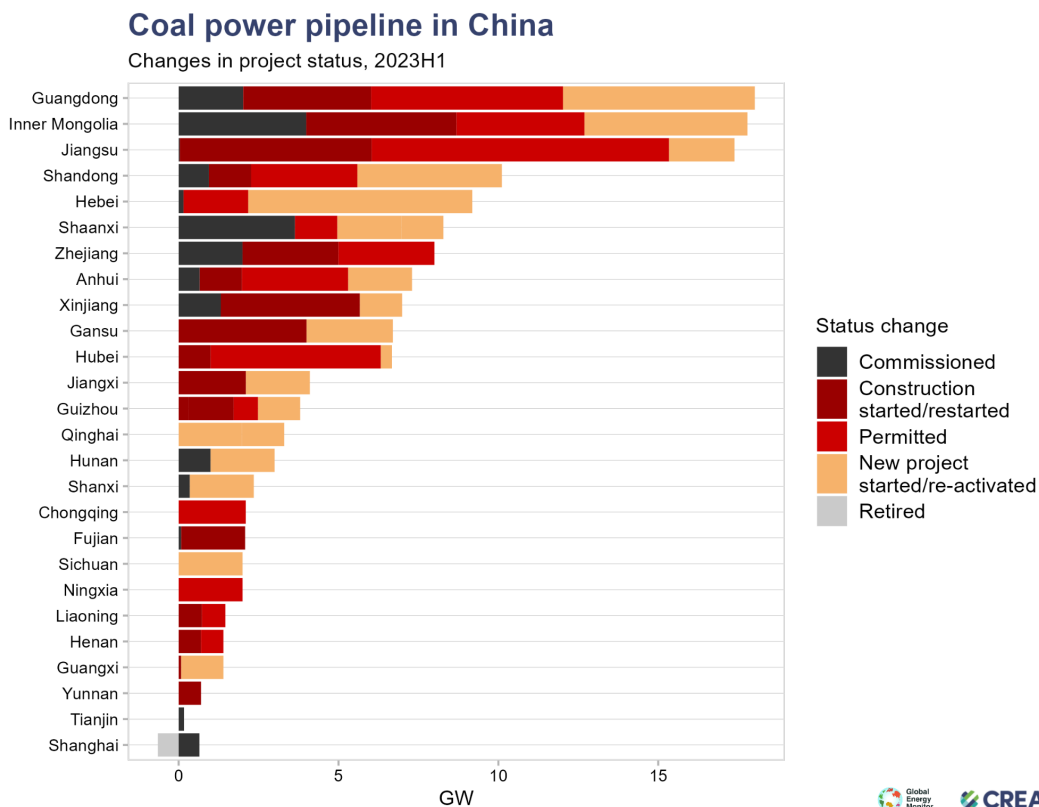


Figure 5: Changes in status of coal power plants and projects in the first half of 2023.

Outdated grid management

The apparent trigger for the current coal power rush was the Sichuan power shortage in the summer of 2022. More broadly, China has seen a rapid increase in electric peak loads in 2021–23. This is in large part due to an increase in the prevalence of air conditioners and exceptionally intense heat waves.

Increasing peak loads are increasing the risk of power shortages in some but not all provincial and regional grids. This is happening because of China’s rigid grid operation paradigm, as discussed e.g. in the CREA and WaterRock [report](#) “Resolving near-term power shortages in China from an economic perspective”. For example, one-third of electricity production in Sichuan province was exported in line with national power dispatch planning. During the drought in 2022, Sichuan continued to export large amounts of electricity to the east, while rationing consumption within the province. The lack of flexible grid management perpetuates reliance on coal power and creates a perceived need to build more of it.

The increase in peak loads is therefore prompting an increase in coal power plant development as a costly and sub-optimal solution, especially in major electricity demand centres and provinces neighboring them.

Building coal-fired power plants to cover peak loads means low utilization of capital-intensive assets, making it an expensive way to solve the problem even in the absence of climate targets. In addition, China’s carbon neutrality commitment means that the lifetime of new coal power plants will be very limited, further driving up the costs.

