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Foreword by Dr. LI Jie

Vice President, Programs and Acting Director of Coal Transition Task Force

As the world's largest coal producer, importer and consumer, China accounts for more than half of global coal production and consumption. Given coal's dominant share in global carbon emissions, coal transition in China is key to any global climate solutions.

After decades of international climate dialogues, Chinese president Xi Jinping made a landmark climate pledge to peak the country's national carbon emissions before 2030 and achieve carbon neutrality before 2060 in his video address to the United Nations General Assembly on September 22, 2021, sending positive shock waves through the climate-policy world.

High-level political momentum on coal transition was further strengthened by renewed and expanded net-zero pledges across the globe. Following the statement on 2021 Leaders Summit on Climate of "phasing down coal consumption gradually in 15th Five-Year Plan (FYP) period," and ahead of COP26 in Glasgow, President Xi made another major climate announcement during his speech to the United Nations General Assembly, declaring that China will "step up support for other developing countries in developing green and low-carbon energy, and will not build new coal-fired power projects abroad." This announcement not only narrowed down China's long-term positioning of coal in its energy structure, but also will significantly boost global momentum for moving away from coal.

Climate is one of the key areas of international cooperation that remain open. Against the backdrop of persistent U.S.-China geopolitical tensions, the world's two largest economies and carbon emitters, the United States and China, still managed to move bilateral climate cooperation agenda forward, which is evidenced by the unexpected China-U.S. Joint Glasgow Declaration on Enhancing Climate Action released on November 10 this year, and laid down the necessary foundation to conclude the Glasgow Climate Pact.

Short-term global and domestic shocks are adding complication. Starting from September 2022, about 20 province-level regions in China began rationing power—a surprising development that was caused by a multitude of factors. Meanwhile, as the world emerges from the pandemic and major economies begin to recover, the demand for energy has shot up across Europe. Besides, limited global gas supplies along with low wind generation, have pushed energy prices up across Europe. Governments are stepping in to curtail prices, fearing the growing burden on households will threaten the economic recovery and erode public support of clean energy transition.

Looking ahead, how different economies across the globe may formulate sensible approaches to balance multiple policy targets including economic recovery, energy security, climate change as well as local environment protection will test political wisdom of their decision makers.

EFC prioritizes security learning in the changing context. In response to the recent development, EFC, while remaining our long-term commitment to support coal transition, is prioritizing in the work of establishing new-type power system in the following key aspects: 1) guaranteeing supply for life and production; 2) boosting energy security; 3) improving system safety and resilience; 4) safeguarding just and stable social-economic transition. Above all, with concerted efforts made by like-minded stakeholders, clean energy transition agenda in China could be accelerated along with the inception of 'phase-down' of coal ahead of the 15th FYP period.



Note from Dr. FU Sha

Program Director, Low Carbon Economic Growth

Phasing out coal power in China's energy system is one of the most beneficial and technologically easiest near-term steps toward China's new growth pathway, as well as a complicated challenge that requires careful planning and implementation to ensure continued prosperity, employment, and economic growth. As the world's largest coal consumer and producer, coal is deeply embedded in China's energy system and its economy. Coal contributed 56.8% of China's total primary energy consumption in 2020 (NBS, 2021). It is widely used in electricity generation, steel and cement production, building materials, chemicals, and buildings. Due to progress made during 12th and 13th five-year plans (2011-2020), China's total coal consumption declined after 2013, but it has increased again in recent years, approaching its 2013 peak in 2021.

A rapid shift away from coal to non-emitting energy sources will be important for delivering on a wide number of the priorities associated with China's growth and development agenda. And it will be essential for reaching carbon neutrality before 2060. Accordingly, China needs to enter a new phase, turning quickly from controlling coal growth to accelerating a phaseout of coal without CCUS in all sectors.

Coal phaseout across different sectors. The phaseout timeline will vary across sectors based on different technical and institutional challenges as well as near-term benefits brought by early actions. Scattered coal combustion for industrial small furnaces and boilers and residential heating and cooking in rural areas can be eliminated first and within the 14th Five-Year plan (2021-2025). Within the power sector, minimizing the incremental coal capacity investment is key during 14th Five-Year plan and the power generation without CCUS should be eliminated by around 2040 to 2045 to limit warming to 1.5°C. Coal consumption without CCUS in industrial sectors that are difficult to electrify (e.g., as a feedstock in steel production) should be eliminated around 2055-2060.

