Global Energy Monitor

BRIEFING: MAY 2022

Why China's Coal Mine Boom Jeopardizes Short-Term Climate Targets

CHINA'S SURGE IN NEW COAL PRODUCTION AT THE END OF LAST YEAR MAY HAVE EMITTED 2.5 MILLION TONNES OF METHANE - AND EVEN MORE DEVELOPMENTS ARE UNDERWAY

Summary

China's strategy to shore-up coal supply in response to an acute domestic "energy crisis" at the end of last year unleashed an estimated 2.5 million tonnes (Mt) of new coal mine methane emissions within a matter of months, equivalent 74 Mt of CO2, and comparable to the emissions of 20 coal-fired power plants operating year-round, according to a new analysis by Global Energy Monitor (GEM).

The surge in new coal production to meet electricity shortages boosted China's mine capacity 464 Mt, according to a GEM analysis of government announcements and province-level media, with actual output up at least 270 million tonnes, more than the annual output of South Africa (246 Mt), the world's seventh largest coal producer. As a result, China broke its production record, mining 4,070 Mt in 2021, which almost certainly contributed to higher methane emissions.

China's hike in emissions comes at a time when policymakers have planned to "accelerate outstanding coal mine investments" and 169 new coal mine projects are already under development, amounting to 559 million tonnes per annum (Mtpa) of new coal mine capacity. Absent relentless adoption of mitigation practices at these new operations, the country's proposed mines could emit an additional 6 Mt of methane each year, which would increase global coal mine methane emissions more than 10%. China, the world's largest producer and consumer of coal, already emits 73% of the world's coal mine methane.

While China has made ambitious commitments to clean electricity, government and industry forecasts of future power outages combined with a plunge in overseas coal imports have accelerated domestic coal production. The surge in new production is in stark contrast to China's "dual carbon" targets and pledge to reduce methane emissions. The planned expansion even outpaces the country's coal mine abandonment rate, meaning China will have to accelerate the speed of mine closures and optimization efforts or else risk oversupply prior to the country's intended coal phase down after 2025.

China's Coal Mine Boom in 2021

During the second half of 2021, China experienced a major coal and power shortage. China's National Development and Reform Commission (NDRC) issued an emergency act to speed up coal mine capacity approvals and spur production. According to a GEM review of government announcements issued last year, the NDRC approved a number of activities within a matter of weeks:

- Granted permission to resume production at 38 previously shelved coal mine projects in Inner Mongolia (67 mtpa)
- Granted permission to extend the life of 15 coal mines (44 mtpa)
- Permitted surface mining at more than 16 coal mines in Inner Mongolia (75 mtpa)
- Permitted surface mining at an additional 7 coal mines in Inner Mongolia (120 mtpa)
- Issued a right for excess production at 98 coal mines in Shanxi (55.3 mtpa)
- Issued a right for excess production at 72 coal mines in Inner Mongolia (98 mtpa)
- Issued a right for excess production at 3 coal mines in Inner Mongolia, Shanxi, and Heilongjiang (6 mtpa)

Coal mine capacity expansions continued over the next several months and remained ongoing until March 2022. During that time, local governments reported that illegal mining activities ran rampant as a result of the national coal shortage and the peak price of coal.

All told, the emergency act increased the country's capacity by at least 464 Mtpa at over 249 coal mines. GEM's review of government announcements and local news in the major coal-producing provinces of Inner Mongolia, Shanxi, and Shaanxi finds that the boost in mine capacity increased actual output at these mines by 270 Mt (Figure 1).