Furthermore, while the concern about peak loads in some provinces was the initial reason that the central government loosened controls on new coal projects, the wave of projects has swollen far beyond those provinces in which this is a concern, and to a much larger scale than needed to address the issue.

“Climbing to the peak”: The next five years as a window to grow emissions

The rush to build new coal power plants and coal-based industrial plants represents the mentality of “climbing to the peak”. [China’s Climate Transition: Outlook 2022](#), a report by CREA, highlighted that many officials and executives in China see the next five years as a window of opportunity to add new carbon-intensive capacity. This is a period where

emissions are still allowed to increase before they are due to peak under China's CO₂ peaking pledge.

Even if coal power generation is steeply lossmaking, state-owned enterprises tend to care more about market share than about profitability, and building more capacity is a way to grab market share.

Profitability of coal power generation is also fully determined by the government, which controls price-setting for power generated from coal. The expectation is that when coal power projects are encouraged by the central government, the government will make developers whole or at least not punish executives and officials who pursue, permit and finance the projects even if they end up as failures economically. One way in which the fortunes of coal power plants could change is the introduction of capacity payments, which would see coal power plant operators compensated for providing available capacity even when they are not generating power. The government work plan for this year includes studying the creation of a capacity payment mechanism.

Central government backing is apparent in the mix of project developers. In 2017–2021, new project development was led by provincial state-owned enterprises (SoEs), with central government firms starting very few projects. However, in the past two years, central government-controlled firms have been gaining share and were responsible for 45% of newly permitted projects in the first half of 2023 (see Figure 6).

Because of the Chinese government's propensity for abrupt shifts in policy, there is a self-reinforcing "coal rush" dynamic: when a massive amount of permits is handed out, market participants expect that the government will clamp down on the excesses soon, which becomes a reason to grab as many permits as possible before the music stops. This dynamic played out the previous time in the similarly large coal plant permitting wave of 2015–16, which was promptly [followed](#) by a clampdown first on new permitting and then on already permitted projects in 2017. To avoid repeating history, many projects were rushed into construction as soon as permits were granted. As mentioned earlier, 10 GW of the 2023 permitted projects have already moved to construction.

Coal miners mandated to invest in power plants

The recent rise in coal prices has drained the profitability of coal power generators, while filling the coffers of coal mining firms. This is a recurring dynamic due to the fact that power prices in China are constrained by government regulation, but prices for the coal used in power plants are determined in a more market-based way. To distribute the misery

more evenly, and enable the construction of new coal plants despite the poor business case, the government has pushed coal mining firms to [take on stakes](#) in the power generation business.

Since 2022, coal conglomerates have become the main investors in new coal power projects in China. [China Coal Group](#) has taken the lead in developing new minemouth power plants in Inner Mongolia, while [Shaanxi Coal and Chemical Industry Group](#) has revealed plans for new coal power in Shaanxi. Coal mining firms have also taken on existing coal plants to clean up the balance sheets of power generators, with five major power companies selling 23 loss-making coal plants in 2022, with coal enterprises taking over most of them.

The vertical integration of coal mining and coal power generation reduces the financial risk from coal price fluctuations. However, this approach still makes companies shoulder the burden of government-controlled electricity prices. And such integration in large-scale makes it easier for the government to control the sector, and encourages a boom of coal-power investment, thus hindering the power sector's market-oriented reforms and energy transition.

Doubling up: Exporters to increase exports while importers want to cut back

Since the 11th five-year plan (2011–15), the central government and State Grid have aimed to move coal power generation to China's western and inland provinces, and centralize it to "coal power bases" linked to the demand centres in the east by very long distance, ultra-high voltage transmission lines. The "coal bases" have morphed into "clean energy bases" in the most recent five-year plan, comprising a mix of renewable and coal-fired power generation.

The motivations for the plan include stimulating economic growth in the west, centralizing the coal mining industry and eliminating mining in more prosperous areas, increasing the relative competitiveness of domestic coal and reducing the need to transport coal from inland to the coast.

As a part of this west-to-east power transmission plan, western provinces such as Inner Mongolia and Shaanxi have built vast amounts of minemouth coal power capacity solely for the purpose of exporting power to eastern provinces.

