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## Periodical Part The 2021 energy crisis: Implications for China's energy market and policies

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A QUARTERLY JOURNAL FOR DEBATING ENERGY ISSUES AND POLICIES

### THE 2021 ENERGY CRISIS:

### IMPLICATIONS FOR CHINA'S ENERGY MARKET AND POLICIES

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### INTRODUCTION

In October 2021, China experienced a severe electricity supply crisis that affected 20 provinces. Industrial activity was curtailed, and even households suffered prolonged outages in some areas. The country is no stranger to periodic energy supply shortages. Think back to 2003–2004, when soaring economic growth outpaced the construction of new power plants; or 2005, when the country faced a shortage of gasoline because the oil companies preferred to export gasoline and diesel to offset losses because of the domestic pricing mechanism. In 2010, provinces curtailed industrial activity in a bid to meet energy intensity targets. In all these cases, the principal causes were domestic and usually involved either poor policy coordination or a clash between market forces and government plans and administrative measures. This time it was no different.

As we discussed in November 2021, this particular crisis also had its roots in the tensions between long-term aspirations and short-term reality and between the market and the plan.<sup>1</sup> At that stage, the precise causes of the power shortages were much debated, as was the likely effectiveness of government countermeasures. This issue of the *Oxford Energy Forum* provides the opportunity to share some more considered reflection on this most recent of China's domestic energy crises, not just on its causes but also on its implications for domestic energy markets and the country's low-carbon energy transition. Of particular importance is the outlook for the 2030–2060 goals: to peak carbon emissions by 2030 and achieve carbon neutrality by 2060.

In the first article, *Lauri Myllivirta* examines the causes of the power crisis and the government's short-term responses. At the heart of the matter was the mismatch between the price of coal, which continues to be set by market forces, and the wholesale tariff for coal-fired power generators, which remains tightly constrained. Rapid economic growth in the first half of 2021 drove rising coal demand. In its efforts to control inflation, the government discouraged coal miners from raising prices, until the upward pressure was too great. When coal prices accelerated upwards, power generators reduced both their purchases of coal and their generation of power. In response, the government ordered coal mines to increase production and increased the tariff range at which coal-fired generators could sell their output. As is discussed in later pieces, one of the consequences of the crisis is a renewed emphasis on coal as a key element of domestic energy security. Moreover, the government now seems to be emphasizing the need to support economic growth as much as pursuing carbon emission reduction. It is not clear yet whether this will involve another round of construction and infrastructure stimulus.

*Xunpeng Shi* and *Muyi Yang* draw attention to the dilemma facing China as it seeks to balance the desire to reduce carbon emissions with the perception that coal is central to security of energy supply. They remind us that annual coal consumption has continued to rise, despite a slight decline in 2015 and 2016. But the share of coal in the primary energy mix has declined from 70.2 per cent in 2011 to 56.8 per cent in 2020 as renewable energy, natural gas, and nuclear power make steadily increasing contributions. The authors argue that the roots of the energy crisis in 2021 lie in the nature of national coal industry policy over the past 20 years or more and the lack of coordination with other policies. Coal mining in China has been subject to repeated measures to constrain production on various grounds such as excess supply, mine safety, environmental protection, and corruption. Despite their good intentions, these actions seem to have been taken without due regard for the consequences for the wider energy system. Without better coordination between policies for different parts of the energy sector, China's phase-out of coal will continue to encounter similar crises, as will that of other coal-dependent nations.

With a focus on the power sector, *David Fishman* revisits the causes of the 2021 power crisis and assesses the measures that the government put in place to further reform the power market. He starts by reminding us that power generators cut back their output in the third quarter of 2021 as rising coal prices and low wholesale tariffs combined to render their business unprofitable. At the same time, the coal stocks at some plants had fallen to two days. The shortage of thermal power was exacerbated by drought in the southwest, which reduced hydroelectricity output, and a short-term, weather-induced decline of wind power from northern China. The 'dual control' policy (ceilings on provincial energy consumption and energy intensity) was a contributory factor as local governments sought to slow down rising energy use. However, Fishman argues that this was only a minor factor. The immediate impact on the power sector was the introduction by the government of long-delayed measures to accelerate the introduction of market forces. In addition to the short-term move to widen the band within which the wholesale tariff could fluctuate, coal-fired generators are now obliged to sell all their output into the competitive wholesale market, and all industrial and commercial customers have to purchase through this market. Nevertheless, the 20 per cent ceiling for price fluctuation remains in place.

<sup>&</sup>lt;sup>1</sup> Michal Meidan and Philip Andrews-Speed, 'China's power crisis: Long-term goals meet short-term realities', Oxford Institute for Energy Studies, November 2021, https://www.oxfordenergy.org/publications/chinas-power-crisis-long-term-goals-meet-short-term-realities/.



*Wu Di*, *Yang Lei*, and *Kang Junjie* pick up the theme of power market reform and assess the lessons learned for the 2030–2060 goals. They draw attention to the fact that the share of coal in the electricity supply mix has declined from 76.8 per cent in 2011 to 60.2 per cent in 2020. However, the continued construction of coal-fired power plants resulted in average annual utilization hours dropping from 5,210 in 2011 to 4,340 in 2020. So, many plants were losing money even before coal prices started to rise in mid-2021. The authors argue that a likely decline in the rate of economic growth, combined with further liberalization of the power market, should support achievement of these goals. Nevertheless, more aggressive steps are needed to enhance the flexibility of the power system by investing in flexible resources and introducing an effective market for ancillary services. Technologies such as hydrogen and solar thermal can play an important role in energy storage. Finally, the main responsibility for the low-carbon transition lies with local governments. They need to improve coordination between their different departments to improve policy design and implementation. They also need to manage questions around social justice during the transition.

Renewable electricity will play a vital role in China's low-carbon energy transition, as it will in other countries. *Anders Hove* identifies several institutional barriers to the continued growth of renewable electricity consumption. First is the role played in policymaking and system planning by the major state-owned grid and generating enterprises that dominate the power sector. These actors prefer to invest in large-scale infrastructure within a centralized power system with a focus on the supply side. The result is that most of the renewable energy installed to date is utility scale. A second obstacle is the protectionist behaviours of provincial governments. They tend to favour their local longstanding thermal power generators at the expense of renewable energy, whether locally generated or transmitted from other regions. On the demand side, energy efficiency has received insufficient attention. Not only do new buildings continue to be poorly designed, but many residential, commercial, and small-scale industrial enterprises have little control over their energy sources or appliances. The author is cautiously optimistic the 2021 power crisis will accelerate moves to overcome these constraints.

China's national carbon emissions trading system (ETS) was launched on 16 July 2021. *Yan Qin* and *Yuan Lin* review the first compliance period, which ended on 31 December 2021, and examine the outlook for the ETS following the power outages and power price reform. For most of this period, trading volumes were low and carbon prices averaged CNY 43.85 (€6)/t. Volumes and prices only picked up towards the end of the compliance period, with prices exceeding CNY 56/t for a few days in late December. This trading behaviour occurred because only spot trading was allowed. In addition, much of the bulk trades were between subsidiaries of the same industrial group. With only 20–30 groups active, trading activity and liquidity remained low. Compliance rates were high. The outlook for the ETS in 2022 is uncertain, not least due to higher fuel prices and the possibility of further reforms to the power market. Concerning the ETS itself, we await a new set of regulations for the ETS to be issued by the State Council, the allocation plan and benchmarks for the second compliance period, and the possible relaunching of the CCER (China's Certified Emissions Reduction) offset market. Other possible innovations may include opening trading to institutional investors and expanding the scope of the ETS beyond the power sector. Despite the strengthening of the policy framework, the carbon price is likely to remain too low to have a significant impact on emissions.

Meanwhile, the power crisis focused attention on China's strong gas imports in 2021. Over time, gas in power will become a key driver of incremental gas demand in China; but in 2021, as *Michal Meidan* argues, the surge in gas demand was not limited to the power sector. Indeed, the need for higher supplies was informed by a number of factors: the recovery in industrial activity and the start of new import terminals and storage tanks as well as a concerted effort to avoid a repeat of the supply shortages that occurred during the winter of 2020–2021. Yet in the aftermath of the power crisis, with the government focusing increasingly on supply security and buyers looking to limit their exposure to price volatility, Chinese gas companies secured over 30 million tonnes per annum of new long-term contracts. Close to a third of these contracts were concluded with US LNG exporters, but at the same time, in a bid to offset the rising dependence on seaborne flows, Beijing and Moscow announced an additional 10 billion cubic metre pipeline deal.

*Byford Tsang* assesses the impact of the 2021 energy supply crisis on China's climate policy. A number of measures announced should support the nation's low-carbon energy transition. The higher prices paid for coal-fired power will make renewable energy more competitive. Certain forms of renewable energy will not be counted towards a province's total annual energy consumption. Looking further ahead, 'dual carbon control' targets will replace 'dual energy control' targets, and the government is likely to introduce a national carbon cap in the next five years. However, as mentioned by other authors in the *OEF*, the energy supply crisis reinforced fears around energy security. The resulting policies to address this challenge rely heavily on boosting the capacity of coal mines and coal-fired power stations, with CNY 200 billion (US\$31.3 billion) of loans for



'clean and efficient coal'. Estimates of the required expansion of China's coal-fired generation range from 53 GW to 150 GW. Yet, at the same time, the People's Bank of China is providing low-cost loans for the installation of renewable energy, smart grids, carbon capture, and other low-carbon technologies. This tension between energy security and climate change mitigation explains China's preference at COP26 for 'phasing down' rather than 'phasing out' coal. It also introduces uncertainty to the short-term trajectory of the country's carbon emissions.

The issue of energy security is picked up by *Linxiao Zhu*. The belief has long been held in China that over-reliance on overseas sources of oil and gas presents a security threat. The energy supply crisis of 2021 highlighted that the low-carbon energy transition poses an additional threat to supply security. The leadership in November 2021 therefore emphasized the need to carefully balance carbon neutrality with national security, including security of energy, food, and industrial supply chains. Maximizing the domestic production of primary energy lies at the heart of China's energy security paradigm, as it has for decades but now with renewed vigour. The strategy relies on the use of 'clean coal' along with renewable and other new sources of energy. Two key impediments constrain the effective implementation of this broad vision. First, turning the vision into specific, practicable policies continues to be undermined by the fragmentation of the policymaking process. This has been exacerbated by the direct involvement of the top Chinese Communist Party leadership in setting policy directions, with insufficient input from government agencies. Second, measures to increase the role of market mechanisms in the energy sector proceed only slowly, whilst at the same time the state-owned enterprises remain at the heart of the sector.

*Alicia Garcia Herrero* looks ahead to the rest of 2022. A combination of the power crisis, pandemic-induced disruptions to supply chains, and government crackdowns on certain industrial sectors has put downward pressure on China's economic growth and upward pressure on inflation. These pressures persist even though the worst of the energy supply crisis is past. The Central Economic Work Conference in December emphasized the need to stabilize the economy even at the expense of short-term efforts to reduce carbon emissions. In this context, the government has already cut both the required reserve ratios for banks and interest rates. Even in the absence of a fiscal stimulus, it is possible that 2022 will see reduced priority assigned to achieving the 2030 goal. However, such postponement will not only make achieving that goal more challenging but may also increase the probability of more energy supply crises. On the converse side, the People's Bank of China has recently launched a new carbon emissions facility that offers low-interest-rate loans to financial institutions that help firms lower emissions.

## ENERGY POLICYMAKING AT 'CHINA SPEED': RESPONSES TO THE COAL CRISIS

#### Lauri Myllyvirta

China's coal crisis, with widespread rationing of electricity, sky-high coal prices, and supply shortages in the second half of 2021, has had profound impacts on energy trends, regulation, and political priorities. Electricity market reforms have been reenergized and investment incentives increased for both clean energy and fossil fuels. On the other hand, the uncertainty of the new situation meant that the government became more reluctant to pin down the country's CO<sub>2</sub> emissions trajectory over this decade, even if emissions have been falling in recent months and carbon neutrality remains an important priority.

The coal crisis has eased over the winter, due to a steep ramp-up of supply and falling demand. The key driver of falling demand in recent months is the construction slump resulting from tighter lending policies for the real estate sector. This has shown the government's determination to pursue essential if painful economic reforms, which will provide an important tailwind to the energy transition.

The net effect of these developments on the emissions trajectory is hard to judge. Uncertainty has increased, and 2022's importance as a political year further muddles the waters on longer-term direction.

#### What led to the coal crunch?

China's recovery from the COVID-19 shock relied heavily on construction and heavy industry. Coal demand increased 11 per cent in the first half of 2021,<sup>2</sup> which meant that the coal market was going to be tight under any circumstances. However, at

<sup>&</sup>lt;sup>2</sup> Ding, Yiting, 'The country's energy consumption grew rapidly in the first half of the year - Overall balance of energy supply and demand is tight', People's Daily, 29 July 2021, <u>http://www.gov.cn/xinwen/2021-07/29/content\_5628083.htm</u>.



the time, the government's attention was on combating producer price inflation, and hiking power prices didn't fit that. Instead, as fuel prices started to rise on the back of the global recovery and blistering demand growth in China, the regulators took actions that amounted to an 'implicit ban' on raising coal prices,<sup>3</sup> and were even considering a formal price cap.<sup>4</sup>

The immediate cause of the crisis was that the electricity prices paid to generators were regulated, while coal prices were and still are set on the market. When coal prices rise, unless the regulators increase electricity prices, it becomes uneconomic for coal power plants to supply electricity. Plants can then avoid generating at a loss by claiming they have a technical malfunction or by failing to purchase the coal they need to run.

As a result, coal power plants cut back on coal purchases, running down coal inventories instead, and coal mines didn't ramp up output in time, as the price and demand signals were dampened. In August, when coal prices were already surging, domestic output expanded by a meagre 1 per cent on year.<sup>5</sup>

The gap was exacerbated by supply-side disruptions: an anti-corruption campaign in Inner Mongolia, mining safety campaigns, heavy rains, and a heavy-handed restructuring of the coal mining industry. Surging coal mine output in recent months has been needed to close this gap.

#### $\label{eq:coal} Coal \ consumption \ and \ supply \ in \ China \ (12-month \ moving \ sum)$



Consumption — Supply (output+net imports)

Source: Centre for Research on Energy and Clean Air analysis of data from China National Bureau of Statistics, China Customs and WIND Information.

An attempt to introduce flexibility to electricity pricing appears to have made things worse. Power plants and grid operators were given the ability to negotiate long-term contracts within a band around the base tariff. This could have allowed plants to

https://www.forbes.com/sites/timtreadgold/2021/05/26/coal-hits-a-three-year-high-despite-china-trying-to-control-prices/?sh=741c9db678b7.

<sup>4</sup> 'China considers price controls on surging coal market—Bloomberg', Reuters, 8 June 2021, <u>https://www.reuters.com/business/energy/china-considers-price-controls-surging-coal-market-bloomberg-2021-06-09/</u>.

<sup>5</sup> National Bureau of Statistics, 'Added value of industrial enterprises above designated size increased by 5.3% in August 2021', http://www.stats.gov.cn/tisi/zxfb/202109/t20210915\_1822085.html.

<sup>&</sup>lt;sup>3</sup> Treadgold, Tim, 'Coal hits a three-year high despite China trying to control prices', Forbes, 26 May 2021,



negotiate higher margins, but, as warned already in January 2020,<sup>6</sup> it had the opposite effect: as China has overcapacity in coal-fired power, it was the grid operator who had the pricing power and generators bid low, further lowering prices.

#### How did the crisis affect energy trends and policies?

The coal and electricity shortages obviously had the direct impact of suppressing China's coal use and emissions. Industrial coal use is affected by the high prices directly. As electricity prices are regulated, electricity users felt the effect of the high prices through power rationing as power plants refused to operate at a loss.

As regulators scrambled to get coal plants back online, electricity market reforms went into high gear. The energy regulator increased the 'float range' within which tariffs paid to coal power plants can be adjusted, allowing them to increase further above the benchmark prices set for each province. Regulated electricity prices were scrapped for industrial consumers, requiring them to transition to long-term contracts at market prices. This is significant because a low and regulated power price has been a key form of support for energy-intensive industries, and abolishing it is aligned with the aim of controlling 'high-energy, high-emissions' industries.

Even more important might be the political signal, showing how closely nominally market-based mechanisms are managed by the government: when the government introduced the floating tariffs, saying they were a way to reduce prices, prices fell; when the government said that the float should be used to increase tariffs, they rose.

The increase in coal power tariffs could make investments in coal power plants more attractive, which would hinder the energy transition. The year 2021 saw an increase in investments in thermal power,<sup>7</sup> again, which creates the risk of a new acute overcapacity situation similar to the one experienced five years ago.

Increased coal power tariffs don't directly affect the attractiveness of wind, solar, or nuclear power, as their tariffs are tied to the benchmark power prices and not the float. The increase in power prices paid to coal plants was realized by using the float, not by changing the benchmarks. However, the government took other steps in response to the coal crisis that benefit renewables, especially giving industrial power users the ability to avoid power rationing by purchasing green electricity and excluding green electricity consumption from energy consumption control targets for provinces, creating a significant incentive to increase clean energy consumption.

China's construction sector activity contracted steeply and emissions started to fall in recent months.<sup>8</sup> The slowdown started when the government tightened credit to real estate, under the slogan 'apartments are for living in, not for speculation.'

The falling coal demand has helped resolve the coal crisis faster. Additionally, because of the industrial slump, data has been showing little rebound in power demand as rationing is eased or eliminated.

The Central Economic Work Conference, held in mid-December, recognized the key reason for the slowdown: 'the withdrawal of the extraordinary fiscal and monetary policy response to the epidemic, leading to a significant fall in consumer and investment demand'.

#### Did the government weaken CO<sub>2</sub> peaking targets due to the crisis?

China's climate targets of peaking CO<sub>2</sub> emissions before 2030 and reaching carbon neutrality before 2060 leave space for emissions increases until late this decade and for a very wide range of possible emissions trajectories over the decade that follows.

In July, China's climate envoy Xie Zhenhua said that the Central Committee and State Council top-level policy documents on CO<sub>2</sub> peaking and carbon neutrality would specify a timetable and a road map for carbon peaking.<sup>9</sup>

<sup>&</sup>lt;sup>6</sup> Feng Hao, 'New pricing could spell trouble for China's coal sector', China Dialogue, 8 January 2020,

https://chinadialogue.net/en/energy/11759-new-pricing-could-spell-trouble-for-china-s-coal-sector/.

<sup>&</sup>lt;sup>7</sup> National Energy Agency, 'National Power Industry Statistical Data for January–September 2021', Chinapower.com.cn, 26 October 2021, http://www.chinapower.com.cn/sj/zxfb/20211026/110100.html.

<sup>&</sup>lt;sup>8</sup> Myllyvirta, Lauri, 'China's CO<sub>2</sub> emissions see first quarterly fall since post-lockdown surge', CarbonBrief, <u>https://www.carbonbrief.org/analysis-</u> chinas-co2-emissions-see-first-quarterly-fall-since-post-lockdown-surge.

<sup>&</sup>lt;sup>9</sup> Xie Zhenhua, 'A detailed explanation of the 1+N policy system as the timetable and roadmap for the realization of the dual carbon goals', <u>finance.sina.com.cn</u>, 27 July 2021. http://finance.sina.com.cn/zl/china/2021-07-27/zl-ikqcfnca9266336.shtml



However, in September, in the depth of the coal and electricity crisis, Premier Li Keqiang said, 'in light of the current situation, we must deepen the calculations and analysis, and ... propose a timetable and road map for peaking emissions,'<sup>10</sup> indicating that the government was taking a time out.

Accordingly, the top-level climate policy documents and China's updated climate pledge (formally, its nationally determined contribution), published just before the Glasgow COP26 climate summit, were very light on targets and did not specify the emissions peaking timeline or peaking level.<sup>11</sup>

The hesitancy to commit to a specific emissions pathway or ceiling for this decade might seem like a paradoxical result from the current downturn in emissions. However, the real-estate slump and coal crisis have increased the uncertainty over China's economic outlook.