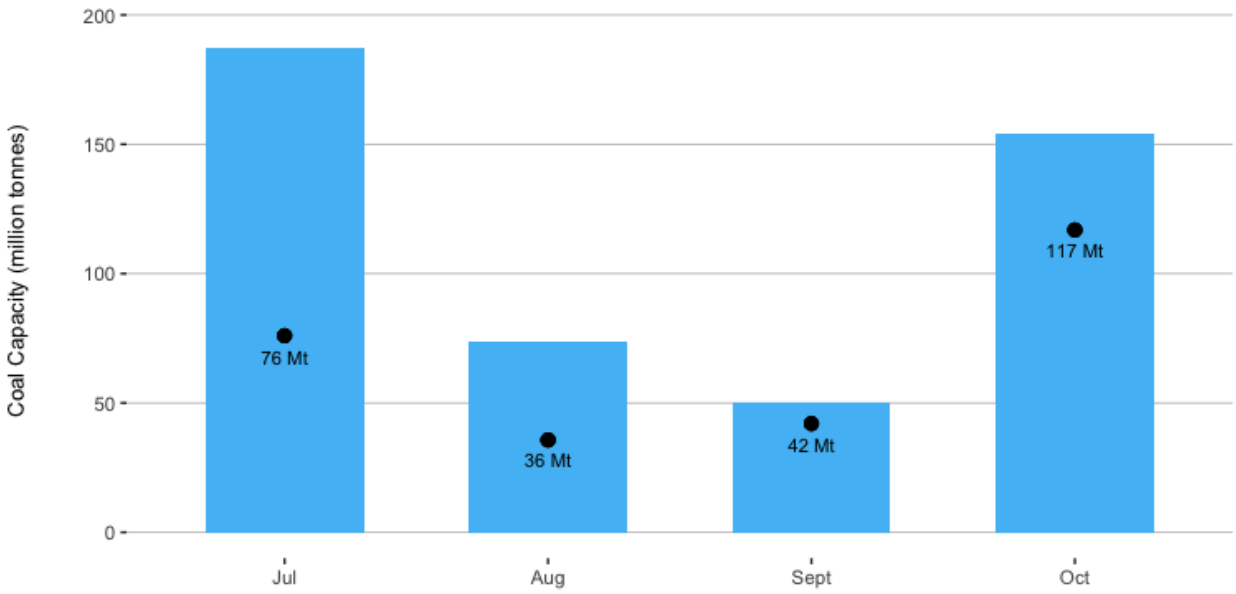

FIGURE 1. Coal mine capacity added under China's emergency act, July - October 2021

China added new coal mine capacity (blue bars) in 2021 the months of Q3 and Q4 in response to the energy crisis. The black dots represent the actual increase in output that resulted from these mine capacity additions.

Source: Government of China National Development and Reform Commission (NDRC) and GEM analysis.

What Was the Impact on Methane Emissions?

The surge in China's output in response to the energy crisis (270 Mt) could have released 2.5 Mt of methane. Those emissions would have come in addition to China's annual methane emissions, which are already the highest in the world, according to GEM's previous global assessment and separate findings of the IEA. China's maneuver to boost coal supply, in other words, would have had an immediate climate impact, even before burning the coal at power plants.

TABLE 1. Five coal mines that ramped up production due to the 2021 emergency act and potential new methane emissions

Coal mine	Original capacity (Mtpa)	Total capacity after increase (Mtpa)	Potential methane emissions from capacity increase (Mt CO2 - 100)
Beifang Weijiamao Coal Mine	6	12	0.7
Changcheng #1 Coal Mine	0.6	3	0.8
Gaotouyao Coal Mine	8	10	0.8
Wangjialin Coal Mine	6	7.5	0.7
Shanxi Zuoyun Changchunxing Coal Mine	4.5	6.625	0.9

Sources: National Development and Reform Commission and GEM analysis.

The production increase during the emergency act came largely from surface mines (141 Mt), according to GEM's analysis, which emitted about 0.5 Mt of methane. The expansions of roughly 150 underground mines (128 Mt) would have had an even greater climate impact and could have emitted 2 Mt of methane.[1]

[1] GEM estimated methane emissions using data on production, mine depth, and coal rank from its Global Coal Mine Tracker in combination with the peer-reviewed Model for Calculating Coal Mine Methane (MC2M). The methodology is online here.