Eastern provinces which are expected to purchase the power, such as Zhejiang, Jiangsu, Shandong and Guangdong have been loath to increase imports of electricity, resulting in a very low rate of utilization for the long-distance transmission lines. These provinces prefer to rather generate the power locally, capturing the value-added into their provincial GDP, along with the tax revenue and jobs.

Another factor that became apparent after Sichuan's power shortage in summer 2022 is distrust between provinces. The major hydropower provinces in southwestern China suffered from serious drought both in 2022 and 2023. While they curtailed local power consumption and continued to export power to other parts of the country, the droughts raised concerns about the reliability of this supply in the longer term.

The power shortage provided coastal provinces with an excuse to shift back to generating power within the province and they jumped onto it.

Guangdong and Shandong recently revised their energy plans to accommodate major increases in coal power capacity, barely a year after releasing their five-year plans in early 2022. Both provinces had aimed to limit increases in coal power capacity, reflecting the central government policy at the time.

In March 2023, Shandong's Energy Bureau announced [plans](#) to add 10 GW of coal power in the next three years. The province's earlier five-year plan targeted coal-fired capacity of no more than 100 GW by 2025, a 10 GW reduction in installed capacity from the level at the end of 2022.

The push for coal power in coastal provinces introduces a major redundancy as western provinces are still building more coal-fired capacity for export to the east, while eastern provinces are building new coal to replace imports from the west. In some cases, provinces neighboring the main economic centers, such as Anhui and Fujian, are also building new coal plants with exports in mind, creating a third layer of redundancy.

The competition between importing and exporting provinces is illustrated by the two provinces topping the list of largest developers of new coal power projects: Guangdong and Inner Mongolia, the largest importer and exporter of electricity among China's provinces, respectively.

Guangdong: backpedaling on clean energy while promoting coal power

The changes to Guangdong's energy plans make it clear that despite the rhetoric, the new wave of coal power projects is not supporting but hindering the uptake of clean energy.

In its [14th Five-Year Energy Development Plan](#), published in March 2022, Guangdong highlighted the need to strictly control coal power projects and reduce the proportion of coal power.

In an unusual step, Guangdong revised its targets just a year later, announcing a [2023–25 energy development plan](#) in May 2023, with energy security as the main slogan. The plan aims to commission 13 GW of coal power by 2025. Compared to last year's five-year plan, the proportion of non-fossil energy installed has been reduced by five percentage points to about 44%. The proportion of non-fossil energy consumption has decreased by three percentage points to 29%, and an additional 6.7 GW of key coal power projects have been added.

Guangdong's [key power generation construction projects](#) for the year 2023 include 31 GW of coal-fired power, 27 GW of gas-fired power, 9.7 GW of nuclear power, 8.5 GW of offshore wind power, and 5.9 GW of photovoltaic power. Given these figures, it is hardly appropriate to label the upcoming large-scale coal and gas power projects as “supportive”, since they represent the clear majority of new capacity.

A further blow to the clean energy transition in Guangdong was a [notice](#) issued by the province's Energy Bureau in July, “advising” to suspend approval of solar and onshore wind projects due to natural resources constraints. Construction has also been temporarily paused on approved but not yet started solar and wind projects. This seems to reflect poor spatial planning, as according to a local solar enterprise owner, the primary reason for the policy is the lack of sufficient land in certain areas to accommodate the planned new energy projects.

Guangdong's drive to generate more coal-fired power locally is mirrored by policies in the main supplier of the province's electricity imports, the hydropower-rich Yunnan. In 2022, Yunnan supplied 69% of Guangdong's electricity imports at a low cost. However, in the long term, Yunnan hopes to consume more of the power it generates locally, by building a highly electricity-intensive aluminum electrolysis industry.

A [report](#) by CREA and WaterRock, “Resolving near-term power shortages in China from an economic perspective”, identified the reasons for Guangdong's tight power capacity

situation, including rigid power pricing and lack of dynamic electricity transmission between provinces to make effective use of existing capacity and infrastructure. The report outlined solutions that would make flexible grid operation and clean flexibility and storage technologies more feasible and competitive.