The big question is whether the economic slowdown will prompt another round of construction and infrastructure stimulus that would drive up emissions once more, before the targeted peak late this decade.

Furthermore, while the coal crisis was caused by ballooning coal consumption and price control policies, there is a widespread perception in China that the current coal crisis is the result of an overly ambitious shift to clean energy—rather than an overreliance on coal and lack of progress in shifting away from it.<sup>12</sup> This perception likely made the leadership hesitant to highlight or strengthen climate targets until the crisis is fully resolved.<sup>13</sup>

China's sectoral implementation plans for steel, construction materials, power, industry, and other sectors, currently being finalized, could also introduce more measurable targets.<sup>14</sup>

#### Focus has shifted to energy security and stabilizing economic growth

The readout of the Central Economic Work Conference, held in December, provides a useful read of the focal points of energy and economic policy after the acute crisis had passed. The priorities that emerge are economic stability, energy security, and carbon neutrality. The statement has a major focus on carbon neutrality and energy, which shows the heightened political importance of energy issues in the aftermath of the crisis.

One of the sentences that jumps out is: 'The phase-out of conventional energy must be based on secure and reliable replacement with new energy.' This is the first time that phase-out of (unabated) fossil fuels has been included in a high-level official document.

However the readout emphasizes that coal is the foundation of China's energy system and promises to promote 'clean coal', while calling for accelerated development of domestic oil and gas production, so there is lots of hedging between fossil fuels and clean energy.

The hedging approach is reflected in energy lending policies, with the State Council recently announcing two new state-backed lending facilities, one for loans to coal projects and one for clean energy.<sup>15</sup> The coal facility covers coal mining; preparation; and

<sup>&</sup>lt;sup>10</sup> State Council Information Office, 'Li Keqiang presided over a meeting of the National Energy Commission. Emphasis on stable energy supply, energy security and enhancing the supporting capacity of green development. Han Zheng attended.', 11 October 2021, http://www.scio.gov.cn/32344/32345/44688/47166/47173/Document/1714527/1714527.htm.

<sup>&</sup>lt;sup>11</sup> 'China briefing: "1+N"; Xi's energy instruction; climate "white paper", CarbonBrief, 28 October 2021, <u>https://www.carbonbrief.org/china-briefing-28-october-2021-1n-xis-energy-instruction-climate-white-paper;</u> China's achievements, new goals and new measures for nationally determined contributions [unofficial translation], <u>https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/China First/China%E2%80%99s</u> Achievements, New Goals and New Measures for Nationally Determined Contributions.pdf; Evans, Simon, et al., 'COP26: key outcomes agreed at the UN climate talks in Glasgow', CarbonBrief, 15 November 2021, <u>https://www.carbonbrief.org/cop26-key-outcomes-agreed-at-the-un-climate-talks-in-glasgow</u>.

<sup>&</sup>lt;sup>12</sup> 'China's energy crisis has villagers questioning its climate path,' Bloomberg, 4 October 2021, <u>https://www.bloomberg.com/news/articles/2021-10-04/china-s-energy-crisis-has-villagers-questioning-its-climate-path</u>.

<sup>&</sup>lt;sup>13</sup> 'China rethinks path to climate goals due to energy crisis', Bloomberg, 12 October 2021, <u>https://www.bloomberg.com/news/articles/2021-10-12/china-rethinks-its-path-to-climate-goals-due-to-energy-crisis</u>.

 <sup>&</sup>lt;sup>14</sup> Liu Hongqiao, 'NDRC: '1+N' progress', Twitter, 17 November 2021, <u>https://twitter.com/LHongqiao/status/1461001673011347459</u>.
<sup>15</sup> Xinhua News Agency, 'The country to establish a 200 billion yuan relending facility to support the clean and efficient use of coal', 17 November 2021, <u>http://www.news.cn/2021-11/17/c\_1128074370.htm</u>; Lee, Georgina, 'Climate change: China's central bank unveils lending facility to spur funding for carbon-reduction projects in net-zero drive', *South China Morning Post,* 8 November 2021, https://sg.news.yahoo.com/climate-change-china-central-bank-033404596.html.



use in industry, heating, and power; as well as 'comprehensive utilization of coal', which includes carbon-intensive coal-tochemicals, coal-to-gas, and coal-to-oil projects. However, the coal facility is limited in size while the clean energy facility, unusually, has no lending limit and provides low-interest-rate credit covering 60 per cent of clean energy loans granted by banks.

'Clean coal' in China includes coal-fired power plants and heating plants that meet the 'ultralow air pollutant emissions standards' as well as 'comprehensive utilization of coal'. Carbon capture, utilization, and storage (CCUS) is not required for coal use to qualify as 'clean' in this context. China has a number of CCUS pilot and demonstration projects,<sup>16</sup> but there are no firm plans to begin deploying the technology at scale. In the Tsinghua researchers' low-carbon road map,<sup>17</sup> which has a prominent position in informing China's carbon neutrality policies, CCUS only begins to make a contribution after 2040.

The statement says the aim is to move as soon as possible to controlling the total CO<sub>2</sub> emissions and CO<sub>2</sub> intensity instead of energy consumption, which will lay the groundwork for China's emissions peak and for emissions reductions after the peak.

The overarching 2022 priority as set by the Central Economic Work Conference is 'stability', which the State Council has predictably translated into speeding up investment spending to boost economic growth.<sup>18</sup> This will mean an increase in the demand for construction materials, and will also boost energy investment: 'food and energy security' are first on the list of areas to invest in.

The result of these signals will be a wave of investment in both clean energy and fossil fuel projects, and a lot of investment in other infrastructure that will backstop the demand for construction materials. Our research has shown that the provinces' lists of major investment projects, which are likely to guide the new wave of spending, are still very fossil-fuel heavy, and it's the provincial governments that are expected to carry out the spending.<sup>19</sup>

The volume of spending will, however, be limited by the poor financial state of local governments after previous rounds of stimulus and after the steep drop in revenue from land sales this year. The new push for infrastructure spending will test how much the emphasis on climate, decarbonization, and high-quality development has filtered to local government decision-making.

The emphasis on stability is in no way unexpected: new loans already bottomed out in the summer, and with the top political event, the once-in-five-years Chinese Communist Party Congress, awaiting in late 2022, economic performance is going to be important and there will be less appetite for fundamental or controversial reforms.

It seems clear that, over the coming years, the leadership is prepared to see through some major structural changes, particularly a major scaleback of real estate construction and speculation, and to tolerate a slowdown in economic growth as a result. Together with growing clean energy investment, this should enable China's emissions to peak and decline well before 2025.

<sup>&</sup>lt;sup>16</sup> 'List of key CCS facilities in China', Global CCS Institute, n.d., <u>https://www.globalccsinstitute.com/archive/hub/insights/202094/list-key-facilities-chinaglobal-ccs-institute-co2re-database.pdf</u>.

<sup>&</sup>lt;sup>17</sup> Institute of Climate Change and Sustainable Development, Tsinghua University, 'China's long-term low-carbon development strategy and transformation pathway. Synthesis report', China Environmental Publishing Group, Beijing, <u>https://www.efchina.org/Reports-zh/report-lceg-</u>20210711-zh.

<sup>&</sup>lt;sup>18</sup> Xinhua News Agency, 'Deploy and accelerate major projects identified in the "14th Five-Year Plan" Outline and in sectoral plans', 1 October 2021, <u>https://finance.sina.cn/2022-01-11/detail-ikyamrmz4399548.d.html?from=wap</u>.

<sup>&</sup>lt;sup>19</sup> Myllyvirta, Lauri, 'China's Covid stimulus plans for fossil fuels three times larger than low-carbon', CarbonBrief, 23 September 2020, <u>https://www.carbonbrief.org/analysis-chinas-covid-stimulus-plans-for-fossil-fuels-three-times-larger-than-low-carbon.</u>



## CHINA'S COAL PHASE-OUT FACES A ROCKY AND WINDING ROAD

#### Xunpeng Shi and Muyi Yang

A timely and orderly coal phase-out is the single most important step to limit global warming to 1.5°C. Last year saw a growing global momentum towards this goal. For the first time in a COP statement, the Glasgow Climate Pact calls on countries to 'phase down unabated coal power'.<sup>20</sup> A total of 47 countries also signed the Global Coal to Clean Power Transition Statement,<sup>21</sup> which commits them to phase out unabated coal power in the 2030s for major economies and in the 2040s globally.

Last year also saw major energy crises affecting various parts of the world: gas and oil price spikes in Europe and the United States and coal and power shortages in China and India. These crises have prompted considerable policy debate on coal phase-out. In Europe, much of the debate has revolved around the replacements for coal. In November 2021, French President Emmanuel Macron unexpectedly announced the revival of nuclear energy.<sup>22</sup> Later, France initiated a campaign to push for including modern nuclear energy in the EU's list of environmentally sustainable economic activities.<sup>23</sup> Meanwhile, the European Commission has been debating whether gas and nuclear energy should be considered climate-friendly investments in EU green finance rules.<sup>24</sup>

In contrast to Europe, the debate in China has tended to focus on the pace of coal phase-out, with some arguing that the country needs to adjust the speed at which coal phase-out progresses.<sup>25</sup> This argument is premised on the consideration that coal remains the backbone of the country's energy supply and accounts for roughly 60 per cent of total electricity generation. Any coal supply shortfalls are therefore very likely to affect the security of electricity supply, especially given that the country is still at an early stage of transitioning towards a low-carbon electricity system that can ensure supply security under all conditions, such as extreme weather and unexpected demand spike.

Taking this argument forwards, this essay suggests that adjusting the pace of coal phase-out does not mean that China should slow it down. Indeed, a rapid phase-out of coal is critical for the country to attain its ambitious climate targets and to help mitigate the worst impacts of climate change. Yet, this process should be better coordinated with decarbonization processes in other segments of the energy system (the power system, in our instance), in order to maintain the overall supply security— essential for achieving a socio-politically sustainable decarbonization of the Chinese economy over the long run.

While based on China's experience, the discussion presented in this essay also provides valuable insights for other coaldependent countries, such as India and Indonesia. These countries are facing similar challenges in managing the coalelectricity-development nexus.

#### Energy transitions and crisis: coal is at the centre of the storm

Energy transition and coal phase-out in China can be traced back to 2006, when the country set its first energy intensity target,<sup>26</sup> primarily driven by concerns that its rapid socio-economic progress could falter due to the lack of energy supply. The following years saw a steady reduction in the energy intensity of the Chinese economy.<sup>27</sup> This contributed to a gradual

https://www.washingtonpost.com/world/2021/12/18/nuclear-energy-climate-france-germany/.

<sup>24</sup> Kate Abnett 'EU plans to finish green investment rules for gas and nuclear next year', Reuters, 20 December 2021,

<sup>27</sup> Gao Baiyu, "Without a carbon cap, you can't provide strong support for a carbon peak", China Dialogue, 15 March 2021,

<sup>&</sup>lt;sup>20</sup> Fiona Harvey, 'What are the key points of the Glasgow climate pact?', *Guardian,* 14 November 2021,

https://www.theguardian.com/environment/2021/nov/14/what-are-the-key-points-of-the-glasgow-climate-pact-cop26.

<sup>&</sup>lt;sup>21</sup> 'Global coal to clean power transition statement', 26th UN Climate Change Conference of the Parties, 4 November 2021, <u>https://ukcop26.org/global-coal-to-clean-power-transition-statement/</u>.

<sup>&</sup>lt;sup>22</sup> Rick Noack, 'Is nuclear energy green? France and Germany lead opposing camps', Washington Post, 18 December 2021,

<sup>&</sup>lt;sup>23</sup> Nelly Moussu and Daniel Eck (translator), 'Macron in favour of integrating nuclear into EU green taxonomy', Euractiv, 3 December 2021, <u>https://www.euractiv.com/section/energy/news/macron-in-favour-of-integrating-nuclear-into-eu-green-taxonomy/;</u> 'EU taxonomy for sustainable activities', European Commission, n.d., <u>https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities\_en.</u>

https://www.reuters.com/markets/commodities/eu-plans-finish-green-investment-rules-gas-nuclear-next-year-2021-12-20/. <sup>25</sup> Orange Wang, 'China's power crisis "man-made", and miscalculations by Beijing serve as "a very painful lesson", coal insiders say', South

China Morning Post, 10 November 2021, https://www.scmp.com/economy/china-economy/article/3155584/chinas-power-crisis-man-made-and-miscalculations-beijing.

<sup>&</sup>lt;sup>26</sup> Ping Zhang, Xun Peng Shi, Yong Ping Sun, Jingbo Cui, and Shuai Shao, 'Have China's provinces achieved their targets of energy intensity reduction? Reassessment based on nighttime lighting data', *Energy Policy* 128, May 2019, 276–283, <a href="https://doi.org/10.1016/j.enpol.2019.01.014">https://doi.org/10.1016/j.enpol.2019.01.014</a>.



decoupling of economic and energy-consumption growth and, together with the inexorable march of renewable energy, to a relative retreat of coal in the primary energy mix, from a peak of 70.2 per cent in 2011 to 56.8 per cent  $\underline{i}$ n 2020, according to the official statistics.

Notwithstanding, coal consumption has continued to rise in absolute terms, leading to growing concerns that China's energy transition is not fast enough, especially not to the extent considered essential for limiting global warming to 1.5°C. In such contexts, President Xi Jinping promised to strictly limit the growth of coal consumption over the period 2021–2025 and to phase it down\_thereafter, as he outlined how China will attain its carbon neutrality pledge in a speech to the Leaders' Summit on Climate in 2021.<sup>28</sup> This means that China's energy transition will step into a new phase, where coal consumption will be in absolute decline.

Later in 2021, however, the country was hit by a major power shortage, affecting two-thirds <u>of</u> the provinces, where many factories were forced to shut down, and some households were left in the dark.<sup>29</sup> While a long list of 'unique circumstances' <u>has</u> been identified as responsible for the power shortage, a broad consensus seems to have emerged that a widespread coal supply shortage<u>is</u> at the top of the list.<sup>30</sup>

The severity of the coal supply shortage can be illustrated by looking at coal price movements in September 2021, when the power crisis was at its peak. At that time, domestic coal prices hit record highs several times, and the widely traded thermal coal futures contracts for January 2022 delivery on the Zhengzhou Commodity Exchange reached US\$200 (CNY 1,288) a tonne on 28 September, up from US\$150 three weeks before. A year before that, the prices were around US\$85—roughly equivalent to the five-year average before COVID-19.<sup>31</sup>

#### Twists and turns in China's coal industry policy: a historical backdrop

While there are several factors contributing to the country's coal supply shortage, a consensus seems to have been reached that coal industrial policies are at the heart of this shortage. Prompted by concerns about overcapacity in China's coal industry, coal production capacity cuts became a top policy priority for the first time in 1998, and actions were taken in the following years to rein in the industry's expansion of production capacity. Later (especially after 2003), these actions were watered down to industry consolidation due to the rapid increase of coal demand. During the industry consolidation period, many small coal mines were closed or merged with large coal mining companies.<sup>32</sup> This further strengthened the dominant market position of these large companies, ushering in a decade-long coal mining boom in China.<sup>33</sup>

The situation began to change in 2016 when coal production capacity cuts once again appeared at the top of the policy agenda as part of the government's supply-side reform.<sup>34</sup> <u>This</u> reform is a key component of the economy-wide reform agenda to sustain growth against a backdrop of excess productive capacity, declining prices for industrial products, and falling profits.

https://www.worldscientific.com/doi/10.1142/S0217590819500589.

https://chinadialogue.net/en/energy/can-controlling-energy-use-drive-chinas-green-transition-during-the-next-five-years/.

<sup>&</sup>lt;sup>28</sup> 'China to control, phase down coal consumption in next decade: Xi', Xinhuanet, 22 April 2021, <u>http://www.xinhuanet.com/english/2021-04/22/c\_139899306.htm</u>.

<sup>&</sup>lt;sup>29</sup> Cissy Zhou, 'China power crisis: thermal coal inventory nears record low as country suffers worst outages in a decade', *South China Morning Post*, 29 September 2021, <u>https://www.scmp.com/economy/china-economy/article/3150457/china-power-crisis-thermal-coal-inventory-nears-record-low</u>.

<sup>&</sup>lt;sup>30</sup> Amanda Lee, 'China's power crisis: why is it happening, how bad is it, and what if it continues into the freezing winter months?', South China Morning Post, 10 October 2021, <u>https://www.scmp.com/economy/china-economy/article/3151710/chinas-power-crisis-why-it-happening-how-bad-it-and-what-if;</u> Xiaohe Dai, Han Zhu, Tao Wu, and Wenyu Fang '多地为何"拉闸限电"?后续电力供应能否保障?', Xinhua News Agency, 09 September 2021, <u>http://www.news.cn/politics/2021-09/29/c\_1127914464.htm</u>.

<sup>&</sup>lt;sup>31</sup> 'Thermal coal', Zhengshou Commodity Exchange, n.d.,

http://english.czce.com.cn/enportal/Products/NonAgriculture/ThermalCoal/H69020203index\_1.htm; John Kemp, 'Record Chinese coal futures signal need to boost output', Reuters, 7 September 2021, https://www.reuters.com/article/china-coal-kemp-idUSKBN2G31BC.

<sup>&</sup>lt;sup>32</sup> Xunpeng Shi, 'China's small coal mine policy in the 2000s: a case study of trusteeship and consolidation', *Resources Policy* 38(4), December 2013, 598–604, <u>https://doi.org/10.1016/j.resourpol.2013.09.009</u>.

<sup>&</sup>lt;sup>33</sup> Xunpeng Shi, Yifan Shen, Ke Wang, and Yanfang Zhang, 'Capacity permit trading scheme, economic welfare and energy insecurity: case study of coal industry in China', *Singapore Economic Review* 66(2), 2021, 369–389,

<sup>&</sup>lt;sup>34</sup> Ouyang Shijia and Zhou Lanxu, 'Supply-side reform gets greater boost', *China Daily*, 6 January 2021, https://www.chinadaily.com.cn/a/202101/06/WS5ff4f35ca31024ad0baa0ac2.html.



The capacity-cut policy, although temporarily relaxed in 2017 when coal prices were skyrocketing,<sup>35</sup> has continued until now.

Recent years have also seen increased penalties<sup>36</sup> for workplace safety violations, frequent checks by the Central Inspection of Ecological and Environmental Protection on the progress of 'energy dual-control' implementation, and corruption probes focused on the coal industry in Inner Mongolia, China's second-largest coal-producing province<sup>37</sup>—all of which have greatly affected the country's coal production, especially the illegal production that has not been reported previously.

#### Power crisis in 2021 and a shift in coal industrial policy

The subdued coal production has, however, not been coordinated with decarbonization efforts in other segments of the energy sector, leading to less flexible capacity of the power sector to respond to changing circumstances.

Specifically, last year saw the occurrence of extreme weather conditions—a drought in southwest China and windless weather in northeast China—that significantly affected hydro and wind generation. Meanwhile, a very hot summer and strong industrial growth, fuelled by rising demand for exports, pushed up the demand for electricity (12.9 per cent year over year, over the first three quarters of last year).<sup>38</sup>

In such settings, additional coal-fired generation capacity was called upon to meet the rising demand for electricity, but its ability to meet this demand was adversely affected by the coal supply shortage and associated high coal prices. According to a report on 8 September, China's coal production in the first seven months of 2021 was only up at a compound annual rate of 4.1 per cent when compared with the same period in 2019.<sup>39</sup> Meanwhile, the country's electricity generation increased at a rate of 7.4 per cent. If the cut in unreported coal production is accounted for, the supply shortfall may be even greater.

Given China's tight control of electricity prices, for many generators, the record high coal prices mean it was unprofitable or even loss-making to operate.<sup>40</sup> Despite being required to continue operating, generators have been less willing to produce and, in some cases, they have found ways to circumvent the mandate.

In recognition of the significant discordance in the energy transition process, China's central leadership called on the country to rectify\_traditional campaign-style carbon reduction (纠正运动式减碳)<sup>41,42</sup>

Neither the Chinese government nor the state media has given an official explanation of these phrases. However, we understand that they indicate that energy transitions and coal phase-out have not been progressed in a coordinated manner: excessive actions have been taken to reduce coal production without considering its impact on other segments of the energy sector.