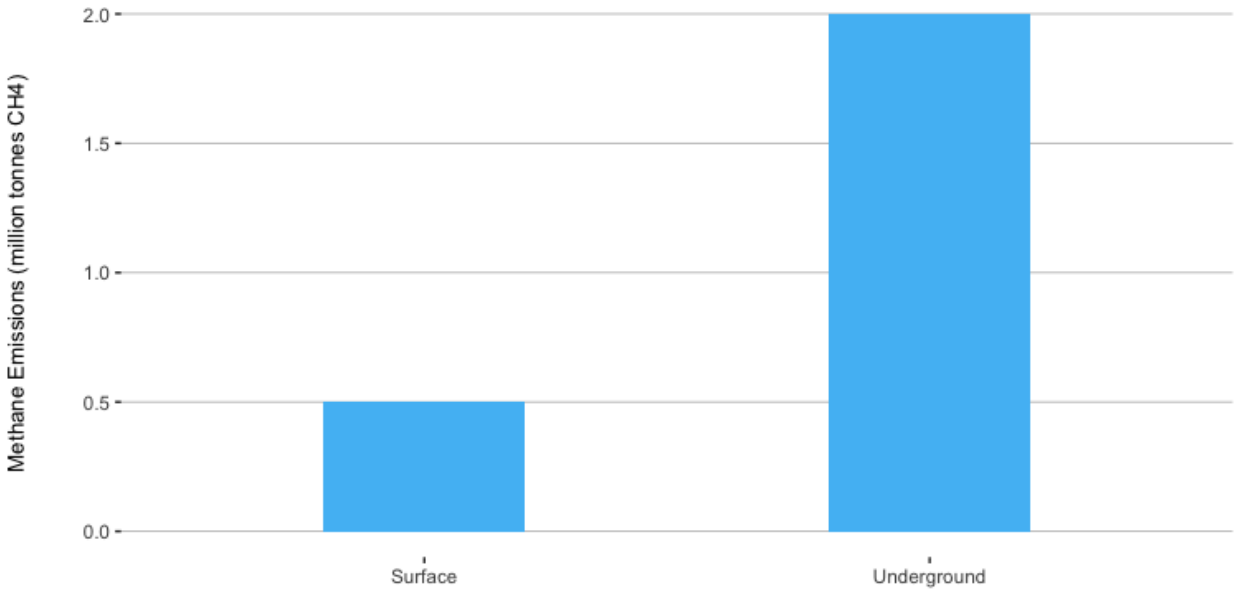

FIGURE 2. Coal mine methane emissions in 2021 from increased output under China's emergency act

Sources: National Development and Reform Commission (NDRC) and GEM analysis.

What About the New Coal Mine Projects?

On top of the surge in new coal mine capacity last year, China has 559 Mtpa of new coal mine proposals under development, which is equivalent to the output of Indonesia (564 Mtpa), the world's third largest coal producer. The new expansions in capacity are highly concentrated in just four provinces: Inner Mongolia (196 mtpa), Xinjiang (125 mtpa), Shaanxi (95 mtpa), and Shanxi (79 mtpa). Together, these four provinces comprise one-quarter (495 mtpa) of all proposed coal mine capacity worldwide (1,944 mtpa).