Clean energy bases: coal power “supporting” wind and solar

One driver of new coal power projects in inland provinces are so-called “Clean Energy Bases”, vast concentrations of both clean solar and wind power generation and “supporting” coal-fired power plants. Some of these bases are in truly remote locations where there is no existing thermal power capacity to act as backup for wind and solar, but spatial analysis shows that most wind and solar projects are in locations that would already have more than enough coal power capacity to permit their integration to the grid. However, a rigid and inefficient institutional set-up sees the bases developed in isolation, without making use of existing thermal power plants.

Inner Mongolia targets the completion of 20 GW of clean energy projects by the end of 2023, and aims to start work on another 12 GW. Following national policy, approximately 13 GW of new coal power will be bundled with the 32 GW of wind and solar capacity. In the first half of this year, a larger portion of coal power construction is dedicated to supporting west-to-east power transmission of renewable energy projects in Inner Mongolia, compared to local consumption.

Based on the [plan](#), over 10 GW of coal power plants will be commissioned this year, leading to the establishment of more coal power plants in the province during the second half of the year.

Shaanxi and Gansu are also pivotal provinces in the west-to-east electricity transmission initiative. Earlier this year, Shaanxi added over 4.4 GW of coal power as bundled projects to send electricity to Hubei. Gansu, in a similar effort, has over [4 GW](#) of coal power projects under construction to bolster the power supply to Shandong.

Zhou Dadi, a climate change expert and executive vice president of the China Energy Research Society, [emphasizes](#) that renewable energy cannot rely on coal-fired power in the long term. Coal power needs to be phased out, and alternative technologies should be employed to ensure a reliable and stable power supply system.

"Once these coal plants are built, they will strive to operate for over 4000 hours per year for economic viability. It becomes challenging for them to purely serve as backup support for

other energy sources. This approach becomes a cycle of relying on either too much water or too much rice, making it difficult to address the structural issues in the low-carbon transition effectively," he said.

Shifting from gas to coal

Another driver behind many of the coal power projects is the shifting fortunes of fossil gas. Gas consumption was promoted in 2010, with the 12th and 13th five year plans (2011–20) setting targets for increasing the share of gas in the energy mix. Replacing coal with gas in industrial boilers, heating plants and household heating was a major feature of China's air pollution action plans from 2013 until 2020.

The policy on gas began to shift with the renewed emphasis on energy security in 2019, driven by increased tensions with the U.S. The energy security concerns intensified when global gas prices shot up as a result of Russia cutting back gas supply to Europe in 2021, in the lead-up to the country's invasion of Ukraine.

China's consumption of fossil gas has plateaued since the price spike of late 2021. The 14th five-year plan does not set targets for increasing the share of gas in energy consumption, and the National Development and Reform Council's [2023 development plan](#) strongly discourages new projects shifting heating or industry from coal to gas, a major policy reversal.

The provinces with the [largest gas-fired power capacity](#), Guangdong, Zhejiang, and Jiangsu, have accelerated coal power projects. Beijing and Shanghai seem to be sticking with gas.

Nowhere was the coal-to-gas campaign as intense as in Hebei, where millions of households underwent a sweeping shift from coal to gas to achieve cleaner heating. Gas-fired combined heat and power plants were built in Shijiazhuang and Langfang, as well as in Beijing and Tianjin. As of 2023, all coal power plants being built or permitted in Hebei are heat power or combined heat and power projects, partially reversing the shift while obviously not going back to using coal stoves in households.

Will the new coal plants undermine China's climate commitments?

Already permitted coal power projects set China up for a 23% increase in coal-fired power capacity by 2027. If projects that are currently in the preparation stage but not yet permitted get a green light, the increase could reach 33% by 2029.

In the short term, the amount of coal-fired power generation is determined by electricity demand growth and the growth in clean power generation. If clean energy investment growth continues at current rates, coal power generation is likely to fall in 2024–25, just as the newly permitted plants start to come online, resulting in a steep drop in utilization and renewed concerns about overcapacity.

Provided that growth in non-fossil power generation from wind, solar and nuclear continues to accelerate, and electricity demand growth stabilizes or slows down, power generation from coal could peak and decline. 78 GW of solar and 23 GW of wind, along with 1.2 GW of nuclear and 5 GW of hydropower were added to the grid in the first half of 2023. Solar and wind installations increased by 150% and 80%, respectively. The solar power installations completed in just six months are equal to the total installed solar power capacity of Germany.