To meet the increasing coal demand and crack down on coal prices, the central government announced in October that it would release 370 million tonnes of additional mine capacity,<sup>43</sup> and prepared another 100 Mt capacity as an emergency response—a

https://www.carbonbrief.org/china-issues-new-single-game-instructions-to-guide-its-climate-action.

<sup>43</sup> '多措并举推动煤炭增产增供取得明显成效', National Development and Reform Commission, 19 October 2021,

http://www.gov.cn/xinwen/2021-10/19/content\_5643532.htm.

<sup>&</sup>lt;sup>35</sup> Xunpeng Shia, Bertrand Rioux, and Philipp Galkin, 'Unintended consequences of China's coal capacity cut policy', *Energy Policy* 113 (February 2018), 478–486, <u>https://doi.org/10.1016/j.enpol.2017.11.034</u>.

<sup>&</sup>lt;sup>36</sup> 'China increases penalties for workplace safety violations in new law amendment', Xinhua News Agency, 06 October 2021, <u>http://www.xinhuanet.com/english/2021-06/10/c\_1310000922.htm;</u>.

<sup>&</sup>lt;sup>37</sup> '吉林省辽源市能耗双控工作不力 "两高"项目违法问题突出', Ministry of Ecology and Environment of the People's Republic of China, 17 September, <u>https://www.mee.gov.cn/ywgz/zysthjbhdc/dcji/202109/t20210917\_949220.shtml;</u> William Zheng, 'China takes aim at corrupt cadres and officials in expanded Inner Mongolia campaign', *South China Morning Post*, 18 March 2021,

https://www.scmp.com/news/china/politics/article/3125867/china-takes-aim-corrupt-cadres-and-officials-expanded-inner.

<sup>&</sup>lt;sup>38</sup> Zen Soo and Joe McDonald, 'China's power cuts may foreshadow shortages of global goods', *Financial Review*, 28 September 2021,

https://www.afr.com/world/asia/chinas-power-cuts-may-foreshadow-shortages-of-global-goods-20210928-p58vgk.

<sup>&</sup>lt;sup>39</sup> John Kemp, 'Record Chinese coal futures signal need to boost output', Reuters, 7 September 2021, <u>https://www.reuters.com/article/china-coal-kemp-idUSKBN2G31BC</u>.

<sup>&</sup>lt;sup>40</sup> Xungpeng Shi and Muyi Yang, 'PRC power shortages, coal and Australia', Australia-China Relations Institute, 30 September 2021, <u>https://www.australiachinarelations.org/content/perspectives-prc-power-shortages-coal-and-australia</u>.

<sup>&</sup>lt;sup>41</sup> Campaign-style carbon reduction, in the Chinese context, typically refer to situations where local governments only chant slogans without making any meaningful actions to reduce emissions or make excessive efforts to reduce emissions even at the expense of socio-economic stability.

<sup>&</sup>lt;sup>42</sup> Xiaoying You, 'China issues new "single-game" instructions to guide its climate action', CarbonBrief, 4 August 2021,



reversal of the previous coal de-capacity policy. In December, the annual central economic work conference demanded an increase in the clean and efficient use of coal and optimization of the interactions between coal and 'new' energy.<sup>44</sup>

#### What's next?

These responses help stabilize the coal market and alleviate the power crisis, but they do not address the fundamental cause of the crisis, i.e., significant dissonance in the energy transition process, with coal phase-out progressing too fast for other segments of the sector to accommodate. Moreover, the relaxation of coal supply capacity control is not in line with the country's overall efforts towards decarbonization.

The energy sector is a complex system, where various energies and associated supply chains interact in an array of competing and complementary relationships to ensure the security and reliability of the energy supply. Changes in one system segment (e.g., coal production capacity cuts), therefore, need to be made in coordination with changes in other segments—for example, a ramp-up of clean power that is sufficient to replace coal in meeting rising electricity demand as well as in dealing with short-term disturbances, such as extreme weather conditions and unexpected demand rise. Furthermore, policies that affect energy transitions from different perspectives need to be coordinated. If not, the functioning of the whole energy system could be affected. Such dysfunctions could build opposition to energy transitions and threaten their long-term sustainability.

China's power crisis last year should substantiate this viewpoint. Although some provinces in southern China (Guangdong and Zhejiang, for example) already saw signs of power shortages earlier last year, the pursuit of the energy decarbonization agenda has continued. In August, China's macroeconomic planner—the National Development and Reform Commission—issued warnings to 19 provinces for failing to meet their targets on energy intensity reduction.<sup>45</sup> Later in September, the Central Disciplinary Commission issued\_instructions with a view to incentivize more active local decarbonization efforts.<sup>46</sup> In such a setting, a ramp-up of coal production and generation appears to be an unattractive short-term option to alleviate supply shortfalls, making the power crisis inevitable.

This is not to suggest that China should slow down its coal phase-out process. Quite the contrary, we suggest that China should continue advancing coal phase-out. But this needs to be progressed in a way that considers the interdependencies and interconnections between coal and other energies (e.g., electricity). To achieve this, Chinese policymakers may like to consider strengthening the energy governance process, which has long emphasized the use of administrative measures (e.g., coal production caps) to deliver sector-specific objectives without considering their flow-on impacts on other energy sectors, through the establishment of mechanisms (such as reduced market interventions to provide better price signals to guide the behaviours of stakeholders across various energy sectors) for facilitating a greater level of cross-sectoral coordination. Through this, progress towards reducing coal production can be made in coordination with the steps to decarbonize other energy sectors, to maintain the overall security of energy supply—essential for securing socio-political acceptance of energy decarbonization.

#### Wider implications

Similar to China, other major coal-producing countries (most notably Australia, Indonesia, India, and South Africa) are also heavily reliant on coal for power generation. This means that coal phase-out in these countries, if progressed in an uncoordinated manner, is also likely to affect their security of electricity supply through the coal-electricity nexus. Better coordination between coal phase-out and clean electricity transition in these countries is therefore important, especially given that their electricity transitions are still at an early stage and there are still many puzzles to be solved before a net-zero system can be developed. Until then, coal power is still required to at least assist clean energies in maintaining the security of electricity supply. By implication, this suggests that policymakers should devote some direct attention to implementation issues (e.g., coordination between coal power-out and clean electricity transition) that confront the efforts towards energy decarbonization, in addition to raising climate ambitions. Furthermore, coal exporters such as Australia and Indonesia also need to understand the complications in the energy transition for their exports and domestic industry.

<sup>&</sup>lt;sup>44</sup> '**中央**经济工作会议在北京举行 习近平李克强作重要讲话, **栗**战书汪洋王沪宁赵乐际韩正出席会议', Xinhua News Agency, 10 December 2021, <u>http://www.news.cn/politics/leaders/2021-12/10/c\_1128152219.htm</u>.

<sup>&</sup>lt;sup>45</sup> '关于印发《2021年上半年各地区能耗双控目标完成情况晴雨表》的通知', National Development and Reform Commission, 17 August 2021, <u>https://www.ndrc.gov.cn/xwdt/tzgg/202108/t20210817\_1293836.html?code=&state=123</u>.

<sup>&</sup>lt;sup>46</sup> '纪检监察机关紧盯减排减碳任务落实 严查不作为慢作为' Central Commission for Discipline Inspection of the Chinese Communist Party, 20 September 2021, https://www.ccdi.gov.cn/toutiao/202109/t20210920\_250959.html.



# REASONS BEHIND CHINA'S POWER SHORTAGE IN Q4 2021, RESULTANT REFORM MEASURES, AND THE IMPACT ON POWER MARKETS

#### David Fishman

Starting in the last week of September and persisting through October 2021, China experienced power rationing measures across more than 20 provinces. Over this period, power consumers across the country received notice from their electricity providers that power supply was insufficient to meet loads, and that their power would be curbed, for certain hours of the day or even for days at a time. While the power rationing was mostly limited to industrial and commercial power users, even residential and municipal power was cut for short periods in cities in China's northeast. Throughout October, sector policymakers released a raft of emergency reform measures addressing the causes of the power shortage, with rapid effect. By early November, the main causes of the supply insufficiency had been addressed and most power consumers across the country were again enjoying stable, unrestricted power supply, although supply remained very tight going into the winter months.

#### How did this happen?

The factors that led to this insufficiency varied across the country and affected different provinces to differing degrees. The single major theme across all regions, however, was a mismatch between the price that coal-fired power producers had to pay for steam coal to run their plants and the price they were able to earn for the sale of their power.

In 2021, China's power sector had progressed halfway along its multi-decade path toward liberalization and marketization. On the upstream fuel end, steam coal markets were already relatively marketized, with fluctuations in price reflecting market forces of supply and demand for steam coal. On the downstream end, however, power offtake prices were still regulated, with the rate-of-return that power producers were allowed to earn in each respective province restricted by policy. This created a scenario where coal-fired power generation could become a loss-making endeavour if steam coal prices were ever to rise unabated.

This is exactly what occurred in the latter half of 2021. Coal prices had already been creeping higher since March, and coal-fired generators had been eating the losses, but the situation escalated rapidly throughout July and August 2021, as large chunks of mining capacity in China's major coal-producing regions became successively unavailable. Inner Mongolia shut down mines that had been linked to a local government anti-corruption probe going back to March.<sup>47</sup> Shanxi had a tragic mine accident that forced a significant number of mines to shut down for safety inspections.<sup>48</sup> Shaanxi instituted a 'blue-sky policy' for the Chinese National Games in September, which caused coal mines in that province to slow production.<sup>49</sup> Henan experienced massive flooding in July, which impacted the transport of coal and demanded the diversion of coal volumes to that region.<sup>50</sup> Unseasonal rainfall and floods impacted coal supply again in October, this time in Shanxi.<sup>51</sup> This all happened just as imported coal from Indonesia was impacted by a typhoon and power demand was soaring, thanks to record-breaking industrial demand and unseasonably warm weather.<sup>52</sup> Over a multi-month period while demand rose rapidly, coal supply in China essentially flatlined.

#### If prices were high, why didn't miners just dig more coal?

With coal prices so high throughout the summer and fall of 2021, miners naturally filed applications to expand mining capacity, but they were denied. This was likely due to policymaker concern over a potentially superfluous expansion of coal mining, directly linked to environmental policies. After all, as recently as February 2021, China's National Energy Administration had received harsh criticism from a central government inspection team for not placing enough emphasis on environmental

 <sup>&</sup>lt;sup>47</sup> William Zheng, 'China takes aim at corrupt cadres and officials in expanded Inner Mongolia campaign', *South China Morning Post*, 18 March 2021, <u>https://www.scmp.com/news/china/politics/article/3125867/china-takes-aim-corrupt-cadres-and-officials-expanded-inner</u>.
<sup>48</sup> 'Mine accident sends China met coal prices above \$600/t', *Argus*, 7 September 2021, <u>http://www.apbi-icma.org/news/5575/mine-accident-</u>

sends-china-met-coal-prices-above-600t. <sup>49</sup> 'How China's pollution fight is roiling commodities', Bloomberg, 17 September 2021, <u>https://www.bloomberg.com/news/articles/2021-09-</u>

<sup>&</sup>lt;u>17/how-china-s-pollution-fight-is-affecting-commodities-quicktake</u>. <sup>50</sup> 'China boosts supply of thermal coal to flood-hit province', Reuters, 28 July 2021, <u>https://www.reuters.com/world/china/china-boosts-supply-</u> thermal-coal-flood-hit-province-2021-07-28/.

<sup>&</sup>lt;sup>51</sup> 'Thousands evacuated and coal mines shuttered as floods hit north China', France24, 11 October 2021, <u>https://www.france24.com/en/live-news/20211011-thouands-evacuated-and-coal-mines-shuttered-as-floods-hit-north-china</u>.

<sup>&</sup>lt;sup>52</sup> Muyu Xu and Sudarshan Varadhan, 'Asia's coal prices hit new highs as global utilities scramble for fuel', Reuters, 7 September 2021, <u>https://www.reuters.com/world/china/asias-coal-prices-hit-new-highs-global-utilities-scramble-fuel-2021-09-07/;</u> 'Tight power supply in China amid strong demand, high coal prices', FitchRatings, 20 August 2021, <u>https://www.fitchratings.com/research/corporate-finance/tight-power-supply-in-china-amid-strong-demand-high-coal-prices-20-08-2021</u>.



protection, specifically calling out a 'failure to stop coal mines from producing more than they were supposed to'.<sup>53</sup> As a result, prices soared even further. In July, domestic spot coal prices were already around RMB 950/tonne, unprofitable for most generators at the fixed power offtake rates of that time. By September, they had passed RMB 1,200/tonne.



#### China coal supply unable to match rapid demand growth as domestic mining efforts slowed

#### Source: The Lantau Group.

At this point coal-fired generators had been reducing onsite coal inventories for months, eschewing long-term contracts, and waiting for coal prices to drop. In the last week of September, Chinese media quoted sources at coal-fired power plants saying that they had only two days of coal stockpiled (when inventories should normally be at least a month).<sup>54</sup> With coal prices so high and still no way to recover fuel costs, plants had no option but to go into 'maintenance outages'.

#### What role did renewables play?

With large chunks of coal-fired capacity going offline, the risk of exposure to variable generation increased. In the northeast, what should have been normal variability in wind generation became intolerable, as the firm coal-fired supply that would normally be available as backup was offline. This led to the most severe outages in the whole country—a period of several days in late September when wind generation was very low, a portion of coal-fired generation was unavailable, and the shortfall was so severe that emergency load shedding was required, unexpectedly and indiscriminately cutting power for industrial, commercial, and residential/municipal buildings alike.

Separately, power supply in south and southwest China throughout 2021 was also much tighter than usual due to poor hydrological conditions and lower hydropower generation in Sichuan and Yunnan. The expensive coal and loss of coal-fired capacity exacerbated this problem further.

#### Did environmental policy play a role?

Finally, it is important to discuss the role played by China's policy drive to control energy consumption and energy intensity (the so-called dual controls). While early reports on the situation from both domestic and international media tended to characterize the power cuts as being primarily driven by the dual-control environmental policies, later reports tended to (correctly) focus on coal pricing as the primary culprit. This is not to say, however, that the dual-control policies played no role at all. In provinces where coal-fired power shortages were less severe, or where coal is not the primary generation source, there were still some outages, with high-energy-intensity and high-polluting industries targeted for power cuts. Additionally, the framework established

<sup>54</sup> Bai Yujie and Chen Xuewan, 'Severe coal supply-demand imbalance challenges winter supply', Caixin Global, 29 September 2021, https://www.caixinglobal.com/2021-09-29/analysis-severe-coal-supply-demand-imbalance-challenges-winter-supply-101781337.html.

<sup>&</sup>lt;sup>53</sup> Joe Lo, 'Chinese inspectors slam energy authority over coal expansion spree', Climate Home News, 2 February 2021,

https://www.climatechangenews.com/2021/02/02/chinese-inspectors-slam-energy-authority-coal-expansion-spree/.



by the dual-control environmental policy was used to determine prioritization for power cuts in regions that *were* affected by coal-fired power shortages There were also some indications that the dual control policies may have played a role in restricting the expansion of coal production, although it is impossible to validate to what extent.

Targeted industries included high-consumption, high-intensity sectors like aluminium smelting, steel production, and industrial chemicals, which were generally first on the list to lose power, while protected industries like high-tech saw very little impact. As a result of environmental policy, these industries had already been facing curbs on their consumption of power going back to earlier in 2021 and will continue to feel the impact of the dual-control policy in 2022, even in the absence of any kind of power shortage. The dual-control policies only played a relatively small direct role overall in the power shortages of September/October 2021.

#### Factors contributing to power shortages in China by province



Source: The Lantau Group.

#### Policy response and reform

The power shortage inspired a rapid policy response from Chinese sector regulators. A reform package announced on 12 October came into effect just three days later, implementing three key policy changes:

- 1) Power pricing reform. Effective immediately, the price that generators were allowed to earn for their power was allowed to rise by as much as 20 per cent over the base price in each respective province. Previously, the offtake price of power had been fixed, which meant generators were unable to pass their higher coal costs on to power buyers. Previously on 30 September, a 10 per cent offtake rate hike had been approved, but that had proven to be wholly inadequate to motivate generators in the face of soaring steam coal prices. The additional 10 per cent (for a total of 20 per cent) approved in October was more effective in getting coal-fired plants to restart operations. This offtake rate hike applied to power traded in the wholesale markets; thus it could be passed on to power consumers. Of the whole reform package, this specific measure was targeted most directly at alleviating the power shortage.
- 2) **Power offtake reform.** Relatedly, the reform established new requirements for coal generators to offtake 100 per cent of their power generated into the wholesale power markets, that is, to compete in the market for dispatch. This contrasted with the previous policy regime, which granted all coal-fired power plants a guaranteed minimum number of offtake hours each year (sold to the grid company, with the balance, if any, sold into the markets). This measure now



helps to ensure that the markets play the dominating force in determining power offtake prices (within the 20 per cent cap set in the previous measure) and raises the quality of pricing signals sent down to power consumers and back up to coal producers.

3) Power procurement reform. To complement the requirement for coal-fired generators to sell into the wholesale markets, the reform also mandated that all commercial and industrial power customers begin to procure power via wholesale market channels, either as direct market participants or via power retailers operating as aggregators. This effectively abolished the previous regulated prices, also called the catalogue tariff, that was set for power users in each province. The wholesale market, after all, is only truly functioning when buyers and sellers are participating fully within it, establishing equilibrium prices by virtue of their economic choices, free of regulatory limitations. This measure only applied to commercial and industrial power users in China; residential and agricultural power customers still use the regulated catalogue rate. Additionally, highly polluting and energy-intensive power consumers have no price cap for the power they procure in wholesale markets (that is, the 20 per cent described in item 1 does not apply for them).

While this major policy reform package was effective at getting sufficient revenue to generators to allow them to start producing power again, it still didn't address a crucial piece of the problem: runaway coal pricing. After 15 October, the price of steam coal continued to rise, far outstripping what could be covered in returns with the 20 per cent hike to power offtake prices, with spot prices exceeding RMB 2,000/tonne by the 20th. At this stage, Chinese policymakers decided that the antidote to the coal pricing issue was a more hands-on approach. A batch of short-term policies targeted at curbing 'market-distorting activities' was released. These included cracking down on coal futures speculation and coal stockpiling, and pushing state-owned miners to offer preferential low rates for long-term coal supply contracts far below spot prices. These non-market, administrative measures were effective, and coal prices came down rapidly in November.

#### What did the reforms do?

Power prices immediately shot up, with trading prices in the wholesale markets becoming more reflective of the cost for coal generators to procure coal. In the first day of trading post-reform, average settlement prices in China's wholesale power markets were just a few tenths of a percentage point below the 20 per cent cap. Power consumers were happy to buy power at any price, considering they had been faced with full outages for days or weeks. The price of renewables trading in the wholesale markets rose too, exceeding the price for coal-fired power and maintaining a small 'renewable premium'. Many power supply contracts between power retailers and power users had already been annulled at this point, invoking either specific contract terms or force majeure provisions, so these were renegotiated at a rate reflective of the new, higher prices for power in the markets.

#### What about over the long-term?

Long-term, the wholesale markets will continue to serve as the primary pricing mechanism for power trading in China, with regulation serving less as a steering wheel, and more as guardrails on the side on the highway (albeit fairly tight guardrails, within the relatively restrictive +/- 20 per cent band). For years, China's power prices were artificially low; now they will be more cost reflective, that is, higher. In December, the Chinese government announced the target long-term contract benchmark price for 5,500 kcal coal in 2022 would be RMY 700/tonne,<sup>55</sup> 31 per cent higher than the previous level. This indicates that policymakers expect coal prices to stay higher for a while, and that power consumers should expect to see higher prices for all kinds of power products (coal and renewables alike) from their power suppliers.