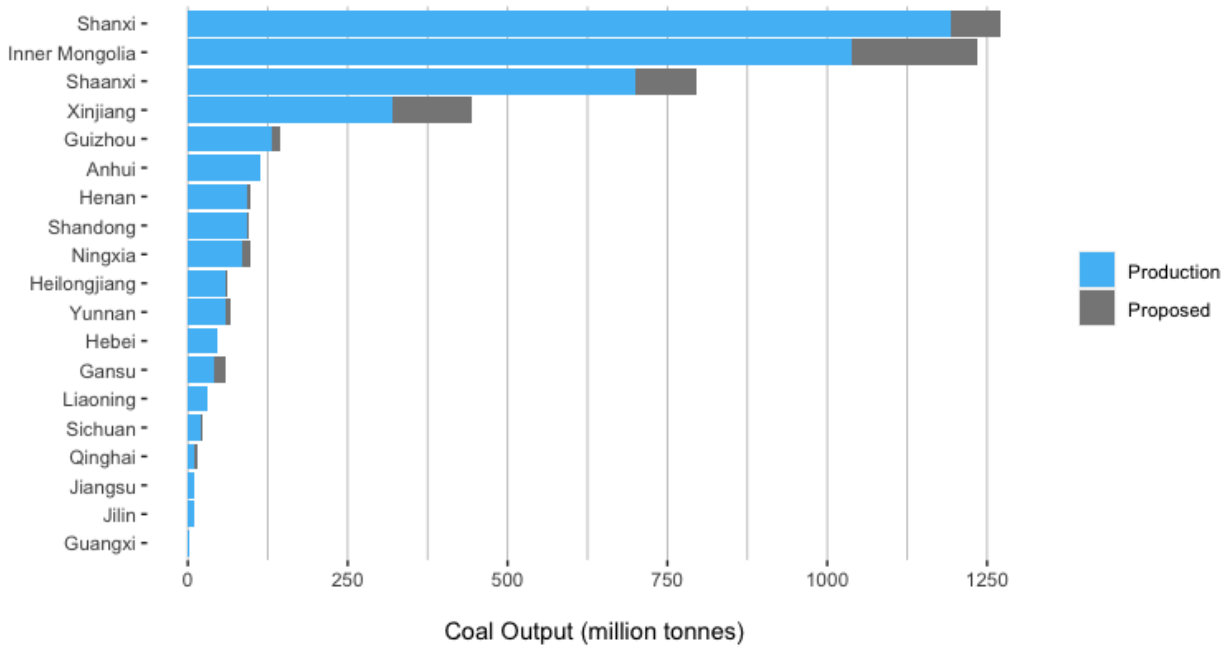

FIGURE 3. China's coal production and planned capacity expansions as of end-of-year 2021

Sources: National Development and Reform Commission (NDRC) and GEM Global Coal Mine Tracker.

At present, 82% of these projects in China are already under construction, suggesting new coal mines and ensuing methane emissions may be already locked in, requiring widespread adoption of mitigation schemes to curb further emissions, or the outright cancellation of new mines.

In March 2022, China's National Development and Reform Commission (NDRC) announced plans to increase mining capacity by 300 million tonnes, though it remains unclear at the time of the announcement if that capacity is supplemental to those projects already under development and documented here (including several "mega mine" projects), or a combination of new projects yet to be announced.

Whatever the case, the new coal mine projects on record here are sited in regions with high-methane gas content. Shanxi, Shaanxi, and Inner Mongolia are currently responsible for the bulk of China's coal mine methane emissions, and already emit one half of all coal mine methane emissions in the world.

China's proposed mines would only add to the outsized impact of these provinces. All together, China's new mines have the potential to emit 6 Mt of methane each year if they proceed as planned.

Who Is Responsible?

China has undergone a significant restructure of its coal corporations since 2020. The reorganization of China's coal mine ownership structure began in 2017, when China Guodian merged with Shenhua Group. But the majority of the reorganization took place in 2020, in the final year of the country's 13th Five-Year Plan (FYP 2016–2020). As a result of the optimization, China achieved a decapacitation of 940 Mt after 5 years, almost double the amount of capacity cut in the 12th FYP. After reorganization of the coal system,

companies like Shandong Energy Group and Jinneng Holding Group experienced massive increases in size and resources.

The ten largest coal companies based on annual coal production capacity and their respective proposed capacities for new projects are shown in Table 2.

TABLE 2. China's largest coal companies after reorganization

Company	Coal capacity (Mtpa)	Proposed capacity (Mtpa)
National Energy Investment Group	533.97	39
Jinneng Holding Group	303.79	10
Shandong Energy Group	270.01	16
China National Coal Group	223.23	0
Shanxi Coal & Chemical Industry Group	195.27	15
Shanxi Coking Coal Energy Group	155.92	8
Lu'an Chemical Group	91.88	0
Huayang New Material Science And Technology Group	88.36	7
Henan Energy Chemical Group	76.56	1.9
China Huaneng Group (Coal Section)	76.07	11

Source: China National Coal Industry Association and GEM Global Coal Mine Tracker.

What about China's Mine Optimization Plans?

The new mining activity raises concerns about China's optimization and reformation plans – a yearslong attempt to reduce excess mine capacity at poorly performing operations. China's authority has continued to promote energy self-sufficiency in 2022 owing to the emerging supply gap with Russia, an ongoing ban on Australian imports, and Indonesia's self-imposed export limit.

President Xi Jinping reiterated in March this year the importance of coal at a National People's Congress delegation, and several delegates called for new policies to shore up profits for coal enterprises. That same month, China's National Development and Reform Commission (NDRC) announced its plans to increase mining capacity by 300 Mtpa and already Beijing has approved three separate "billion-dollar" coal mines.