In addition, China permitted [six nuclear units](#) at the end of July. By the end of 2022, installed nuclear capacity totaled [56 GW, with another 25 GW](#) under construction. 2022 also saw [ten](#) units being granted permission, the highest number since 2009.

This rate of non-fossil energy additions is sufficient to cover electricity demand growth up to 4% per year⁵. In the first half of 2023, the growth rate was 5%.

Even then, hundreds of brand-new coal power plants will make meeting China's climate commitments more complicated and costly. The politically influential owners of the plants

⁵ In the first half of 2023, 78 GW of solar, 23 GW of wind, 5.4 GW of hydropower and 1.2 GW of nuclear power capacity were added. At the average annual utilization of each technology, calculated from monthly [generation](#) and [capacity](#) data, and assuming the same amount of capacity is added in the second half of the year, this new capacity will generate a total of 340 TWh/year, comprising of 96 TWh solar, 49 TWh wind, 18 TWh hydro and 9 TWh nuclear. The added generation would represent 4.0% of 2022 [consumption](#) of 8,694 TWh.

have an interest in protecting their assets and avoiding a rapid build-out of clean energy and a phase-out of coal.

There are a few different ways in which new coal plants can increase China's emissions and undermine the country's contribution to the global climate effort:

- The pressure to make use of the newly built coal power plants and prevent a steep fall in utilization leads to a moderation in China's clean energy buildout, and/or the promotion of energy-intensive industries to consume the electricity. This could mean a major increase in China's CO₂ emissions over this decade.
- While China is making rapid progress in scaling up clean energy, the country's power system remains dependent on coal power capacity for meeting electricity peak loads and managing the variability of demand and clean power supply. The continued addition of new coal power capacity implies an insufficient emphasis on overcoming the power system and power market constraints that perpetuate dependence on coal.
- The rush to build new coal power plants and coal-based industrial plants represents the mentality of “climbing to the peak”. Many officials and executives in China see the remaining five years before CO₂ emissions are due to peak as a window of opportunity to add new carbon-intensive capacity, while emissions are still allowed to increase. As pointed out in [China's Climate Transition: Outlook 2022](#), if this impulse is followed, China could meet the commitment to peak emissions before 2030, but the emission peak happens at a higher level, and the subsequent decline in emissions could be slower than if emissions increases were controlled in the years before the peak. The result is a larger amount of emissions overall which is hard to reconcile with the Paris Agreement goals.

CREA's [China's Climate's Transition Outlook 2022](#) as well as some Chinese researchers have warned of this risk. Professor Yuan Jiahai of North China Electric Power University [pointed out](#) that the booming of coal power plants may slow down the implementation of China's goal to peak CO₂ emissions before 2030 and reach carbon neutrality before 2060. And [according to](#) Chao Ketu, a researcher of [CHN Energy](#), one of China's main power companies and coal producers, “Investing in large amounts of coal power plants all over the country will delay China's carbon peaking, and increase the difficulty of carbon neutrality.” But both Yuan and Chao echoed the government on coal power's importance as “ballast” for energy security on many other occasions on national media.

The rush for new coal has also seen a major shift in the narrative communicated in state media. After the announcement of China's carbon neutrality goal in 2020, emission

reductions and clean energy were a major topic in China’s state media. Now, the media highlights coal’s essential role in ensuring a stable energy supply and averting power shortages during this scorching summer. Last year, the internet buzzed with discussions about “power restrictions”, but this year, “ensuring electricity supply” has become a prominent topic in the media.