The establishment of a wholesale power market that most generation sources are required to sell into will eventually allow the emergence of a true economic merit order. China's power sector is still heavily oversupplied on a national basis; wholesale markets and true economic dispatch should be the key to shedding some of that excess capacity. We can reasonably assume that future power customers will continue to demand power that is inexpensive and reliable and that (increasingly) meets corporate social responsibility requirements. With these demands in mind, it is reasonable to expect that the maturing wholesale markets provide the mechanism by which power customers can ensure their needs are heard by generators. As power customers exert more force on the market by virtue of the power products they demand (and the prices they are willing to pay),

<sup>&</sup>lt;sup>55</sup> Suyash Pande, 'China's NDRC hikes benchmark price for long-term contract for 2022 by 31%,' S&P Global Platts, <u>https://www.spglobal.com/platts/en/market-insights/latest-news/coal/120321-chinas-ndrc-hikes-benchmark-price-for-long-term-contract-for-2022-by-31#:~:text=China's%20top%20planning%20body%20National,seen%20by%20S%26P%20Global%20Platts.</u>



generators will be incentivized to invest more into generation assets that meet the specific needs of the market. As long as coal prices continue to trend upwards in tandem with the growing corporate appetite for green power, the wholesale markets' impact on China's renewables deployment will be a strong positive.

KEY DRIVERS OF CHINA'S 2021 POWER SHORTAGES, THEIR IMPLICATIONS, AND LESSONS LEARNED FOR THE COUNTRY'S 2030–2060 GOALS

#### Wu Di, Yang Lei, and Kang Junjie

From August to September 2021, over 20 provinces in China suffered temporary power shortages, forcing local governments to impose power rationing measures. Jiangsu Province ordered energy-intensive sectors, including iron and steel, chemicals, cement, metallurgy, and other related enterprises, to reduce production levels during peak load time and use electricity in an orderly manner. Yunnan Province demanded that local electrolytic aluminium enterprises reduce their output by 30 per cent by the end of 2021.<sup>56</sup> In northeast China (Jilin, Liaoning, and Heilongjiang Provinces), power shortages have been especially severe.

In northeast China, residential users were cut off from the electricity supply without any warning—a move rarely seen in China, considering residential users only account for around 15 per cent of the country's total electricity consumption,<sup>57</sup> and social safety and stability are among the government's key priorities. The residential power cuts had serious impacts on people's everyday lives, including a series of social incidents such as water supply disruption, blackout of traffic lights, and gas poisoning. The power shortages became the number-one trending topic on China's social media platform Weibo in late September, due to their severity and universality, with many people arguing that coal is still the backbone of China's energy supply system and should not be phased out or phased down in the near future.

This article first analyses the key drivers of China's 2021 power shortages and then explains why the power shortages should not delay China's energy transition progress and what lessons China can learn to facilitate the achievement of its 2030–2060 goals (achieve carbon peak before 2030 and carbon neutrality before 2060).

#### The key drivers of China's 2021 power shortages

First, the demand and supply imbalance of coal caused temporary power shortages. From the demand side, China is the world's only major economy that has recovered from the Covid-19 global pandemic due to its effective and precise virus control policy. Many countries have not yet shaken off the adverse impacts of the pandemic, resulting in the transfer of many foreign export orders to China. China's GDP growth rate was 12.7 per cent in the first half of 2021 and reached 8.1 per cent for the whole year.<sup>58</sup> The economic recovery led to strong electricity demand: China's year-on-year electricity demand growth rate reached 10.3 per cent in 2021,<sup>59</sup> while the annual electricity demand growth rate during the 13th Five-Year Plan period (2016–2020) was only 5.7 per cent.<sup>60</sup> The electricity demand surge caused a large increase in China's coal consumption, an increase estimated at more than 200 million tonnes in 2021, which caused that year's total coal consumption to overtake the previous peak in 2013.

From the supply side, due to the combined effects of supply-side structural reforms, environmental protection constraints, and clean energy transition, China's coal mining sector cut a total of 1 billion tonnes of production capacity between 2016 to 2020, surpassing the government goal of 800 million tonnes set in the 13th Five-Year Plan.<sup>61</sup> The tight supply of coal made it difficult for power plants to purchase sufficient coal. Meanwhile, since the wintertime was approaching, coal-fired power plants were reserving coal for producing heat during the heating season, resulting in a lack of willingness to generate electricity.

<sup>&</sup>lt;sup>56</sup> Caixin, Yunnan implements 'energy dual-controls' to limit electrolytic aluminium production by 30 per cent until the end of the year, 2021, <a href="https://www.caixin.com/2021-09-13/101772724.html">https://www.caixin.com/2021-09-13/101772724.html</a>.

 <sup>&</sup>lt;sup>57</sup> China Electricity Council, *China electric power statistical yearbook*, 2021, <u>https://www.cec.org.cn/detail/index.html?3-298413</u>.
<sup>58</sup> National Bureau of Statistics, *Preliminary calculation of GDP for the second quarter and first half of 2021*, 2021,

http://www.stats.gov.cn/xxgk/sjfb/zxfb2020/202107/t20210716\_1819555.html; National Bureau of Statistics, *The target of sustained economic recovery in 2021 was achieved*, 2022, http://www.stats.gov.cn/tjsj/zxfb/202201/t20220117\_1826404.html.

<sup>&</sup>lt;sup>59</sup> National Energy Administration, *Electricity consumption increased by 10.3 per cent year-on-year in 2021*, 2022, <u>http://www.nea.gov.cn/2022-01/17/c\_1310427282.htm</u>.

 <sup>&</sup>lt;sup>60</sup> China Electricity Council, *China electric power statistical yearbook*, 2021, <u>https://www.cec.org.cn/detail/index.html?3-298413</u>.
<sup>61</sup> China Power Media Group, *China energy statistical yearbook*, 2021, https://mp.weixin.gg.com/s/xfEUYT24WfyDxyTrIP-SIg.



Second, electricity price regulation has prevented coal-fired power plants from passing high fuel costs on to end-users, making coal-fired power plants reluctant to generate electricity. The rapid development of renewable energy in the past decade in China is squeezing out the space for coal-fired power. The share of coal-fired power in China's total electricity generation decreased from 76.8 per cent in 2011 to 60.2 per cent in 2020. The average utilization time of coal-fired power in China was only 4,340 hours in 2020,<sup>62</sup> far lower than the 5,210 hours in 2011, resulting in a significant decrease in revenue and even losses for many coal-fired power plants. In 2020, about 50 per cent of coal-fired power plants in China were already suffering losses.

On the one hand, the supply and demand mismatch for coal in 2021 caused coal prices to skyrocket, which further encroached on the profits of coal-fired power plants. The comprehensive price of 5,500-kilocalorie coal on the China Electricity Coal Index rose to RMB 2,000/tonne in mid-October 2021,<sup>63</sup> almost four times higher than the normal price. On the other hand, the strict electricity price regulation had set a price cap, thus rendering generators unable to recoup high fuel costs. The fuel cost was over RMB 0.6/kWh when the coal price was over RMB 2,000 per ton, not to mention maintenance, wages, and other expenses—all of which combined is far greater than the RMB 0.4/kWh of China's average coal power benchmark price. In this situation, although state-owned coal power plants have the responsibility to ensure enough electricity supply, the rising costs motivated them to decrease output to prevent the risks of capital loss, and even to seek to shut down generators for maintenance to avoid losses.

Third, local governments implemented power rationing as a last resort to meet 'energy dual-controls' (controlling total energy consumption and energy intensity) targets. In 2020, China emitted more than 11 gigatonnes of carbon emissions.<sup>64</sup> Achieving carbon neutrality in less than 40 years shows China's ambitious climate commitments. Local governments have been relying on the dual-controls approach to facilitate energy transition and reduce carbon emissions. However, in the first half of 2021, several provinces failed to meet the progress requirements for controlling energy consumption, energy intensity, or both, and were issued with warnings by the central government. Approaching the end of the year, some provinces and cities adopted one-size-fits-all compulsory measures to limit production for energy-intensive industries by power rationing, with the aim of getting back on track for meeting the annual energy-dual-controls targets. Relying on compulsory administrative approaches also reflected local governments' lack of systematic planning to achieve the 2030–2060 goals.

Fourth, the insufficient flexibility of China's electricity system creates hidden risks for power shortages as massive renewable energy supplies come online. On the one hand, China has the world's largest newly added and cumulative renewable energy installed capacity. By the end of 2021, China had more than 600 GW of total solar and wind capacity. However, the output confidence levels for wind and solar power are only 5–15 per cent and 0–15 per cent of their total installed capacity, respectively, far lower than coal-fired power plants (around 90 per cent). The power shortages in northeast China were also related to the substantial reduction in short-term wind power output. The installed capacity of wind power in northeast China accounts for about 20 per cent of the region's total power installed capacity, but during the power shortage period, the output of wind power was less than 10 per cent of the installed capacity.

On the other hand, insufficient flexibility of China's electricity system has made it difficult for the country to address the intermittency of renewable energy and adjust the fluctuation of the power load in real time. In 2020, China's flexible coal-fired power, natural gas power, and pumped hydro installed capacity were 80 GW, 99.72 GW, and 31.49 GW, respectively, which together have failed to meet the government targets of 220 GW, 110 GW, and 40 GW set in the 13th Five-Year Plan.<sup>65</sup> In addition, China has not fully utilized demand-side management—which in developed economies can meet around 5 per cent of the highest load—to ensure electricity supply security.

#### Implications and lessons learned for China's 2030-2060 goals

First, the power shortages must not affect China's determination to gradually phase out coal consumption. Coal currently accounts for about 80 per cent of China's total carbon emissions. Thus, reducing coal consumption is China's most essential approach for achieving the 2030–2060 goals. In September 2021, President Xi announced that China will strictly control coal-

https://baijiahao.baidu.com/s?id=1716268998020968654&wfr=spider&for=pc.

<sup>&</sup>lt;sup>62</sup> China Electricity Council, China electric power statistical yearbook, 2021, <u>https://www.cec.org.cn/detail/index.html?3-298413</u>.

<sup>&</sup>lt;sup>63</sup> China Newsweek, China has no shortage of coal, but why have prices soared this year, 2021,

<sup>&</sup>lt;sup>64</sup> International Energy Agency, *An energy sector roadmap to carbon neutrality in China*, 2021, <u>https://www.iea.org/reports/an-energy-sector-roadmap-to-carbon-neutrality-in-china</u>.

<sup>&</sup>lt;sup>65</sup> China Electricity Council, China electric power statistical yearbook, 2021, https://www.cec.org.cn/detail/index.html?3-298413.



fired power generation projects and strictly limit the increase in coal consumption over the 14th Five-Year-Plan period (2021–2025) and phase it down in the 15th Five-Year-Plan period (2026–2030).

In late 2021, China adopted a wide range of measures to ensure a safe and stable electricity supply, including liberalizing electricity price regulation, improving regional collaboration on electricity transmission, and increasing domestic coal production. For example, China now allows coal power prices to fluctuate by up to 20 per cent from benchmark levels, compared with 10 per cent previously. For energy-intensive industries, prices will be determined by the market and will not be limited to a 20 per cent increase. By adopting these effective measures, the coal price falls sharply, the electricity price increases, and power plants are more willing to generate electricity. These measures demonstrate China's ability to resolve problems quickly and effectively; therefore, the power shortages cannot impede China's rapid progress in energy transition.

In addition, the high electricity demand growth rate, which to some extent caused the power shortages, is only a temporary phenomenon. The year-to-year electricity demand growth rate decreased to 3.6 per cent in August, 6.8 per cent in September, 6.1 per cent in October, 3.1 per cent in November, and -2.2 per cent in December, compared with 16.2 per cent in the first half of 2021.<sup>66</sup> There is no need for China to build new coal-fired power plants to meet future electricity demand growth. According to the forecasts of many Chinese research institutions, the electricity demand growth rate in China during the 14th Five-Year-Plan period is likely to further decline, with the average annual growth rate dropping to 4–5 per cent.

With newly added non-coal clean power generation capacity, if China can better utilize demand-side resources and improve the operation and dispatch of existing coal-fired power fleets and electricity transmission networks, it can meet its increasing electricity demand without having to build new coal-fired power capacity. Even some existing coal-fired power is expected to be replaced by renewables and demand-side resources.

Second, China should accelerate electricity sector reform to increase the flexibility and risk management capability of the electricity system, and promote the coordinated development of power generation source, grid, load, and energy storage systems. In the electricity wholesale markets, China currently has not built effective ancillary service markets that would benefit flexible resources, such as natural gas power, pumped storage hydro, flexible coal-fired power, and demand-side resources. At present these ancillary service providers cannot obtain stable and reasonable financial returns, and this limits investment enthusiasm.

In the future, China needs to establish effective ancillary service markets and continuously improve the market design and benefit/cost-sharing mechanisms. Flexible resources can earn reasonable profits when they provide ancillary services, including frequency regulation, spinning and non-spinning reserves, black start, and voltage support. In December 2021, China issued a new government regulation on ancillary services, which added new market participants, expanded the range of ancillary services, and improved the ancillary cost-sharing mechanisms.<sup>67</sup> However, the regulation details and its implementation results remain to be seen.

In the electricity retail markets, the existing end-user electricity price in China is generally low. As a result, the system costs of integrating increasing amounts of renewable energy cannot be effectively passed on to the demand side. In 2020, the average industrial and residential electricity prices in China were only \$0.087/kWh and \$0.080/kWh, respectively, significantly lower than in the UK (\$0.157/kWh and \$0.235/kW) and globally (\$0.109/kWh and \$0.196/kWh) averages.<sup>68</sup> In the future, China needs to continuously improve electricity end-user pricing mechanisms and use electricity pricing as a lubricant and catalyst to promote the coordinated development of power generation source, grid, load, and energy storage systems. To be more specific, China needs to gradually increase the electricity price level, and establish various price mechanisms, including ladder-type pricing, peak day pricing, time-of-use pricing, and real-time pricing. By establishing effective price mechanisms, China can increase energy efficiency, promote sustainable development of renewable energy, and ensure the safe and stable operation of the electricity system.

<sup>&</sup>lt;sup>66</sup> National Energy Administration, *Electricity consumption rose by 9.8% year-on-year in June*, 2021, <u>http://www.nea.gov.cn/2021-07/14/c\_1310060966.htm</u>.

<sup>&</sup>lt;sup>67</sup> National Energy Administration, Notice on the issuance of regulation for power sector ancillary markets, 2021, <u>http://zfxxgk.nea.gov.cn/2021-12/21/c\_1310391161.htm</u>.

<sup>&</sup>lt;sup>68</sup> International Energy Agency, OECD *energy prices and taxes quarterly*, 2021, <u>https://www.iea.org/data-and-statistics/data-product/oecd-energy-prices-and-taxes-quarterly</u>.



In addition, central and local governments need to develop systematic strategies and plans to simultaneously address climate change, improve energy security, and promote high-quality economic development, so as to ensure the smooth and orderly realization of the energy dual-controls targets and 2030–2060 goals. Achieving the 2030–2060 goals requires systematic changes and a revolution in China's social and economic structure. Success will depend on various factors, such as institutional reform, market design, technology innovation, and behaviour change. It is imperative for China to depend less and less on compulsory administrative measures.

There are many areas China needs to focus on in the future. First, China should increase research, development, and demonstration in energy storage technology, especially long-term storage methods like green hydrogen and solar thermal. Long-term energy storage can ensure reliable power supply during extreme weather events that span weeks or even months. Although currently China has the world's largest energy storage capacity (both pumped hydro and Li-ion batteries), long-term energy storage systems are still in the early development phase in China.

China has only around 500 MW of solar thermal installed capacity so far, due to its high price and the lack of fiscal supports, unlike the feed-in tariff China has used to support the development of solar PV since 2011. In terms of hydrogen, while many provinces have put it in the central position of their industry development planning in the 14th Five-Year Plan, almost all of them are only planning to use hydrogen in the transportation sector. The pivotal role of hydrogen in long-term energy storage methods has not been well considered.

Second, local governments should establish a Carbon Peak and Carbon Neutrality Office that coordinates various government departments to facilitate energy transition, reduce carbon emissions, and promote high-quality socioeconomic development. The responsibility for achieving the 2030–2060 goals is currently dispersed among various government departments, making it almost impossible for them to maintain effective cooperation, and sometimes they even end up making conflicting policies.

Third, China should guarantee a socially just transition by implementing active labour market policies for employees in traditional industries, increasing investment and compensation to support the transformation of traditional mining regions, and involving a wide range of stakeholders in government decision-making processes. 'Just transition' is a new concept to China's policymakers, and the country's top-down decision-making process has made it difficult to consider the economic and social hardships faced by many local jurisdictions.

#### Conclusion

Five months after the power shortages, there is no sign that China will slow down its rapid progress in phasing down coal consumption. In fact, on 25 January 2022, President Xi hosted a high-level internal meeting attended by top government officials on analysing the situation and tasks for the 2030–2060 goals; he once again emphasized that China must firmly control coal consumption, ensure energy security, and gradually use carbon dual-controls targets (controlling total carbon emissions and carbon intensity), to replace energy dual-controls targets.

The 2030–2060 goals are major strategic decisions made by China based on the responsibility of building a community with a shared future for all humankind and the inherent requirements of achieving sustainable development. China has decided to take only 30 years to achieve carbon neutrality from carbon peak, far shorter than the time taken by developed economies (71 years for the EU, 43 years for the US, and 37 years for Japan). This requires China to make arduous efforts and overcome countless obstacles. A temporary power shortage is one of the obstacles faced by China in its tough journey towards carbon neutrality. China must maintain its determination and continuously improve and detail its '1+N' policy framework ('1' refers to the long-term approach to combating climate change and 'N' refers to various solutions in different sectors to achieve the 2030–2060 goals),<sup>69</sup> in order to be prepared for any future challenges and translate its pledges on carbon peak and carbon neutrality into concrete actions.

<sup>&</sup>lt;sup>69</sup> Embassy of the People's Republic of China, '*China's "1+N" policy framework*', 2021, <u>http://www.china-embassy.org/eng/zt\_120777/ydqhbh/202111/t20211117\_10449121.htm</u>.



## POWER OUTAGES, RENEWABLES, AND CHINA'S 2030-2060 GOALS

#### Anders Hove

As the other articles in this issue have shown, the September 2021 electric power outages in China had causes that are specific to the design and circumstances of China's coal and electricity markets. The actions following the electricity crisis suggest that central government officials understood the immediate causes—market-based coal prices combined with power prices fixed at levels below operating cost.

However, as with most electricity and energy crises, the immediate policy responses and long-term consequences tend to reflect existing paradigms and institutional structures in the industry, sector, and economy. In China, these structures tend to emphasize capital investment in new supply rather than more cost-efficient, long-term structural measures. Central government policies aimed at implementing the 2030 and 2060 carbon peaking and carbon neutrality goals will have to swim against this current.

Maintaining a reliable electricity system requires a suite of measures on the supply, demand, and grid sides—a paradigm that is recognized in Chinese policy documents. On the supply side, as China adds more variable renewable energy capacity, there is an urgent need to boost the flexibility of the thermal coal power fleet so that plants can ramp up and down more quickly to balance renewable energy. China's coal fleet missed its flexibility upgrade targets under the 13th Five-Year Plan,<sup>70</sup> in part because coal plants lack a clear economic incentive to improve flexibility. China's dispatch system also favours dispatch within provinces to meet load, rather than economic dispatch over a wider geographical area, even when transmission capacity is available.

Transmission lines are also scheduled based on monthly and annual power contracts rather than economic dispatch—and bidirectional power trading is often left to emergency situations. While new policies for transmission allocation and a national spot market could help, these are likely to take years to fully scale up. Indeed, the new policy sets 2025 as a date for preliminary completion of regional spot markets nationwide and 2030 for final implementation.<sup>71</sup>

In a 2019 report I co-authored with scholars from the Energy Research Institute of the National Development and Reform Commission, we found that the electric power system in the Jing-Jin-Ji region near Beijing was far less flexible than the similar-sized market in Germany, mainly because of inflexible coal power and transmission operations.<sup>72</sup> The report found that these are also likely the lowest-cost measures for boosting grid flexibility and security—and should be prioritized ahead of adding energy storage or building new power plants to meet in-province peak load.