China's rate of mine closure and abandonment – or decapacity – averaged just 3.13% per year in that time, according to GEM analysis (Figure 4). Yet China has plans to increase capacity by at least 14% on top of the ramp up at the end of 2021, and that's not including projects the NDRC has signaled are forthcoming in 2022. The opening of these new mines, therefore, will require steeper cuts to operating capacity than previous years, or risk

renewed concerns about oversupply, and the likelihood producers will overshoot the China Coal Association's output cap of 4,100 Mt by 2025.

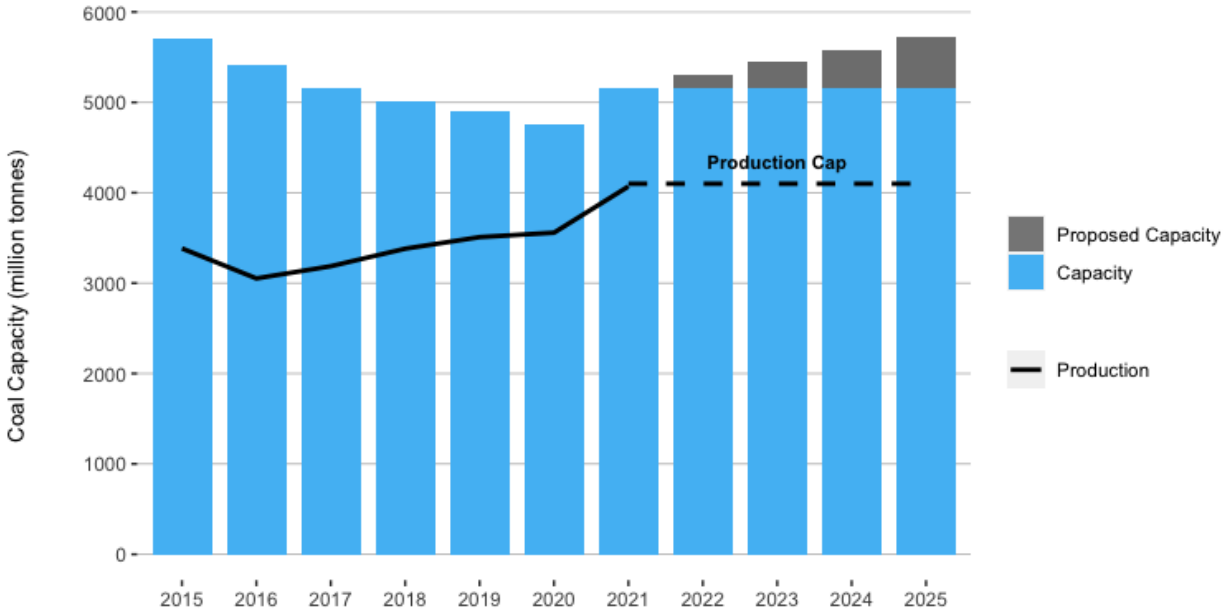

FIGURE 4. China coal mine capacity and production levels

Sources: GEM's Global Coal Mine Tracker, International Energy Agency (IEA) "Coal Data", and GEM analysis.

From "Decapacity" to "Mining Boom"

The sheer amount of new mine capacity under development in China today represents a marked shift from where the country appeared to be heading in 2015. That year the central government issued a policy for coal "decapacity," signaling an intention to wind down the country's growing coal use. The policy involved the closure of smaller mines, consolidation and integration of mine operations, and the creation of a fund for worker transition. The policy also included a three-year ban on raising coal mining capacity through 2018, meaning no new coal mines could be opened unless an equivalent amount of capacity was closed.

But when the country's economy began to slow in 2016, the central government introduced a large stimulus spending package, with emphasis on coal-intensive heavy industry. The transfer of coal power permitting authority from the central government to the provinces in late 2014 led to a frenzy of new coal plant construction. By 2017, China's coal use and production was back on the rise. In 2021, China produced a record 4,070 Mt.