Newly permitted coal power projects by firm type

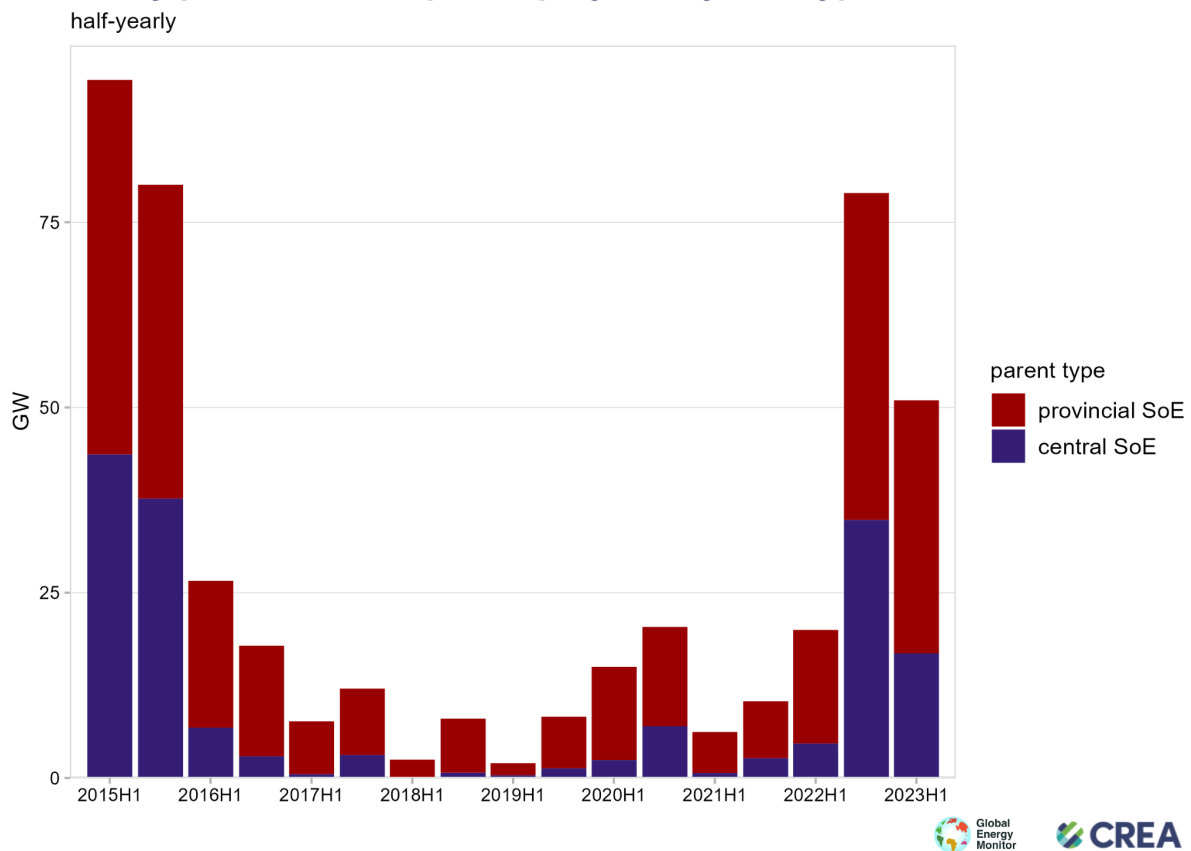


Figure 6: Central SOEs are driving the latest wave of coal power project permits.