A similar study from the Berkeley Laboratory in 2021 found that greater sharing of reserves via inter-provincial power lines was the most economical way to meet peak loads under a high renewables scenario, and could significantly reduce the need for coal power capacity as China scales up wind and solar to meet its climate goals.<sup>73</sup>

On the demand side as well, energy efficiency measures are critical to smoothing the growth of electricity demand even as the industry and transport sectors electrify, boosting power demand. Here again, institutional and structural economic incentives have tended to prevent needed investment in efficiency.

There are several policies underway that have the potential to counteract these elements of policy inertia, such as the introduction of inter-provincial electricity spot markets, higher prices for coal power, and policies to encourage virtual power plants and energy storage to participate in power markets. Further policies and market incentives on energy efficiency and

<sup>&</sup>lt;sup>70</sup> Kang Junjie, Yang Fuqiang, and Wu Di, "**十四五"我国用**电情景预测及电力规划推荐情', Beijing, 1 September 2021, <u>https://shoudian.bjx.com.cn/html/20210901/1173982.shtml</u>.

<sup>&</sup>lt;sup>71</sup> '国家发展改革委 国家能源局关于加快建设全国统一电力市场体系的指导意见', National Development and Reform Commission, 18 January 2022, <u>https://www.ndrc.gov.cn/xxgk/zcfb/tz/202201/t20220128\_1313653.html</u>.

<sup>&</sup>lt;sup>72</sup> Zhang Yanan et al., *A quantitative comparative study of power system flexibility in Jing-Jin-Ji and Germany*, Energy Research Institute of National Development and Reform Commission, December 2020,

https://www.energypartnership.cn/fileadmin/user\_upload/china/media\_elements/publications/Power\_system\_flexibility\_in\_Jingjinji\_and\_German y.pdf.

<sup>&</sup>lt;u>y.pdf</u>. <sup>73</sup> Jiang Lin et al., *Enhancing grid flexibility under scenarios of a renewable-dominant power system in China*, Lawrence Berkeley National Laboratory, August 2021, <u>https://eta-publications.lbl.gov/sites/default/files/final\_national\_plexos\_081221\_addappen\_3.pdf</u>.



distributed energy are likely needed before these can play a significant role in both preventing outages and reducing the impact of any shortages that still occur.

#### Institutional barriers to improving electricity supply security

China's 2030 and 2060 goals represent firm commitments of the central government which provincial officials and SOEs are obligated to implement. Their path to achieving these goals will be partly determined by existing institutions and organizational routines. The following institutional barriers presently hinder more comprehensive and integrated investments to make electricity both reliable and cost-efficient.

#### Incumbent state-owned enterprises' dominance of power sector policymaking and planning

China's two large grid companies, the Big Five power generation groups, and other electric power sector state-owned enterprises (SOEs) play an important role in planning the nation's power grid, directing research at planning the future power system, and drafting policies related to the power sector. Targets in the five-year planning process are often set based on combining the plans of the individual SOE power companies—as in the case of targets for wind power capacity.<sup>74</sup> Grid companies have tended to prefer investments in long, high-voltage power lines to connect remote energy bases to distant cities. Historically, grid companies and generation companies planned dispatch protocols based on ensuring sufficient economic returns to coal plants, rather than economic dispatch.

A system dominated by large SOEs tends to favour large, supply-side investments. Even after policymakers and grid companies reformed electricity dispatch to reduce curtailment of wind and solar, and following the introduction of the 2030 and 2060 carbon goals, it is likely that large SOEs will continue to favour centralized generation and investments in supply-side infrastructure over distributed, customer-sited power, efficiency measures, or demand flexibility. Rules requiring renewable generators to install energy storage, or planning practices that hinder interconnection of smaller distributed wind farms or rooftop solar, appear designed to protect the privileged position of the largest incumbent players. It is also possible that large SOEs will jump in and dominate the distributed energy field to prevent the emergence of new players.

The central government has tools to ensure that these biases do not entirely hinder the development of a new type of power system involving distributed energy and demand flexibility. Academic think tanks and new energy industries actively contribute to the drafting of measures aimed at achieving climate and clean energy goals, and can provide valuable feedback and criticism to unfair policies. However, these groups lack the resources and ability to quickly deploy capital investments of large SOEs, and the weight of large SOEs in the policymaking process can explain why clean energy has developed mainly on a centralized pattern up to the present.

#### Provincial protectionism

The power cuts in the winter of 2020/2021 were concentrated in a few regions, and lack of available resources for imports from other regions played a role.<sup>75</sup> Historically, provinces have sought to have sufficient capacity to meet within-province peak load, with some notable exceptions, such as the municipalities of Beijing and Shanghai, which import power from distant areas. Importing power reduces revenue for generation companies within the province, in which provincial SOE banks often have a stake.

Provinces have also sought to build out excess capacity in coal power—a process which led central authorities to develop a traffic light system (known in Chinese as the Early Warning Monitor) based on quantitative indicators when approving new coal plants. The traffic light system accounts for firm transmission imports, renewable curtailment, and peak load growth; however, it appears less transparent or quantitative on environmental or emissions considerations or the ability of provinces to share reserves or trade power bidirectionally.

Many provinces have also taken a conservative approach to renewable energy, which competes with domestic coal power for market share. Provinces have adopted strict limits on new wind or solar installations, in some cases approving new coal plants

<sup>&</sup>lt;sup>74</sup> Mengye Zhu et al., 'The China wind paradox: the role of state-owned enterprises in wind power investment versus wind curtailment', *Energy Policy* 127, April 2019, <u>https://doi.org/10.1016/j.enpol.2018.10.059</u>.

<sup>&</sup>lt;sup>75</sup> '新华社: 这些地区为何"拉闸限电"?', Xinhua News Agency, 8 December 2020, <u>https://mp.weixin.qq.com/s/BcD8UK4bJSG17wDJBtXEkw</u>.



to meet load growth when simultaneously announcing that the province has no 'consumption capacity' for renewable energy.<sup>76</sup> This means that even when renewable energy reaches price parity and a province faces possible shortages, renewable energy is not viewed as a solution.

Greater consumption flexibility and dispatch of renewables over a wider area could mitigate these problems. To counteract the provincial tendency to constrain renewables, the central government has adopted strict provincial quotas—which SOEs must implement—for increased share of non-hydro renewables in the consumption mix. In November 2021, the central government also announced the expansion of inter-provincial electricity spot market trading, which could help enable more sharing of low-cost renewables across provincial boundaries.<sup>77</sup>

#### Obstacles to investment in efficiency

As in other countries, in China the demand side is often an afterthought in energy security discussions. Often the topic of energy demand is managed by different departments, such as by the Ministry of Housing and Urban Rural Development, in the case of building energy efficiency. Policymakers also view efficiency as a goal that takes years to implement—too long to address short-term shortages. Finally, owner–occupant dilemmas—the tendency of building owners to lack the incentive to improve flexibility given that only the tenants benefit—combined with a predominance of high-rise living and working in urban China, mean that market incentives play little part in encouraging energy saving investment: building owners pass energy costs on to apartment owners or renters, who lack the ability to alter or improve their building's energy performance or resilience to power cuts.

Although China differs from other countries in that industry consumes the majority of energy and electricity, improving commercial and residential efficiency—especially insulation and air conditioning—helps reduce urban peak loads in summer and winter, especially in regions without district heating. Even in Beijing in the north of China, air conditioning can account for half of peak load on the hottest days. Though new administrative rules on orderly power consumption—meaning the priority different consumers have when scheduling rolling blackouts—should help prevent outages that have shut off power to urban neighbourhoods, improving efficiency helps raise the reliability for all customers.

#### Passive attitude of consumers and industry

China's immense industrial base is renowned for its flexibility and rapid adaptation to changing market conditions. This relates to the existence of low-cost industrial parks, logistics parks, and other land developed for industry clusters under the guidance and encouragement of provincial and local development planning authorities. Often, enterprises rent space under leases that last two or three years. Given this setup, businesses have limited ability to invest in on-site renewables, energy storage, or flexibility measures—even when those measures offer fairly attractive payback periods. Industrial consumers often take a passive attitude towards energy costs, and industry parks simply pass on energy costs to tenants.

Even after the recent market reforms, in which fixed-price catalogues were abolished and all industrial and commercial consumers pushed into the bilateral market, for many industry parks the grid company offers a default electricity price that essentially represents the prior price catalogue. Industry parks are home to huge flat roofs that would be ideal for rooftop solar, but most await government requirements before initiating such projects.

#### Could the outages help reduce some of these barriers? Time will tell.

In most countries, shortages tend to focus the public and policymakers on problems of supply, rather than on demand, efficiency, or flexibility. That appears to be the case in China as well. Energy security has risen as a priority in a wide variety of policy pronouncements, which often emphasize the supply side of the equation. Provinces have begun to expand coal-fired generation capacity again, and central government policymakers have clarified that retired coal plants—typically smaller, less efficient plants—should go into reserve rather than closing.<sup>78</sup> It is unclear whether building more capacity will lead to a rerun of

<sup>78</sup> '双碳目标下电力系统如何实现低碳保供?', China5e, 24 November 2021, <u>https://www.china5e.com/m/news/news-1125959-1.html</u>.

<sup>&</sup>lt;sup>76</sup> '湖南宣布无消纳空间·暂停新增普通地面光伏项目备案,' Solar IN, 27 May 2020, <u>https://solar.in-en.com/html/solar-2359649.shtml</u>; '关于长安 益阳发电有限公司三期(2×1000MW)扩建工程社会稳定风险评估公众参与信息公示', Yiyang Government, 29 May 2020, <u>http://www.yiyang.gov.cn/yiyang/2/3/4/content\_1189176.html</u>.

<sup>&</sup>lt;sup>77</sup> '省间电力现货交易(试行)印发', State Grid Corporation of China, 24 November 2021,

http://www.sgcc.com.cn/html/sgcc\_main/col2017021449/2021-11/24/202111241103186885809041.shtml.



the experience of the past decade, when economic stimulus after the financial crisis led to severe overcapacity. It would seem reasonable that the existence of spare capacity will lessen the urgency around flexibility or efficiency, and worsen the tendency of provinces to protect their provincial generation assets.

There are reasons to expect this time to be different, however. The 2030 and 2060 goals have been set at the highest level by President Xi Jinping, who recently underlined that China's climate commitments are more reliable than those of other countries by noting, 'If you say something, do it. If you can't do something, don't say it.'<sup>79</sup> China is pursuing a carbon peak and carbon neutrality as a national development strategy, and the central government views meeting these commitments as a sign of the country's institutional advantage. Hence, although vested interests might seek to emphasize building coal plants as the main solution, central officials—led by the National Development and Reform Commission, the National Energy Administration, and the State Council—are likely to continue to roll out policies and reforms to counterbalance those interests. The actions of the Central Environmental Inspection Team earlier in 2021 are also likely to reinforce the message that environmental and emissions targets are not to be put on the back burner.

Since 2015, central officials have pursued electricity market reforms as a long-term solution for some of the institutional barriers noted here. Economic dispatch and greater provincial power trading would help resolve shortages and provide incentives for flexibility. In November, China's State Grid released a draft rule for cross-provincial spot electricity trading,<sup>80</sup> and President Xi announced that China would shortly issue national spot power market regulations,<sup>81</sup> which would represent a big step—but only a step. For spot markets to really provide a market signal, the markets likely need to grow in volume and begin to displace some of the inflexible monthly and annual contracts that currently dominate China's electricity market system.

In addition, as recent analysis has shown, markets and dispatch need to operate regionally, not just inside provinces,<sup>82</sup> a transition that may go against both provincial and SOE interests. Policies to sustainably promote small-scale wind, solar, and energy storage are still needed. Though some such policies are already on the books, so far the incentives are either too vague or inadequate to move the market away from excessive reliance on big projects. Expanding administrative mandates on provincial renewable energy quotas to more directly incentivize industrial users—such as the 'dual high' (high emissions, high energy consuming) industries—could move these consumers to adopt a more active posture on integrating clean energy. Orderly power consumption rules to prioritize industries that directly purchase renewable energy or take specified efficiency and flexibility measures will also help.<sup>83</sup>

Electricity shortfalls have become more common worldwide due to a wide variety of factors—market, climate, and institutional. Each power shortage is unique: while one factor sometimes predominates (lack of winterized gas supply infrastructure in Texas in early 2021, energy price policies in China last September, climate change and fires in California in 2020), typically there are multiple other contributing factors. Often, the public and policymakers focus primarily on the supply side, while leaving demand-side energy efficiency, flexibility, and related market reforms by the wayside. In China, the government has attached a high priority to the 2030 and 2060 goals and recognizes that all industries—including powerful state-owned energy industries—will have to do their part to scale up clean energy. Still, the call for more energy security tends to empower incumbent players seeking to add more capacity on the supply side, even as central government policy promotes a wider portfolio of policy measures. While radical changes are unlikely, some mixture of policies on flexibility, distributed energy, and efficiency will continue to counterbalance the longstanding institutional incentives favouring buildout of more thermal coal power for the sake of provincial self-sufficiency.

http://www.sgcc.com.cn/html/sgcc\_main/col2017021449/2021-11/24/20211124110318688580904\_1.shtml.

<sup>&</sup>lt;sup>79</sup> '**中美元首首次**视频会晤料为后续经贸谈判铺路 习近平呼吁不玩零和博弈.', Reuters, 16 November 2021, <u>https://www.reuters.com/article/china-</u> <u>xijinping-us-tw-1116-idCNKBS2I10GL</u>.

<sup>80 &#</sup>x27;省间电力现货交易(试行)印发', State Grid Corporation of China, 24 November 2021,

<sup>&</sup>lt;sup>81</sup> '习近平主持召开中央全面深化改革委员会第三十三次会议', Xinhua, 24 November 2021, <u>http://www.news.cn/politics/leaders/2021-</u> <u>11/24/c\_1128096690.htm</u>.

<sup>&</sup>lt;sup>82</sup> Jiang Lin et al., 'Assessing flexibility options and operational impact of a renewable-dominant power grid in China', *iScience*, 15 September 2021, <u>https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=3924610</u>.

<sup>&</sup>lt;sup>83</sup> '《有序用电管理办法》的通知', China National Development and Reform Commission, 21 April 2021,

https://www.ndrc.gov.cn/fzggw/jgsj/yxj/sjdt/201104/t20110428\_987489.html.



# THE OUTLOOK FOR CHINA'S EMISSIONS TRADING SYSTEM: GRADUALLY GETTING ON TRACK IN 2022

#### Yan Qin and Yuan Lin

China launched its national Emissions Trading System (ETS) in 2021. It became the largest carbon market globally in terms of covered emissions and finished its debut year with upbeat results. This year, China's ETS will likely see further consolidation of its legislative framework, stricter rules for allowance allocation, and progress in expanding sectoral coverage and trading participants. These developments will help to strength the scheme, and increase its role in contributing to China's climate goal. Last autumn's power shortages created some headwinds in the near term, since heavy financial losses by utilities could make them more reluctant to accept the tougher rules of the ETS. The current intensity-based target of the ETS may still limit its potential impacts on reducing emissions, in comparison with the absolute emissions targets implemented in other ETSs.

#### China's national ETS finished its debut year

The national carbon market China launched last year, covering the power sector, was a decade in the making. On 31 December 2021, the Ministry of Ecology and Environment officially announced that the first compliance period had been successfully completed.<sup>84</sup> The compliance rate is 99.5 per cent based on covered emissions. This means that the majority of the 2,162 power sector enterprises in the scheme surrendered allowances before the deadline, meeting their compliance obligation for the 2019–2020 period.

The China ETS launched trading on 16 July, and the price of the China Emission Allowance has been quite rangebound between CNY 40 and 60, averaging CNY 43.85 (€6)/t in 2021's 114 trading sessions. A total of 179 million tonnes were transacted. This price level is just a fraction of the price in more mature ETSs, such as the €80/t in the EU's ETS. Thus it only has negligible impacts in terms of driving emission reduction. In addition, the dominance of over-the-counter trading and low trading volumes of most of the sessions indicate that the level of liquidity still has some room to improve. Daily trading volumes stayed very low at only several hundred thousand tonnes, but surged to a million tonnes per day in December just before the year-end compliance deadline. This 'tidal' pattern is largely due to the fact that only spot trading is allowed at the moment. This means that compliance entities had little incentive to buy or sell well in advance of the compliance deadline and were more willing to trade near final compliance. For example, the major utility Huadian Group announced that it began with allowance trading on 26 November, and finished all the transactions and surrendering of allowances by 14 December.<sup>85</sup>

It was reported that major utility groups prioritized internal transfer among their own enterprises, before conducting trading with other groups. As mentioned in the news about the Huadian Group's ETS compliance, it collected allowance allocation and emissions data from all of its subsidiaries and designed a compliance strategy for them. Similar practices are reported for other utility and industrial groups. As a result, market participation in the China ETS is very concentrated. Despite over 2,000 enterprises being covered, there are indeed fewer participants in actual trading with this type of internal transfer policy in place. There are just around 20–30 utility or industrial groups active in the market, which dented trading activities and liquidities.

The Ministry of Ecology and Environment did not disclose official data on emissions and allocation. The Refinitiv carbon research team estimates final verified emissions for the two-year period to be 8.7 billion tonnes and total allocation for the two-year period to be 9.01 billion tonnes. This then leaves a surplus of 360 million allowances in China's national ETS after the compliance deadline, mainly due to rather generous allowance allocation and offset usage. Around 33 million tonnes of China's Certified Emissions Reduction (CCER) offsets are estimated to have been surrendered for compliance.

<sup>&</sup>lt;sup>84</sup> China Ministry of Ecology and Environment, 'Completion of first compliance cycle of national ETS',

http://mee.gov.cn/ywgz/ydqhbh/wsqtkz/202112/t20211231\_965906.shtml.

<sup>&</sup>lt;sup>85</sup> International Energy News, 'China Huadian Group finished compliance in national carbon market', <u>https://wind.in-en.com/html/wind-</u> 2413744.shtml.





#### China's national carbon market daily closing price (CNY/t) and trading volumes (listed trades, tonne)

#### The 2021 power outages cast a shadow over the development of ETS

The high compliance rate in China's national ETS's first compliance period beats expectations. This occurred as coal-fired power plants covered in the ETS mostly suffered heavy financial losses in 2021, due to surging coal prices. On the one hand, the benchmarks of the ETS are already above the average emission factor of the coal fleet in 2020, and the majority of coal-fired power plants have sufficient allowances for compliance needs. Refinitiv estimated that the big five utilities own roughly half of the 360 million tonnes of surplus allowances in the market. On the other hand, some compliance entities were said to have sold their allowances to cover losses by the plants and had difficulties fulfilling compliance in December. This is mostly prominent in the provinces of Inner Mongolia, Shandong, and Henan, where the coal fleet is in general more outdated than in the eastern provinces.

China's domestic coal prices have stabilized after the intervention of state planner NDRC (National Development and Reform Commission) since last October. However, spot coal contracts were still at CNY 800– per tonne in mid-February in China, meaning most of China's coal plants will likely see higher fuel costs and a financial burden in 2022, too. This will create further headwinds in the discussion of benchmarks and allocation rules for the second compliance period in early 2022. Power enterprises could be more reluctant to adhere to stricter emission reduction rules and tighter allocation. In addition, it was reported that some power plants chose to blend coal of different qualities, which will complicate emissions reporting and verification for the ETS.

#### Further speeding up of power sector reform will facilitate carbon price pass-through

In 2022, China may see further progress in its power sector reform following the coal tariff reform last October and expansion in the coverage of power trading. The coal-fired power tariff is allowed to fluctuate 20 per cent above or below the benchmark, and even higher for energy-intensive industry. At the same time, the roll-out of time-of-use tariffs in the provinces, including the introduction of significantly higher peak power tariffs, will also widen the band. In this regard, more flexible power pricing will also smooth the pass-through of carbon allowance costs from generators to power price, which previously was limited due to rather fixed tariffs.