The onset of the Covid-19 pandemic in late 2019 had heightened the pressure on the provinces to use new coal projects to stimulate local economies in the wake of the economic slowdown. Coal companies pushed to expand the country's coal mining capacity and China's National Energy Administration (NEA) approved 195.7 mtpa in 2019 followed by 22 mining projects totaling 42.6 mtpa of coal mining capacity in 2020, and another 11 projects totaling 24.5 mtpa in 2021. GEM previously assessed that many of these

mines appeared to have begun construction before the permits were granted, meaning the permits may have applied retroactively to coal mines that had been operating illegally.

In 2021, China's Central Environment Inspection Group rebuked the NEA for lax enforcement of the country's restrictions on coal development. According to the report, inspections of three provinces found that 121 coal mines were exceeding production quotas by as much as 30%. The China Coal Association announced that year the country will limit its annual coal output to 4,100 mtpa through 2025, and production-levels have now almost reached that limit (4,070 Mt). Any additional coal mining capacity would require equivalent closures to meet the China Coal Association's coal production cap.

Climate Actions in Jeopardy

China took significant strides in 2021 to optimize its mining sector and commit to new climate actions. The 14th FYP, released in March, called for the continued optimization of the coal supply system through 2025. The next month, in April, President Xi announced at the Climate Leaders' Summit that the country will "strictly limit the increase in coal consumption over the 14th FYP period and phase it down in the 15th Five-Year Plan period." The announcement suggested the country's coal consumption – and production – should peak by 2025, and phase down through 2030.

Last autumn, during the 76th session of the UN General Assembly, President Xi announced that China will no longer invest or participate in any new overseas coal power projects. The state council subsequently issued the "Peak by 2030 Action Plan" in October 2021 outlining more specific goals on coal capacity reduction. At the end of the year, during COP26, China and the US issued the US-China Joint Glasgow Declaration on Enhancing Climate Action in the 2020s, which stated that "China will phase down coal consumption during the 15th Five-Year Plan and make best efforts to accelerate this work." China plans to add 1,200 GW of wind and solar generation capacity over the coming decade.

Despite these efforts, China's planned increase in coal mining capacity is incompatible with the country's intended wind down in production after 2025, though China still retains ambitious plans for increasing clean electricity production, and argues that new mine capacity won't contradict climate commitments. Yet the UN and leading research organizations have called for an 11% cut in coal production each year through 2030 to remain consistent with a pathway to 1.5°C and the latest assessment of the Intergovernmental Panel on Climate Change (IPCC) has found energy use from coal needs to decline 75% before 2030 to meet the Paris climate agreement.

So far, China's mine optimization plans have remained vague about the potential impact of coal mine methane. China has not reported methane emissions figures to the UNFCCC since 2014. Even then, China relied on simplified assumptions that, according to researchers at Tsinghua University, could have significantly underestimated coal methane emissions. As a result, there is much disagreement about China's coal mine methane emissions, which may represent up to 90-95% of methane emissions from the country's entire energy sector given the dominance of coal in China's energy mix and the gassiness of many of its coal fields. The International Energy Agency (IEA) has previously estimated China's coal mine methane emissions at 24 Mt and GEM has estimated them higher at 38 Mt.

Since 2020, environmental impact assessments require utilization of the methane gas when concentrations are above 8%, but whether compliance is working remains to be seen. According to a 2019 study in Nature, earlier regulations had "no discernible impact" on continued emissions. It is also unclear whether Chinese operators have taken systematic steps to mitigate emissions from the several thousands mines closed and abandoned under recent optimization

efforts. This study has not factored in potential emissions from abandoned operations, but that is also a significant concern since China's decapacity policy has closed thousands of mines in the last decade and research suggests that abandoned coal mines can emit methane for up to a century after closure, and pose a serious climate impact.

Background on Global Energy Monitor

Global Energy Monitor is a nonprofit research organization developing information on fossil fuel projects worldwide. Through its Global Coal Mine Tracker (GCMT) project, Global Energy Monitor provides biannual updates on coal mine operations. GEM data is used by the International Energy Agency (IEA), UN Environment Programme, U.S. EPA, and World Bank. GEM's Global Coal Plant Tracker (GCPT) data is licensed by Bloomberg LP and UBS Evidence Lab, and is used by the Economist Intelligence Unit and Bloomberg New Energy Finance.

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