Global coal power pipeline

Changes in project status, first half of 2023

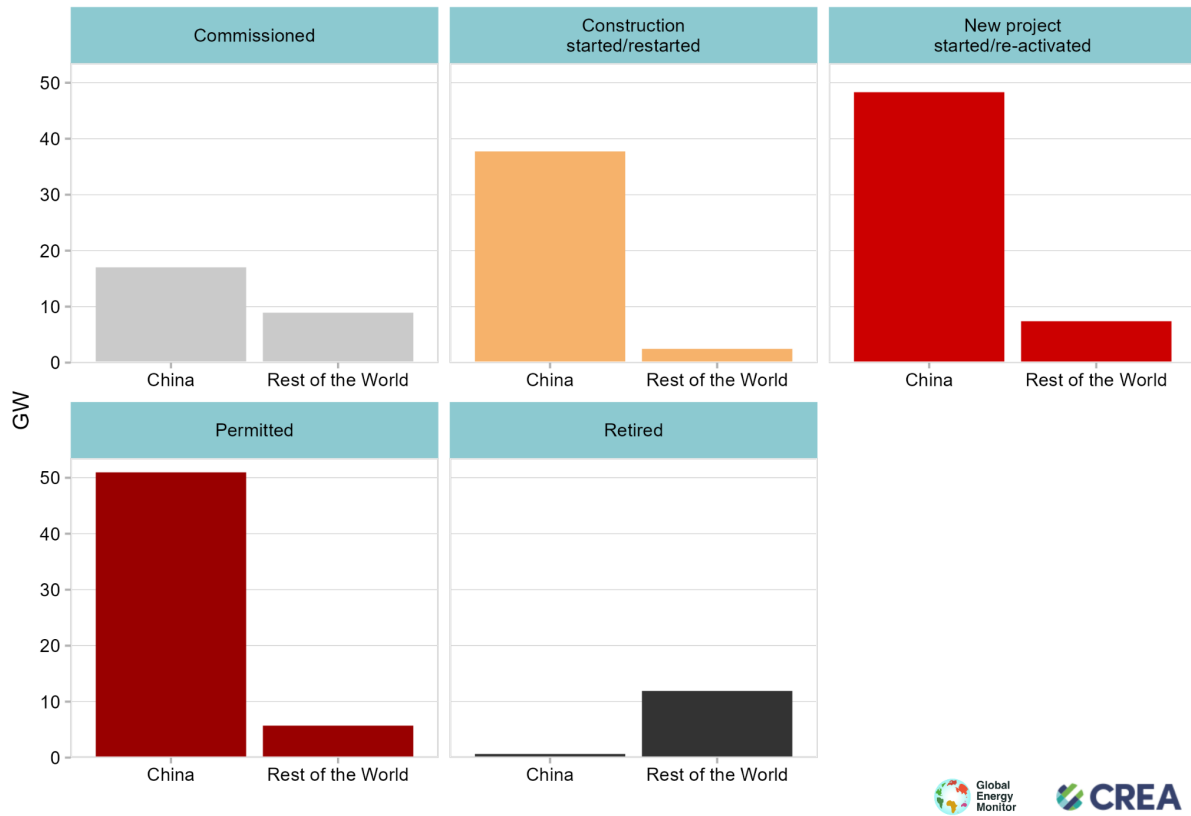


Figure 7: China dominates new coal power project activity, while retiring little existing capacity. Coal power projects in China and the rest of the world with changes in project status in the first half of 2023 (between Global Coal Plant Tracker January 2023 and July 2023 updates). Categories are not mutually exclusive–e.g. plants that both obtained permits and started construction in 2023H1 are included in both categories.

Policy recommendations

- Strictly control new coal power capacity and reject or revoke permits to projects that are not necessary for “supporting grid stability” or “supporting the integration of variable renewable energy”.
- Accelerate investment in clean power generation to fully meet growth in electricity demand and stop increasing bulk power generation from coal. Decarbonisation requires substantial changes in network infrastructure, market mechanisms, regulatory framework, and planning processes, which require central government facilitation.
- Increase investment in electricity storage, flexibility and transmission within grid regions. Create a level playing field for different storage, demand response and generation technologies for meeting peak demand, and enable clean flexibility technologies to scale up. While many technologies, such as pumped hydro, lithium-ion battery and demand-side technologies, are as mature as coal power and ready for wider adoption, current power systems and policy frameworks still lead developers to default to coal.
- Strengthen energy efficiency requirements for A/C units and for new buildings, and introduce a program of large-scale energy efficiency improvements for existing buildings.

About the data

The changes in coal power project status analyzed for this briefing are based on the latest July 2023 update of Global Energy Monitor's [Global Coal Plant Tracker](#) (GCPT) and the historical 2014–2023 information available upon request. The permitting dates and related statuses were amended for five projects in the July 2023 data: Changshu-1 power station (Units 7–9: 2023-06-30), Huaneng Taicang power station (Phase III, Units 5–6: 2022-10-28), Ligang power station (Phase V, Units 1–2: 2023-06-30), Lu'an power station (Phase III, Units 5–6: 2023-02-23), and Wangting power station (Units 7–8: 2023-06-30). 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. GCPT is the most detailed dataset available on the global coal power fleet, and has provided biannual updates on coal-fired generating capacity since 2015.

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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About Centre for Research on Energy and Clean Air (CREA)

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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