In addition, China's energy regulators aim to further develop the spot power trading pilots and carry out spot trading in more provinces. The wider deployment of marginal cost-based power prices will also enhance the pass-through of carbon costs, making thermal producers less hostile to the ETS. China Southern Grid's researcher estimated that when China's allowance price rises to CNY 200 per tonne and full auctioning is introduced, a coal-fired power plant's ETS compliance costs will be around CNY 0.18/kWh.<sup>86</sup> This is nearly one-third of the coal-fired benchmark tariff in Guangdong Province.

#### The second compliance period of ETS starts in 2022 with many unsolved issues

In 2022, China's national ETS will start its second compliance period. The coverage will remain unchanged, covering coal- and gas-fired power generators. It is unclear whether the new period will cover only 2021 or both 2021 and 2022. The latter would have larger impacts in terms of forcing thermal power producers to curb emissions this year.

There are many unsolved questions clouding the outlook for the national ETS. A key puzzle in the policy framework of China's national ETS remains unsolved, as the new State Council-level ETS regulation (compared to the current ministerial -level regulation, which is of a lower bureaucratic ranking) that was expected to be approved by end of 2021 has not been published. The draft consultation version of this ETS regulation was released in March 2021 and is also included in the State Council 2021 work plan of key legislation. This, when effective, will replace the current ETS management measures which entered into force in February 2021, and will elevate the legislation and enable higher penalties for non-compliance and tighter enforcement. It is still expected that this new and higher-level ETS regulation can be released in the first quarter of 2022 by the State Council.

In addition, after the end of the first compliance period, 2019–2020, the market is anxiously awaiting the allocation plan and benchmarks for the second compliance period. The draft benchmarks have already been consulted,<sup>87</sup> and may already be published in the first quarter. China's state planner issued new guidelines on coal-fired plants' retrofitting and upgrading in November. It aims to reduce thermal plants' average coal consumption to 300 g standard coal/kWh in 2025, down from current level of 305 g/kWh. Since the national ETS's benchmarks for the power sector are closely linked with this coal consumption indicator, the new coal retrofitting rules will likely prompt the Ministry of Ecology and Environment to tighten considerably the benchmarks for thermal plants. A lower ETS benchmark will reflect the improvement in the efficiency of the coal fleet and counteract the excess allowance in the first compliance period.

Third, it was reported that the offset market, the CCER, will be relaunched during 2022, following its suspension in 2017. The Beijing Green Exchange will host the national CCER trading. In the first compliance period, enterprises were allowed to use CCER for up to 5 per cent of their yearly compliance obligation, from CCER projects in renewable energy, carbon sinks, methane utilization, and others. This policy has in fact led to a rise in CCER prices in recent months due to demand from power enterprises. Allowing offset usage is intended to reduce enterprises' compliance costs, but too much offset supply will also dent the demand for allowances. Hence it is uncertain whether the regulator will keep the 5 per cent share in the new compliance period or revise it downwards. Nevertheless, this rule will continue to boost the demand for offsets and push forward the relaunching of the CCER scheme.

Another hot topic on the agenda is to open carbon trading to institutional investors. So far, the trading is limited to compliance enterprises, and is said to have limited market liquidity. When trading is mainly for the purpose of compliance, this resulted in reduced trading activities during most months, followed by a sharp rise in the final weeks before the deadline. In addition, only the large power enterprises have established professional carbon asset management teams, and many small-to-medium-sized enterprises do not have the capability to carry out carbon trading. This triggers the need to include financial institutions as intermediaries to facilitate trading. Thus, we may get some clarity over this during the year, such as criteria for eligible investors (non-compliance entities). But it is very likely that only domestic investors will be allowed to participate at the beginning, rather than foreign investors or individuals. Moreover, there have also been suggestions to broaden the trading products from spot trading only to carbon futures. The newly established Guangzhou Futures Exchange is reportedly to be the main venue should the carbon futures trading be approved.

<sup>&</sup>lt;sup>86</sup> Energy Observer, '80 euro vs 50 yuan carbon price', <u>https://mp.weixin.qq.com/s/yYHGP-NTSuLXc42vtsmhPw</u>.

<sup>&</sup>lt;sup>87</sup> Bloomberg, 'China's carbon market may get stricter under a new proposal', <u>https://www.bloombergquint.com/business/china-mulls-a-deeper-</u> <u>cut-in-carbon-quotas-for-coal-power-plants</u>.



Finally, China's ETS is in the process of expanding beyond the power sector. The regulator has aimed to include more industry sectors by 2025, allowing the scheme to cover 60 to 70 per cent of China's national emissions. The aluminium and cement sectors are highly likely to be the first new sectors to enter the scheme. The EU carbon tariff proposal currently under discussion could also prompt China to speed up the inclusion of the steel sector in the ETS. But it seems that the emissions data collection and benchmarks calculation are very complicated, which may delay the process slightly. From this perspective, petrochemicals and chemicals are likely to be the last to enter, following aluminium, cement, and steel.

Nevertheless, there are still many positive events to expect in China's new national ETS in its second year of operation in 2022. The policy framework will become more complete, allowance allocation rules will be stricter, and trading liquidity will increase further. Sector expansion and the introduction of more trading participants will advance further. Going forward, the national ETS will make enterprises more aware of carbon costs and conscious of reducing emissions, helping China to achieve its carbon peak and neutrality pledge. Refinitiv carbon researchers expect China's ETS price to average CNY 65/t in 2022, rising slightly from the 2021 average due to tighter benchmarks. However, this is still below the optimal marginal abatement cost of CNY 100/t during the period 2021 to 2025, estimated by Refinitiv's fundamental China power sector model, and far below the level needed to achieve the 2060 carbon neutrality goal. In addition, prioritizing economic growth in 2022 and inflation worries via rising power and carbon prices will likely make environmental regulators more wary of setting considerably strict targets in the national ETS.

## AFTER THE ENERGY CRISIS, A DASH FOR GAS?

#### Michal Meidan

At the height of China's energy crisis, despite the strong focus in China on coal, global gas markets were alarmed by Chinese Premier Li Keqiang's call to secure energy supplies 'at all costs'.<sup>88</sup> In the context of tight gas markets and already record prices in Europe, a large increase in LNG imports from China—if power generators were to rely increasingly on gas instead of coal—would only lead to further price spikes, exacerbating the global energy crunch. Yet gas use in China's power sector remains limited, and while its potential role and importance have been highlighted by the power crisis, this was only one factor informing China's strong appetite for gas in 2021. Robust economic activity, which led to strong industrial demand, alongside ongoing increases in residential consumption and new LNG import terminal and storage tank start-ups, all contributed to the surge in China's gas demand in 2021.

The power crisis has highlighted the importance of gas in China's power mix as well as the need to hedge against price volatility. Going forward, gas in power will remain critical for peak shaving and is likely to account for the majority of China's incremental gas use. In light of this, and the government's growing focus on supply security in the aftermath of the power crunch, Chinese buyers have signed new import deals, many with US exporters, and have moved forward with plans to add new LNG import terminals. Meanwhile, in a bid to offset some of its reliance on seaborne flows, Beijing has committed to buying an additional 10 billion cubic metres (bcm) of gas from Russia via pipelines, with another large pipeline from Russia still on the table.

#### A strong year for gas

China's power crunch, and government calls to ensure supplies at any cost rattled global gas markets, but the strength in both imports into China and domestic production predated the September–October crisis. Between January and September 2021, China's implied demand (production and net imports) grew by a staggering 49 bcm year on year (y/y), with full-year demand growth estimated at 62 bcm y/y. Put differently, the power outages in September–October (or in fact previous outages in June 2021) were not the only drivers of demand growth. What is more, in 2020, the power sector accounted for 16 per cent of China's total gas use, or 53 bcm, according to China's National Energy Administration's *Natural Gas Development Report*,<sup>89</sup> while the industrial sector accounted for 37 per cent of total consumption, or 121 bcm, that same year. The data for gas use in the power sector has not been released for 2021, but even assuming a 20 per cent y/y increase (or double overall electricity demand growth in China in 2021), power demand would have accounted for under a quarter of additional gas demand in 2021.

 <sup>&</sup>lt;sup>88</sup> 'Premier Li calls for "all-out" efforts to ensure "warm winter", *Global Times*, 20 October 2021, <a href="https://www.globaltimes.cn/page/202110/1236871.shtml">https://www.globaltimes.cn/page/202110/1236871.shtml</a>.
<sup>89</sup> China's Natural Gas Development Report 2021, <a href="https://www.nea.gov.cn/1310139334\_16294604014501n.pdf">https://www.nea.gov.cn/1310139334\_16294604014501n.pdf</a>.



The need for increased supplies in 2021 was therefore driven by a number of factors—including the rebound in industrial activity, as well as ongoing efforts to switch commercial and residential users from coal to gas, in line with the government's pollution prevention plans, which seek to reduce the share of dispersed coal and replace it with gas or electricity networks.

Lessons from the supply shortages of the winter of 2020–2021 also supported strong imports early on in 2021: a cold spell in December 2020 sent domestic prices skyrocketing as supplies from the pipeline system or from large underground storage facilities were not released fast enough. This was due to a lack of coordination between China's newly created midstream company, PipeChina—which took over the dispatching responsibility for the first time—and gas suppliers and downstream players. Underestimating the strength of demand in the winter on concerns over weakening economic growth and COVID-19 restrictions, city gas distributors had failed to raise winter contractual volumes,<sup>90</sup> sending the wrong message to upstream suppliers about winter demand levels. Ahead of the winter of 2021–2022, the supply security imperative was even more important in light of the Winter Olympics taking place in China in February 2022.

Imports were therefore strong throughout the year, leading to higher arrivals of both LNG and pipeline gas. In 2021, according to China's customs data, imports were up by 46 bcm y/y, with pipeline supplies up by 13 bcm (after falling y/y in 2020). This was due to a combination of low prices, averaging \$5.4/million British thermal units (mmbtu), or almost half the average cost of LNG, and a large growth in imports from the Power of Siberia (PoS) pipeline from Russia, with imports reaching close to 10 bcm (+6 bcm y/y). Oil indexation for oil-linked LNG contracts tends to feed through to prices in around three months, while the pipeline price indexation has a longer lag of 9–12 months. Yet with new LNG import terminals starting up, many of which faced delays because of the pandemic, and an additional 2 bcm of storage tanks at new or existing terminals, LNG imports grew by over 20 bcm y/y.

So, the power crisis at the end of the year did little to move the needle on gas imports. If anything, it may have had a chilling effect on Chinese buyers that had already sourced ample supplies for the winter and were bumping up against full storage tanks. Any incremental volumes, given their now high costs, were less appealing. And even though the power price reform introduced in October 2021 allows importers to pass through the costs to end users, the strong emphasis on increasing coal supplies and imports led to a switch back to coal towards the end of 2021. Finally, the anticipated economic slowdown, due to the slowing of the real estate sector, and industrial curbs to limit air pollution were set to weigh on economic activity and gas demand.

#### Gas in power will drive incremental demand growth

While gas in power was not the main driver of incremental demand in 2021, it is likely to become a key source of future growth. Gas accounted for 106 GW of installed capacity in mid-2021, up from 98 GW at the end of 2020. The China Electricity Council expects installed gas-fired capacity to reach 150 GW by 2025, and even though this pales in comparison with plans to install an additional 600 GW of solar and wind power through 2025,<sup>91</sup> it remains a key factor in future gas demand.

Estimates of China's future gas demand vary but still foresee at least another decade of strong growth: the National Energy Administration forecasts demand will reach 550–600 bcm by 2030, before peaking at an undisclosed volume in 2040, and PipeChina reckons demand will reach 650 bcm in 2035, while China National Petroleum Corporation (CNPC) expects gas use will reach 535–600 bcm in 2030 and peak at 650 bcm in 2040. CNPC forecasts that gas in power will add over 200 bcm of demand between 2020 and 2040, with industry, buildings, and transport combined accounting for around 100 bcm of new demand over that same period. The importance of gas in power is also reflected in provincial plans, with much of the expected demand set to come from users in southern China. Fuel switching in the north of the country has led to a strong peak in the winter months and concerted efforts to add import infrastructure and improved distribution connections there, but demand is also rising in southern China.

The Guangdong provincial government, for instance, in its 14th Five-Year Plan, set out plans for higher natural gas penetration rates in urban use, having almost completed its coal-fired boiler switch and having the largest installed gas-fired capacity in

<sup>&</sup>lt;sup>90</sup> Cindy Liang, Shermaine Ang, and Eric Yep, 'China's gas buyers shun high-priced spot LNG despite energy shortages', S&P Global Platts, 15 January 2021, <u>https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/011521-analysis-chinas-gas-buyers-shun-high-priced-spot-lng-despite-energy-shortages</u>.

<sup>&</sup>lt;sup>91</sup> 'China briefing: surge in offshore wind; Xi's new speech; IEA's report', CarbonBrief, 27 January 2022, <u>https://www.carbonbrief.org/china-briefing-27-january-2022-surge-in-offshore-wind-xis-new-speech-ieas-report</u>.



China, over half of which are peaking plants.<sup>92</sup> The provincial government is looking for annual supply capacity to almost double from 48 bcm in 2020 to 80 bcm in 2025, including 16 new and expanded LNG terminals. And with domestic gas production expected to reach 250–300 bcm between 2030 and 2035, the call on imports will remain significant.

#### The geopolitics of supply security

The heightened focus on supply security in the aftermath of the power crisis, combined with a promising role for gas in China's energy transition and the extreme price volatility seen in 2020–2021, have spurred a flurry of long-term supply deals.

Over the course of 2021, and particularly in the second half of the year, Chinese companies signed over 30 million tonnes per annum (Mtpa) of new term contracts, of which close to 14 Mtpa are set to begin in 2022, with an additional third taking effect in 2023. Almost one-third of those deals are for US LNG, coinciding with a thawing of bilateral ties and the end of the 'phase one' deal between Washington and Beijing. As of November 2021, China's energy imports from the US reached half of the amount pledged under the US–China 'phase one' deal, signed in January 2020, and even though President Biden has signalled that his administration is not planning to negotiate a 'phase two' deal, he pressed Beijing to implement the existing agreement. In January-to-November 2021, China imported 11.4 bcm of US LNG, an almost four-fold increase from 2020. In addition to the geopolitical merit of higher flows from the US, price volatility and a desire to secure long-term supplies were other key drivers. As a result, since October 2021, Chinese companies have signed five long-term supply deals with US LNG exporters, with at least two deals reportedly linked to Henry Hub prices.

The desire to secure more LNG term contracts—from all potential suppliers—underpins the expected doubling of China's import terminal capacity, from just over 90 Mtpa at the end of 2021 to around 190 Mtpa by 2025. It is also informed by the ongoing liberalization of China's gas market, with PipeChina offering capacity on the domestic pipeline system, where spare capacity is available, as well as access to import terminals—which in turn is encouraging a diverse group of buyers to seek term contracts and invest in LNG import terminals. Already, tier-two players accounted for 15 Mtpa of receiving capacity in China, and their share of the infrastructure build is growing. Similarly, one-third of the term contracts agreed in 2021 were signed by tier-two players, including power companies and local distribution companies, with the state-owned majors (CNPC, Sinopec, and CNOOC) accounting for 23 Mtpa of newly signed deals.

But while the liberalization efforts and flexibility of LNG supply contracts suggest rapid increases in LNG flows to China, they inevitably lead to higher import dependence on seaborne flows, a source of strategic vulnerability that Beijing has long sought to mitigate. The announcement, in early February, that Russia will supply China with an additional 10 bcm of pipeline gas, will serve as a counterbalance to increased reliance on LNG. At the time of writing, there are few details regarding the start time of the additional 10 bcm and the origin of the gas; but based on Gazprom projects with uncommitted gas reserves, the gas may come from Sakhalin 3, with flows starting around 2024.

That the project will be settled in euros, rather than dollars (but also not in Chinese renminbi or in Russian roubles) points to the geopolitical dimensions underpinning the supply contract. That said, pipeline imports to China from Russia were the lowest-cost source in 2021, averaging \$3.7/mmbtu at the border, an extremely cost-competitive option. With PoS 1 set to reach its full 38 bcm per annum (bcma) capacity by 2025, the additional volumes would mean that Russian pipeline exports to China would reach 48 bcma by 2027, and that barring another large surge in demand, LNG import growth would start to slow.

This leaves the question of the PoS 2 very open. Russia is looking to deliver 50 bcma through PoS 2 via Mongolia. But if Chinese demand forecasts for 2030–2040 are realistic—and if domestic production does manage to exceed 300 bcma by the mid-2030s—both the current LNG build-out and an additional pipeline from Russia would leave the Chinese market well balanced and well supplied.

<sup>&</sup>lt;sup>92</sup> Yan Qin, 'Natural gas in China's power sector: challenges and the road ahead', Oxford Institute for Energy Studies, December 2020, https://a9w7k6q9.stackpathcdn.com/wpcms/wp-content/uploads/2020/12/Insight-80-Natural-gas-in-Chinas-power-sector.pdf.



## WILL CHINA'S POWER CRUNCH SHIFT ITS CLIMATE POLICY?

#### Byford Tsang

Power rationing is not uncommon in China. Provinces sometimes introduce rationing measures to regulate power demand, and at times they ration power to meet energy targets. These measures mostly affect industrial power users.

What sets the 2021 power crunch apart is the scale of it and the impact on people's livelihoods. Restrictions were introduced in provinces generating 75 per cent of China's GDP.<sup>93</sup> Residential power was affected in the northeast, which led to incidents on roads and in factories, hospitals, and elevators in residential and commercial buildings.

The shortage also came against the background of months of government rhetoric and measures to curb energy use and carbon emissions. As a result, some blamed the country's climate targets and policies as a cause of the power crisis.

#### Is climate policy to be blamed?

At the time of the 2021 energy crisis, the main policy targets that governed local-level energy and carbon performances were a five-year national carbon intensity target and the annual energy target (total-consumption and energy-intensity targets, commonly known as 'dual control' in China).

But these targets are not new. The dual-control system has been around since 2016, long before China put out its carbon peaking and neutrality targets. Every year, local governments are given targets they need to meet. The targets set for the provinces in 2021 were similar to the ones in previous years.<sup>94</sup> In 2021, provincial governments were under no immediate pressure to introduce restrictions on power generation to achieve their 2025 targets on carbon intensity.

The central government did step up the enforcement of the energy targets in the context of reining in energy-intensive and polluting industries, driving 'high-quality' growth and the carbon peak and neutrality targets.

- Earlier in 2021, the NDRC (National Development and Reform Commission, China's top economic planner) ramped up the naming-and-shaming campaign by publishing provinces' performance on energy targets.<sup>95</sup>
- NDRC said in mid-September that they will strengthen the use of energy targets in assessing the performance of provincial officials, which would affect their career prospects within the Chinese Communist Party (outlined in the Scheme to Refine Dual-Control of Energy Intensity and Total Energy Consumption, published by NDRC in September 2021).<sup>96</sup>

While these measures added pressure on provincial officials to meet the energy targets, they were not the main cause of power rationing in all provinces. As the dust settles after the crisis, most analysts agree that China's power crunch in 2021 was the result of a mismatch between supply and demand for coal, made worse by missing price signals, but not a result of insufficient coal capacity or of the effort to meet new climate targets. Reliance on coal, as the power crisis has exposed, is no guarantee of energy security. As geopolitical tensions between China and the West rise, China's coal imports will be increasingly vulnerable to supply chain disruption, which is likely to be exacerbated by extreme weather incidents driven by climate change.

#### What has changed since the crisis?

The central government has put into place a flurry of administrative and fiscal measures to boost coal supply in response to the crisis. Among these measures, the reform of coal power pricing tackles the root cause of the crisis and is likely to be consequential in driving China's energy transition.

09/17/5637960/files/49cb6c96c1384ed89c6e61269ee69da0.pdf.

<sup>&</sup>lt;sup>93</sup> David Rees, 'Energy shortages add to China's economic woes', Schroders, 30 September 2021,

https://www.schroders.com/en/uk/tp/economics2/economics/energy-shortages-add-to-chinas-economic-woes/.

<sup>&</sup>lt;sup>94</sup> Chen Xi, 'What's with the electricity rationing? 5 misconceptions of dual energy control', Yicai, 28 September 2021,

https://www.yicai.com/news/101185610.html.

<sup>&</sup>lt;sup>95</sup> National Development and Reform Council, People's Republic of China, 'Barometer of performance against energy dual targets – by provinces and regions in 2021 H1', 12 August 2021, <u>http://www.gov.cn/zhengce/zhengceku/2021-08/18/content\_5631846.htm</u>.

<sup>&</sup>lt;sup>96</sup> National Development and Reform Council, People's Republic of China, 'Proposal to improving energy intensity and energy consumption dual control targets', 11 September 2021, <u>http://www.gov.cn/zhengce/zhengceku/2021-</u>



In October, China's top economic planner announced measures to speed up the liberalization of the power market.<sup>97</sup> All coal power utilities are required to sell their power through the wholesale market with no price guarantee. Generators are also allowed to pass through part of the cost to commercial and industrial users by setting power prices within a ±20 per cent window anchored to a base price. This means that coal generators, unlike during the onset of the recent power crunch, do not necessarily have to operate at a loss at times of high fuel prices.

This new pricing mechanism, despite safeguarding coal power generators' ability to remain profitable in the short term and at times of coal price hikes, should make coal less competitive against solar and wind power over the long term.<sup>98</sup> The reformed system means market players are less exposed to the uncertainties of a market with regulated electricity pricing but market-based coal prices. Better price signals could motivate end-users to invest in energy efficiency measures.

The power crunch is also changing the role of the dual-control energy targets as a tool in driving China's energy and climate objectives. The rigidity of the dual-control policy has been blamed as the cause of the occasional 'self-inflicted' power shortages towards year-end as local officials rushed to meet annual targets by switching off the power supply.

In September 2021, the government started loosening the rules so that certain renewable energy addition will not be counted towards provinces' annual total energy consumption targets.<sup>99</sup> This incentivizes provinces to meet their rising energy demand with renewable instead of fossil power sources. Since the power crunch, Beijing has doubled down on this initiative, by stating categorically that renewable energy should be excluded in the current system of absolute energy consumption targets.<sup>100</sup>

The limitations and the perverse incentives of the energy targets policy, laid bare by the 2021 power crisis, will shape how policymakers design the system to enforce the country's climate targets. Ahead of the crisis, the country's top economic planner declared the dual-control energy targets as a 'key entry point' in delivering the country's carbon neutrality target.<sup>101</sup> In December 2021, at the top government economic conference after the peak of the crisis, however, the transition from 'dual energy control' to 'dual carbon control' (total emissions and emissions intensity targets) was agreed as a priority in driving carbon emissions reductions.

China is likely to introduce a national carbon cap in the next five years, an idea first floated in the country's 14th Five-Year Plan, published in March 2021. The new carbon targets should feature more flexibility than the existing energy dual-control policy, as officials have been urged by Beijing to avoid 'simple top-down allocation' in designing the climate targets. Some energy experts believe that the national cap will be developed in a bottom-up fashion by aggregating provincial targets that are set based on local circumstances.<sup>102</sup> The carbon cap could be implemented through the national carbon market with a gradual decrease in the number of allowances.<sup>103</sup>

#### **Political signals**

The power crunch has raised the political salience of energy security in China. Chinese leaders have since struck a more cautious tone when referencing the country's climate policies, highlighting the need to safeguard the security aspect of the energy transition.<sup>104</sup> Ensuring energy security per se is not contradictory to China's climate objectives, as rising renewable

09/17/5637960/files/49cb6c96c1384ed89c6e61269ee69da0.pdf

<sup>101</sup> National Development and Reform Council, People's Republic of China, 'Interpreting the proposal to improving energy intensity and energy

<sup>104</sup> State Council, People's Republic of China, 'Premier stresses stable energy supply, energy security', 11 October 2021, http://english.www.gov.cn/premier/news/202110/11/content\_WS61643b38c6d0df57f98e17ab.html.

<sup>&</sup>lt;sup>97</sup> National Development and Reform Council, People's Republic of China, 'Notice on further deepening the market-oriented reform for the ongrid price of coal-fired power generation', 11 October 2021,

https://www.ndrc.gov.cn/xxgk/zcfb/tz/202110/t20211012\_1299461.html?code=&state=123.

<sup>&</sup>lt;sup>98</sup> David Fishman, 'Measures to Accelerate and Deepen Power Sector Reforms Announced in China' 15 October 2021, The Lantau Group, <u>https://www.lantaugroup.com/file/brief\_china\_power\_sector\_oct21.pdf</u>.

<sup>&</sup>lt;sup>99</sup> National Development and Reform Council, People's Republic of China, 'Proposal to improving energy intensity and energy consumption dual control targets', 11 September 2021, <u>http://www.gov.cn/zhengce/zhengceku/2021-</u>

<sup>&</sup>lt;sup>100</sup> 'Central Economic Work Conference was held in Beijing', 10 December 2021, People's Daily, <u>http://politics.people.com.cn/n1/2021/1210/c1024-32305205.html</u>

consumption dual control targets', 22 September 2021, <u>https://www.ndrc.gov.cn/xxgk/jd/jd/202109/t20210922\_1297198.html</u>.

<sup>&</sup>lt;sup>102</sup> 'What does China's 14th "five year plan" mean for climate change?', CarbonBrief, 12 March 2021, <u>https://www.carbonbrief.org/qa-what-does-</u> <u>chinas-14th-five-year-plan-mean-for-climate-change</u>.

<sup>&</sup>lt;sup>103</sup> 'Implement the transition of "dual control" to the control of total carbon emissions and intensity in an orderly fashion', Chinese Communist Party News, 28 December 2021, <u>http://theory.people.com.cn/BIG5/n1/2021/1228/c40531-32318551.html</u>.



energy capacity could free the country from dependency on oil and gas imports. But the recent crisis, which was not driven by disruption of energy imports, has led policymakers to focus their minds on domestic energy security and stress the 'centrality of coal in China's energy resource endowment'<sup>105</sup>.

Similar references to coal were included in the country's road map to peak emissions in 2030,<sup>106</sup> published during the height of the energy crisis. Language in the road map regarding coal power expansion was reportedly added at the last minute,<sup>107</sup> although it was unclear whether it was linked to the power crunch. The concept of 'decarbonizing securely' was raised for the first time in the '1+N' document,<sup>108</sup> the overarching guiding document for China's long-term climate policy, published in late October. The '1' refers to the 'working guidance' that sets out the overarching principles of all forthcoming policies that aim to facilitate China's peaking and neutrality goals. The 'N' refers to a '2030 carbon peaking action plan' and a series of forthcoming plans that will lay out sectoral policy road maps and targets.<sup>109</sup>

An emphasis on energy security based upon coal is hardly a step forward in China's climate policy, but the language underscores the sense of unease among policymakers as they balance the short-term need to keep the lights on and the country's long-term climate aspirations.

Since the power crunch, the government has also introduced a series of regulatory and financial incentives for the coal mining and power sectors. These include a CNY 200 billion (\$31.3 billion) lending program for 'clean and efficient' coal,<sup>110</sup> roughly what the Bank of China invested in coal power and mining between 2016 and 2020. Projects such as coal plant retrofits, industrial boiler upgrades, coal washing, and coal-bed methane capture would be eligible for funding under this new programme.

The renewed focus on energy security could be seized upon by coal industry incumbents that are seeking to delay the transition, while the short-term measures to boost 'clean and efficient coal' could throw another lifeline to the coal industry.

Coal researchers and industry associations alike have already taken the opportunity to call coal the 'bedrock' of a secured energy system,<sup>111</sup> urged policymakers to proceed with a 'coal phase-out' with caution as it would 'not be compatible with the country's energy strategy',<sup>112</sup> and warned that a rapid coal phase-out would make power blackouts 'larger and deeper than 2021' and more frequent.<sup>113</sup>

Nevertheless, the power crisis in 2021 is unlikely to impact China's long-term climate ambition. The new funding programme on clean coal was launched side-by-side with a low-cost loan programme by China's central bank to support low-carbon projects, including the installation of renewable energy, smart grid, and carbon capture technologies. Climate change remains one of the key economic priorities for China in 2022, listed alongside 'common prosperity' and managing financial risks in the readout to the government's annual economic planning meeting.<sup>114</sup> In his speech to the World Economic Forum 2022,<sup>115</sup> Chinese President Xi Jinping declared that China's approach to energy transition is centred on the principle of 'phasing out the old and bringing in the new', potentially a veiled swipe at industry voices advocating to put brakes on the phase-out of coal.

<sup>105</sup> ibid

<sup>&</sup>lt;sup>106</sup> State Council, People's Republic of China, 'Action plan for carbon dioxide peaking before 2030', Xinhuanet, 26 October 2021, <u>http://www.news.cn/english/2021-10/27'/c 1310270985.htm</u>.

<sup>&</sup>lt;sup>107</sup> Sha Hua, 'China gives itself wiggle room on climate change ahead of COP26', Wall Street Journal, 29 October 2021,

https://www.wsj.com/articles/china-gives-itself-wiggle-room-on-climate-change-goals-11635538164.

<sup>&</sup>lt;sup>108</sup> National Development and Reform Commission, People's Republic of China, 'Working guidance for carbon dioxide peaking and carbon neutrality in full and faithful implementation of the new development philosophy', 24 October 2021,

https://en.ndrc.gov.cn/policies/202110/t20211024\_1300725.html.

<sup>&</sup>lt;sup>109</sup> Belinda Schäpe and Byford Tsang, '1+N: what's in China's upcoming climate plans?', E3G, 20 October 2021, <u>https://www.e3g.org/news/1-n-china-upcoming-climate-plans-1n-xie-beijing-han/</u>.

<sup>&</sup>lt;sup>110</sup> 'China establishes a 200-million-yuan fund to support clean and efficient use of coal', Xinhuanet, 17 November 2021,

http://www.news.cn/2021-11/17/c\_1128074370.htm

<sup>&</sup>lt;sup>111</sup> 'Coal issue investigation: prices roam like a "wild horse", what did the "crazy" coal market expose?', Economic Daily, 13 December 2021, <a href="http://m.gxfin.com/article/finance/ny/default/2021-12-13/5707322.html">http://m.gxfin.com/article/finance/ny/default/2021-12-13/5707322.html</a>.

<sup>&</sup>lt;sup>112</sup> 'Exploring a new path of coal sector "dual carbon" strategy', China Coal Post, 12 January 2022, <u>https://www.cctd.com.cn/show-176-220540-</u> 1.html.

<sup>&</sup>lt;sup>113</sup> 'Energy sector development and energy security in the context of "dual carbon" target', Petro China News Centre, 1 January 2022, <u>http://news.cnpc.com.cn/epaper/sysb/20220101/0152212004.htm</u>.

<sup>&</sup>lt;sup>114</sup> 'Central Economic Work Conference was held in Beijing', 10 December 2021, People's Daily,

http://politics.people.com.cn/n1/2021/1210/c1024-32305205.html .

<sup>&</sup>lt;sup>115</sup> 'Special address by Chinese President Xi Jinping at the 2022 World Economic Forum virtual session', Xinhuanet, 17 January 2022, http://www.xinhuanet.com/english/20220117/d3c169b45b304f6f9176969a45480784/c.html.



China did play a central role in the last-minute diplomatic wrangling to water down the language on coal in the Glasgow Climate Pact, insisting that it would stick to the 'coal phase-down' language used in domestic policy instead of the more ambitious 'phase-out'. But in signing the Pact, China for the first time acknowledged coal power generation as the specific target of a 'phase-down', instead of its previous more general references to overall coal consumption in domestic policies. At Glasgow, Beijing also pledged to 'make best efforts to accelerate' the phase-down of coal consumption in the US–China Glasgow Declaration. While these do not represent major progress, Beijing appears to have inched forward on its position on coal amid the power crisis.

#### What to watch in 2022

In the end, the impact of the power crunch on the pace of China's clean energy transition will be determined by actions, not words. Policymakers in Beijing will be making some hard policy choices in 2022 to balance energy security and climate objectives while countering the political headwinds from incumbents in the power sector and international climate diplomacy.

Targets, policies, and pace of change advocated by the energy sector plans as part of the 1+N and 14th Five-Year Plan policy frameworks, to be published in 2022, will determine how much longer coal will remain in China's energy mix in the power system. Research institutes affiliated with industries have argued that a 150 GW expansion of coal capacity is necessary to safeguard China's energy security.<sup>116</sup> But independent analysis has shown that capping China's coal capacity at 1,100 GW by 2025 (53 GW more than currently operating) will allow China to meet its future energy demands.<sup>117</sup>

Increasing the flexibility of coal power plants—transitioning existing plants' role from serving base load to peak load—is crucial in ensuring an orderly phase-out of coal while safeguarding energy security. Measures to subsidize flexibility retrofits and strategic backup capacity could encourage local economic planners to meet energy demand with existing instead of new coal capacity.<sup>118</sup> Some of these measures, including a 'capacity compensation mechanism', have been raised in a recent government document on power market reform in response to the power crisis,<sup>119</sup> but are yet to be taken forward.

China accounts for 55 per cent of the world's pre-construction pipeline of coal-fired power plants<sup>120</sup> and is under increasing pressure to end the construction of new coal power plants and to put an expiry date on coal in its power system. In 2021, the 'no new coal' movement picked up internationally with more than 60 countries committing to stop building new coal power. Major coal users in the developing world, including Vietnam and Indonesia, both Chinese neighbours, have noticeably stronger commitments than China on coal after signing on to the Coal to Clean pledge at COP26.<sup>121</sup> This divergence is likely to cast a shadow over China's attempt to paint itself as a climate leader internationally going into COP27, and will also play a part in Beijing's calculus on its strategies to phase down coal.

<sup>118</sup> Gao Baiyu, 'Does coal still have a role in China's decarbonising power market?', China Dialogue, 8 January 2021,

https://chinadialogue.net/en/energy/does-coal-still-have-a-role-in-chinas-decarbonising-power-market/

https://www.ndrc.gov.cn/xxgk/zcfb/tz/202110/t20211012\_1299461.html?code=&state=123.

statement/#:~:text=We%2C%20the%20undersigned%2C%20noting%20that,to%20accelerate%20the%20energy%20transition.

<sup>&</sup>lt;sup>116</sup> 'Coal power installed capacity to reach 150 GW during "14<sup>th</sup> Five-year Plan" period', China Energy Post, 15 December 2021, <u>https://news.bjx.com.cn/html/20211215/1193645.shtml</u>.

<sup>&</sup>lt;sup>117</sup> Michael Giovanniello and Yang Wang, 'China can meet energy and climate goals capping coal power', Natural Resources Defense Council, 4 August 2021, <u>https://www.nrdc.org/experts/alvin-lin/china-can-meet-energy-and-climate-goals-capping-coal-power</u>.

<sup>&</sup>lt;sup>119</sup> National Development and Reform Council, People's Republic of China, 'Notice on further deepening the market-oriented reform for the ongrid price of coal-fired power generation', 11 October 2021, ,

<sup>&</sup>lt;sup>120</sup> Chris Littlecott et al., 'No new coal by 2021: the collapse of the global coal pipeline', E3G, September 2021,

https://9tj4025ol53byww26jdkao0x-wpengine.netdna-ssl.com/wp-content/uploads/No-New-Coal-by-2021-the-collapse-of-the-global-pipeline.pdf. <sup>121</sup> 'Global coal to clean power transition statement', 26th UN Climate Change Conference of the Parties, 4 November 2021, <u>https://ukcop26.org/global-coal-to-clean-power-transition-</u>



## GREY RHINOS, BLACK SWANS, AND THE DRAGON-TO-BE-GREENED—THE 2021 POWER OUTAGE AND CHINA'S ENERGY SECURITY REGIME

#### Linxiao Zhu

In late 2021, policymakers in Beijing were scratching their heads over carbon neutrality planning when the worst power outage in decades swept the nation. The timing could not have been more inopportune, occurring just ahead of the COP26 summit in Glasgow and the release of newly drafted '1+N' documents, the overarching guidelines that outline China's colossal carbon neutrality plans. Indeed, the crisis has significantly stress-tested the strength, limits, and adaptability of China's energy security regime, leaving a more pronounced priority of safeguarding energy security on an uphill battle toward the 2060 carbon neutrality goal.

#### Evolving perceptions, elevated priorities, fragmented politics

The conventional wisdom in Chinese policy and academic circles holds that overreliance on oil and gas imports from foreign countries poses the biggest energy security threat. By this logic, China is vulnerable to external geopolitical events or natural disasters that risk crippling its oil and gas import volumes—a highly-probable and high-impact event dubbed as the "grey rhino" in Chinese political language. In 2019, China's oil and gas import dependency ratios reached 70.8 and 40.3 per cent, respectively,<sup>122</sup> figures that officials frequently warn against as a critical underlying national security threat. To tackle the challenge, in 2014, the Xi administration unveiled an ambitious Four Revolutions, One Cooperation long-term energy security strategy.<sup>123</sup> China's subsequent energy reform and governance agenda has broadly been allocated in five baskets: the revolutions in energy consumption, supply, technology, and systems, in addition to international cooperation.

However, the 2021 power crisis has exposed new energy security challenges that are predominantly of domestic origins—an unexpected, low-probable, but high-impact "black swan" event. As a result, the '1+N' documents have for the first time officially identified the energy risks stemming from uncontrolled and rapid decarbonization, as well as any accompanying risks in industrial chains, supply chains, food, financial sectors, and socioeconomic stability. The new phrasing stands in stark contrast to previous policy documents, which almost exclusively focused on energy supply security.

While it is debatable how much China's power outage owed to decarbonization, the crisis has caused unexpected and considerable disruption to China's industrial and economic activities, in addition to sowing widespread dissatisfaction in society. Comporting to President Xi's championing of 'a holistic approach to national security' in governance of all aspects, Beijing has recognized the contagious externality of the energy crisis and formally bundled energy security with a series of sectoral risks. Last but not least, a global energy crisis that has caused persistent inflation and political backlash has likely further compounded regime anxiety.

Although energy security was already a policy focus amid the heated US–China tensions during the Trump presidency, Beijing's top leadership circle has particularly stepped up its emphasis on this issue following the power crisis, partly in response to domestic debates about China's decarbonization path—whether China should flatten the carbon curve for the near future.<sup>124</sup> That emphasis has seen more centralized control over regional carbon planning. At the onset of the power cuts and coal price surge, the administration put a brake on the 'campaign-styled decarbonization'—zealous and unapproved decarbonization plans by local governments.<sup>125</sup>

Following a slew of stopgap actions to boost coal and electricity availability, Xi made two symbolic trips to energy enterprises, at the Shandong Shengli Oil Field and Shanxi Ruiguang Power Plant, calling for enhanced domestic energy sufficiency, and promoting the clean use of coal, respectively.<sup>126</sup> Presidential visits in China are delicately crafted to deliver critical policy signals,

<sup>&</sup>lt;sup>122</sup> China National Petroleum Corporation, 'In 2019, China's foreign dependence on crude oil was 70.8%', 31 March 2020, <u>http://news.cnpc.com.cn/system/2020/03/31/001769303.shtml</u>.

<sup>&</sup>lt;sup>123</sup> National Development and Reform Committee, Energy Production and Consumption Revolution Strategy (2016-2030), December 2016, <u>https://www.ndrc.gov.cn/fggz/zcssfz/zcgh/201704/W020190910670685518802.pdf</u>.

<sup>&</sup>lt;sup>124</sup> Zhou Dadi, 'If new energy is not developed, the international economic risks of imported oil and gas will always impose great pressure on China', 163.com, 28 January 2022, <u>https://www.163.com/money/article/GUQK7T3O00258J1R.html</u>.

 <sup>&</sup>lt;sup>125</sup> 'The politburo of the Central Committee of the Communist Party of China held a meeting to analyse and study the current economic situation and economic work', Xinhua, 30 July 2021, <u>http://www.xinhuanet.com/politics/leaders/2021-07/30/c\_1127713888.htm</u>.
<sup>126</sup> 'The General Secretary's three visits to energy enterprises released a clear signal', Xinhua, January 29 2022,



with officials across the bureaucracy and outside observers as the target audiences. Adding to the signalling efforts is a *People's Daily* commentary from 7 January 2022 stating that 'China must hold its energy sources in its own hands',<sup>127</sup> echoing Xi's call for energy self-sufficiency and underscoring risks from rapid decarbonization and oil, gas, and technology dependency.

Document	Key energy security excerpts <sup>a</sup>
The 13th five-year plan for energy development, December 2016 <sup>a</sup>	building a solid bottom line and developing safely. We should establish bottom-line thinking, enhance crisis awareness, adhere to the holistic approach to national security, and firmly grasp the initiative in energy security. We should also <b>strengthen domestic oil and gas</b> <b>supply guarantee capacities</b> , promote oil reduction and substitution in key sectors, accelerate the development of oil substitution industries, strengthen strategic technological reserves in producing synthetic oil and gas with coal, coordinate the use of 'two markets and two resources', build a multi-dimensional security guarantee system, and safeguard national energy security.
	The main goals of energy development in 2020 are: energy security— <b>maintaining the energy self-sufficiency rate above 80%</b> , enhancing the ability to guarantee energy security strategies, improving energy utilization efficiency, and increasing the level of clean energy substitution.
Working guidance for carbon dioxide peaking and carbon neutrality in full and faithful implementation of the new development philosophy, November 2021 <sup>b</sup>	guarding against risks. The efforts to reduce pollution and carbon emissions must be balanced with the need to <b>ensure the security of</b> <b>energy, industrial chains, supply chains, and food, as well as</b> <b>normal daily life</b> . We need to respond appropriately to any economic financial, and social risks that may arise during the green and low- carbon transformation to prevent any excessive response and ensure carbon emissions are reduced in a safe and secure way.

## Shifting energy security definitions, as displayed in two overarching energy documents

<sup>a</sup> Excerpts are marked in bold for highlighting purposes.

<sup>b</sup><u>http://www.nea.gov.cn/135989417\_14846217874961n.pdf</u>.

<sup>c</sup> <u>http://english.www.gov.cn/policies/latestreleases/202110/25/content\_WS61760047c6d0df57f98e3c21.html</u>.

Ultimately, these frequent signals among domestic debates have resulted in an interim 'political resolution' during a 24 January Politburo study session,<sup>128</sup> where Xi reconfirmed China's long-term carbon neutrality pledge, with a focus on more coordinated and phased decarbonization to ensure sufficient short-term fossil fuel supply. According to the readout, China's energy solution—vigorously developing new energy sources while leveraging the clean use of coal as the baseload source—remains unchanged. The train of actions has offered a glimpse of how China's decarbonization trajectory is still volatile to market responses and public opinion, subject to future energy security challenges.

Fragmented energy policymaking within the government also complicates the implementation of the new energy security strategy. Against the backdrop of the global energy transition and economic recovery from the COVID-19 pandemic, China's energy security agenda bears increasing ramifications for geopolitics, socioeconomic security, and climate progress. As a result, energy security policymaking has risen far beyond the remit of the sectoral regulator, the National Energy Administration (NEA), and often necessitates the final stamp of approval from the Central Committee of the Chinese Communist Party, if not President Xi himself.

http://www.news.cn/politics/leaders/2022-01/29/c\_1128312347.htm.

<sup>&</sup>lt;sup>127</sup> Ren Ping, 'China must hold its energy sources in its own hands - on promoting the high-quality development of China's energy in the new era', People's Daily, January 7 2022, <u>http://opinion.people.com.cn/n1/2022/0107/c1003-32325750.html</u>.

<sup>&</sup>lt;sup>128</sup> 'Xi Jinping presided over the 36th collective study session of the Politburo of the CPC Central Committee and delivered an important speech', Xinhua, January 25 2022, <u>http://www.gov.cn/xinwen/2022-01/25/content\_5670359.htm</u>.



It is no secret that high barriers between different ministries have long worked against effective national energy strategy-making. Ironically, the National Energy Commission—a Hu administration effort to institutionalize interagency energy strategy making, currently chaired by Prime Minister Li—remains ad-hoc, crisis-triggered, and secondary at best. In fact, many of the most critical energy strategies enacted—including Four Revolutions, One Cooperation, the carbon neutrality pledge, building a 'new-type electric system', and correcting 'campaign-style decarbonization'—were announced by President Xi personally, at the Central Financial and Economic Affairs Commission or Politburo sessions that he chairs, drawing policy recommendations from moreindependent think tanks rather than ministerial inputs. The enormous perception gap between the supreme leader's grand vision and officials in the ministries or at the local level, further undermined by the opaque Chinese bureaucratic language, impedes an effective policy implementation, and often invites rounds of corrections.

Navigating these bundled security priorities is no easy task, given the obscure policy language, rife conflicts between economic, environment, and energy agencies, and lack of data capacity or a clear-cut risk measurement matrix. While politics predate policies, they do not necessarily translate to effective policies.

#### The last revolution

Although Beijing has consistently blamed campaign-styled decarbonization as the major cause of the power outage, the government has clearly learnt that inefficient domestic power market design—and an overdue reform task—has at least been a dominant driver. The tension between 'market coal' and 'planned electricity', as well as an illiberalized power market rife with interregional barriers, has frustrated allocation efficiency throughout the outage. While it has been recognized as a top reform priority of the energy system revolution since 2015,<sup>129</sup> high inter-provincial regulatory barriers have significantly delayed the progress.

Since 2016, the energy consumption and supply revolution agenda has yielded relatively fruitful results with both headline targets listed in the 13th Five-Year Plan achieved. Its progress was mostly linked to China's signature reforms, including the 'dual control' campaign, which tackles both energy intensity and total consumption, as well as the rapid development of renewable energy. The energy technology revolution has also received renewed focus in recent years, with Beijing joining the global race to develop cutting-edge technology while battling US sanctions and export control regimes. In contrast, the energy system revolution, which aspires to deepen the marketization of all energy sectors and improve the energy governance and law framework, has witnessed relatively slow progress if not setbacks. An ever-more-enlarged role for state-owned enterprises (SOEs) in China's economic planning continues to plague the market reform. Some top reform tasks, not least power market reform and energy law legislation, have been notably shelved.

The power outage has been responded to with doubled-down efforts to deepen the energy revolution, as Xi repeatedly calls it, with a reoriented priority to approach the outstanding energy system revolution. On 12 October 2021, the National Development and Reform Commission issued a power pricing reform for coal-fired power.<sup>130</sup> On 24 November, President Xi formally approved *Guidelines to Expedite Building the National Power Market*.<sup>131</sup> This agenda was rapidly adopted by the Commission and the NEA, with several reform policy documents already issued. These steps are an early indication of the administration's determination to follow through the energy system revolution, which is further confirmed by NEA's 2022 work agenda.<sup>132</sup>

#### Brave new cooperation

The global energy crisis has magnified China's anxiety about the future of fossil imports and forced China to join the overseas search for commodities, as coal and gas have experienced a strong import growth in late 2021. Other than lobbying Moscow, Washington, and major international oil companies for fossil import increases, Beijing has tasked SOEs with securing spot purchases, long-term import contracts, and equity shares in overseas upstream projects.<sup>133</sup> Under the guideline of 'securing

<sup>130</sup> National Development and Reform Commission, 'Notice on further deepening the market reform of grid electricity price for coal-fired power generation', 11 October 2021, <u>https://www.ndrc.gov.cn/xxgk/zcfb/tz/202110/t20211012\_1299461.html</u>.

<sup>&</sup>lt;sup>129</sup> National Energy Administration, 'CPC Central Committee and State Council's opinions on further reforming the power system', 15 March 2015, <u>http://fjb.nea.gov.cn/pufa\_view.aspx?id=31434</u>.

<sup>&</sup>lt;sup>131</sup> Chinese Government, 'Xi Jinping presided over the 22nd meeting of the Central Committee for Comprehensive Deepening Reform and stressed accelerating the reform of the scientific and technological system and building a unified national power market system', 24 November 2021, <u>http://www.gov.cn/xinwen/2021-11/24/content\_5653171.htm</u>.

<sup>&</sup>lt;sup>132</sup> National Energy Administration, 'Notice on printing and distributing the key points of energy regulatory work in 2022', 12 January 2022, http://zfxxgk.nea.gov.cn/2022-01/12/c\_1310432975.htm.

<sup>&</sup>lt;sup>133</sup> Russian Government, 'The Russian-Chinese Intergovernmental Commission on Energy Cooperation holds its 18th meeting', 17 November 2021, <u>http://government.ru/en/news/43829/;</u> 'State-owned Assets Supervision and Administration Commission: Energy guarantee and supply



supplies at any cost', the ability of SOEs to supply markets was prioritized over their balance sheet performances, essentially fast-tracking many business deals under previously complex state approval procedures.

While politics played a decisive role in some shopping sprees, such as the US–China liquified natural gas (LNG) deals, businesses have also leveraged the autonomy to pursue their own interests, control market share, and lobby for more regulatory approvals, despite a disadvantaged position in the very tight seller's market. These downsides risk undermining the strategic significance of China's 'strategic purchasing power release'.

The volatile geopolitics of China's major energy suppliers also leave China in a precarious position. Chinese customs data shows that Russia has been a reliable source in ramping up its emergency fossil exports, not least the steam coal supplies to save China from the power crisis. In addition, Russia has been an active partner developing long-term contracts throughout the crisis.<sup>134</sup> President Putin, during his high-profile visit to Beijing, announced plans to build a new 10 bcmpa (billion cubic metres per annum) Far Eastern Route Pipeline, a sign of commitment to secure long-term energy relations.<sup>135</sup> However, as the visit stopped short of committing to a long-expected 50 bcmpa Power of Siberia 2 Pipeline<sup>136</sup>—not even in the form of a memorandum of understanding—it likely reflects Beijing's concern about exposure under looming US secondary sanctions should Russian invade Ukraine, despite the much closer China-Russia political alignment. Indeed, as Russia was China's largest coal, second largest oil, and third largest gas exporter in 2021, Putin's military adventurism bears consequential risks for China's energy and financial sectors.

Indonesia's fresh coal export controls<sup>137</sup> also cast doubt over the reliability of China's second major coal supplier. Lastly, worsening US–China relations, and especially a protracted trade war pending the conclusion of the US–China Phase One Trade Agreement, endanger the newly established energy trade relations.

The global energy crisis also offers opportunities to test China's changing role in the global energy order. Xi's direct involvement has presented unprecedented flexibility for diplomacy to trial new cooperation mechanisms. China's first public sale of strategic petroleum reserves to temper prices, in September 2021, happened to collide with the White House's burning priority to temper inflation by pressuring the Organization of the Petroleum Exporting Countries (OPEC) to increase supply. As a marriage of convenience to ensure gasoline affordability for both men's constituencies, on 16 November, Biden and Xi 'discussed the importance of taking measures to address global energy supplies'.<sup>138</sup> China's consent was immediately used by the US as extra ammunition against OPEC. On 23 November, the Biden administration announced a release of its strategic petroleum reserves in parallel with 'other major energy consuming nations, including China, India, Japan, Republic of Korea, and the United Kingdom'.<sup>139</sup>

While still short of a sale from China as of 20 February 2022, the fact that China signalled its willingness to defend energy interests in concert with other major consumers against OPEC, the de facto oil price maker, marks a consequential departure from its conventional diplomacy of non-interference. By displaying its leverage to work with its most high-energy-security-risk source and weigh in on global oil price making, China has opened the door to greater diplomacy in an energy world where the status quo could soon be rewritten.

are the main performance assessment indicators of this year's central enterprises with a "one-vote veto" implemented, Xinhua, 20 October 2021, <u>http://www.news.cn/fortune/2021-10/20/c\_1127974853.htm</u>.

<sup>&</sup>lt;sup>134</sup> National Energy Administration, 'Fifteen agreements signed at the 3rd China-Russia Energy Business Forum', BJX, 30 November 2021, <u>https://news.bjx.com.cn/html/20211130/1190813.shtml</u>.

<sup>&</sup>lt;sup>135</sup> Gazprom, 'Gazprom and CNPC sign agreement to supply Russian pipeline gas to China via Far Eastern route', 4 February 2022, https://www.gazprom.com/press/news/2022/february/article547478/.

<sup>&</sup>lt;sup>136</sup> 'China and Russia signed a series of cooperation documents', Xinhua, 4 February 2022, <u>http://www.news.cn/world/2022-02/04/c\_1128331429.htm</u>; Gazprom, 'Feasibility study completed for Soyuz Vostok gas pipeline project', 25 January 2022, <u>https://www.gazprom.com/press/news/2022/january/article546748/</u>.

 <sup>&</sup>lt;sup>137</sup> Bernadette Christina and Fransiska Nangoy, 'Indonesia to allow only compliant firms to restart coal exports when ban ends—official', Reuters, 27 January 2022, <u>https://www.reuters.com/business/energy/indonesia-allows-171-coal-miners-resume-exports-official-2022-01-27/</u>.
<sup>138</sup> US White House, 'Readout of President Biden's virtual meeting with President Xi Jinping of the People's Republic of China', 16 November 2021, <u>https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/16/readout-of-president-bidens-virtual-meeting-with-president-xi-jinping-of-the-peoples-republic-of-china/</u>.

<sup>&</sup>lt;sup>139</sup> US White House, 'President Biden announces release from the strategic petroleum reserve', 23 November 2021, <u>https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/23/president-biden-announces-release-from-the-strategic-petroleum-reserve-as-part-of-ongoing-efforts-to-lower-prices-and-address-lack-of-supply-around-the-world/.</u>



#### China's steam coal imports by month (million tonnes)

Source: Chinese Customs.

## WHATS DOES CHINA'S 2021 ENERGY CRUNCH MEAN FOR ITS 2022 MACROECONOMIC OUTLOOK?

#### Alicia Garcia Herrero

Even with more than two years after the first outbreak of COVID-19, China, as well as the rest of the world, still faces the impact of the pandemic. While the economy has surged from the bottom since the middle of 2021 after China's successful containment of the domestic spread of the virus, the recovery's momentum has slowed down quite rapidly, especially since the second quarter of 2021. This is partially due to China's strict measures to fight COVID-19, which are not likely to soften any time soon in the light of the new Omicron variant, but also to a rather tight policy stance until recently. Business sentiment is not fully back to pre-pandemic levels, either. The latter might be more related to the government crackdown on several strategically important sectors such as real estate, technology, and education. The energy crunch which erupted after summer 2021 has only added to the complications.

A combination of stronger-than expected demand growth and slower supply increases in both coal and gas led to a severe power crunch globally in the run-up to COP26—most notably, a shortage of natural gas in Europe and coal in Asia, especially in China. Beyond the global shortage of coal, which is exacerbated by China's heavy reliance on coal-fired electricity and the import restrictions on coal from Australia stemming from their deteriorated relations, there are two more important reasons for the widespread power outages seen in China at the end of 2021: (1) local governments' rush to comply with their emissions targets, and (2) price caps on electricity, which leave demand unaffected by the increasing input costs. For the former, local governments' scramble to meet emissions targets forced them to curb, or even temporarily halt, energy-intensive production. The latter is crucial, since the cap on electricity prices limits the pass-through of higher input costs to electricity users, and the reduced profit margin in turn lowers the incentives to generate electricity.





A combination of the factors above has lifted producer prices in China, and possibly overall inflation, and has been a drag on growth. The power restrictions imposed to control demand have hit the manufacturing sector, which has so far offered the greatest support to the Chinese economy given the rapid slowdown in service activities. While the direct impact may be only on the upstream sectors that have a higher reliance on energy inputs, it could still squeeze the profit margins of downstream sectors as well.

But the impact on the economy may not last long, since the government has reacted by increasing thermal coal production and relaxing the cap on coal-fired electricity prices (from 10 per cent above benchmark to 20 per cent). The increase in coal production clashes with China's longer-term emission targets, but a reversal on its decarbonization efforts is unlikely; China will still fine-tune those efforts. Relaxing the cap on electricity prices helps to alleviate the burden on electricity generators, although a 10 per cent increase is far from enough to offset the almost doubling costs of coal. Meaning, more liberalization in electricity pricing is needed in China, which will be effective in encouraging changes to consumer behaviour and a shift towards renewable energy.

All in all, the energy crunch is normalizing, at least temporarily, and should not be an impediment for China to grow in 2022, although at a decelerated pace, and well below that of 2021—which ended with GDP growth above 8 per cent. The target for 2022 should lie between 5 and 5.5 per cent, according to Li Keqiang's address during the Central Economic Work Conference last December. This would reduce energy needs, and should help, at least partially, to comply with emission targets for 2022. In any event, if slower growth were not enough, in the same conference, Chinese policymakers signalled a potential delay in their carbon emission targets by stressing the need to minimize the short-term consequences of medium-term climate goals. This is in line with the government's stated priority to stabilize growth in the near term.

How much the partially cyclical, but also structural, deceleration will be cushioned will depend on the extent of the fiscal and monetary stimuli. The latter has clearly started with cuts in the Required Reserve Ratio early in December and more recently interest rate cuts. In addition, bolstering infrastructure investment will be a key fiscal instrument but has not yet really started, putting additional pressure on monetary easing. Against this backdrop, China's GDP growth rate is expected to stabilize to 5.2 per cent in 2022.

One of the key issues to watch in 2022 is how China will implement its by now globally renowned targets towards net zero amid a global energy crunch. In particular, China also released its much-awaited action plan on peaking emissions in 2030 after President Xi first mentioned it in September 2020. The plan detailed the specific targets to reach peak carbon as part of China's updated National Determined Contribution (NDC), but it is still short on details on how such targets will be achieved, even in the short term. Also, it delays most of the efforts to the next Five-Year Plan, starting in 2026. This also means that local governments could be given more leeway on their targets for 2022, and possibly beyond, as there is no specific commitment in the NDC for the next few years. It goes without saying that China's path to reaching peak emissions by 2030 will become quite uphill if the pressure on local governments eases in 2022 for the sake of economic growth.

In the scenario where local government emission reduction targets are kept, one cannot discount a new energy crunch in China, with potentially similar consequences to those experienced last September—namely, restrictions in energy use, even at the industrial level, as well as higher producer prices, especially for upstream sectors, which reached a record 18.7 per cent in October and have eased somewhat since. Beyond rationing of electricity and its negative consequences on production, and thus growth, high producer prices have been hurting downstream manufacturers. Many of the downsteam producers, in turn, have not been able to pass on the increase in input prices to the final consumer, given the weakness of household consumption in China, which is likely to continue in 2022. The silver lining of this scenario, though, is that China will have more incentives to accelerate the transition from brown to greener power. In fact, Asia is projected to account for over half of global solar and wind power capacity by 2030, and this should be led by China, with its ambitious targets to boost solar and wind installation capacity to over 1,200 GW by the end of this decade.

The financing of this massive transition remains challenging; but some good news is coming from the People's Bank of China (PBoC), which launched a new carbon emission facility in November 2021 to offer low-interest-rate loans to financial institutions that help firms cut emissions. This tool is clearly relevant as a starting point for the PBoC's contribution to China's energy transition. In fact, the creation of a new green monetary tool is a good sign for faster growth in green assets, because it will create additional incentives for banks to prioritize renewables, energy saving, and carbon reduction in lending. The energy



crunch has made this transition even more urgent because the underinvestment in brown energy, as well as the slow transition to renewables, are key reasons behind the power crunch.

All in all, the Chinese economy is bound to decelerate in 2022, although monetary and fiscal support will likely limit the extent of the slowdown. This macroeconomic environment means that energy demand growth will also slow, supporting China's commitment to peak its emissions by 2030: a daunting task which needs to be started immediately. Should economic activity, however, rebound significantly, the energy crunch, which has been easing in the last few months, might come back to the forefront in 2022. But given the new, Omicron-driven COVID wave which is taking place in China and the government's broader efforts to slow economic growth and steer the country's development path toward a greener trajectory, the likelihood of a new energy crunch seems low.



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