- **Coal-fired power generation.** Phasing out coal is particularly important in the electricity sector, which accounts for more than 50% of China's total coal consumption, about 60% of China's total power generation and about 50% of its installed power capacity. Through an immediate halt of new construction of coal-fired power plants, rapid retirement of a small portion of old, dirty, inefficient coal plants in the near term, and gradually reduced utilization of the remaining majority of operating plants, China can phase out coal power generation without CCUS by around 2040-2045. However, for the next 20-30 years of transformation process, coal exit path is very complex, there must be relevant clear and detailed criteria rather than "one size fits all", comprehensive consideration of environmental benefits, economic, livelihood protection needs and other factors. Several provinces have specific near-term opportunities. Shandong, Inner Mongolia, and Shanxi are the top three coal consuming provinces. Shandong has the highest installed coal power capacity, and its share of small, old, and inefficient coal plants is larger than other provinces. Moreover, over a third of the total capacity in Shandong and around 20% of total capacity in Inner Mongolia are industrial self-use plants not connected to the grid. They often have higher environmental impacts due

to challenges in enforcing regulations and policies. Coal retirements could be implemented more rapidly on industrial-owned power plants and small heating and power supply units below 300 MW due to less favorable technical attributes.

- **Industry coal use.** Coal consumption in iron and steel production, building materials, the coal chemical industry, and cement together account for over 40% of China's total coal consumption. Phasing out coal without CCUS in these sectors requires a combination of strategies, including efficiency improvements, electrification, low-carbon fuel switching (i.e., to zero-carbon hydrogen or modern biomass), and demand reductions through economic and industrial structural changes. Some of the approaches can be implemented immediately (i.e., energy efficiency), while others may take longer and depend on technological and institutional changes.
- **Residential and industrial scattered coal.** Significant progress has been made in reducing scattered coal use during the past decade, especially in the Beijing-Tianjin-Hebei region. The progress has been achieved by shutting down inefficient and polluting small furnaces and boilers in the industrial sector, and through wide implementation of coal-to-gas and coal-to-electricity switching in rural residential heating supported by public subsidies. These actions can feasibly be replicated rapidly across the country in combination with increasing use of renewable energy technologies, such as roof-top PV and biomass in the residential sector. In addition, phasing out scattered coal is one of the most effective near-term approaches to reduce local air pollutant emissions and generate human health benefits. It should be a priority during the 14th FYP.

Societal benefits and challenges beyond climate mitigation. Phasing out China's reliance on coal will bring considerable benefits beyond climate mitigation, including continuous improvements in air quality and human health, enhanced energy independence and energy access through low-cost renewables, and the creation of new jobs and growth opportunities in a green economy.

- **Air quality and human health.** In the past decade, air quality and health benefits have increased dramatically from shutting down obsolete coal fleets and eliminating scattered coal use in China. With recent policy efforts, air quality has largely improved in the Beijing- Tianjin-Hebei area. However, major cities in the large coal-consuming provinces, such as Shandong, Henan, and Shanxi, still face severe air pollution problems, and often rank at the bottom in terms of local air quality across the country. For these regions, lowering PM2.5 concentrations is a central motivation for eliminating scattered coal consumption in residential and industrial uses. Phasing out coal in the energy system will not only deliver significant, immediate, and broadly shared health benefits, it will also provide a necessary path towards long-term improvements in air quality to the highest standards.
- **Restructuring of local economies.** Phasing out coal will also bring opportunities to the major coal producing and exporting provinces, including Inner Mongolia, Shanxi, and Shaanxi. With an increasing reliance on coal to support their economies, they are increasingly vulnerable to the well-known "resource curse" of overdependence on low-value and volatile resource extractive industries. Both Shanxi and Inner Mongolia have experienced difficult economic conditions due to volatility in coal markets. With abundant renewable resources, these provinces have the opportunity to diversify their energy portfolios and their economic systems to find a new impetus for long-term growth. With the inevitability of a transition away from fossil fuels, it is important to begin now and

ease the transition instead of continuing on the current course and facing a crisis with little time to react.

- **Employment.** Phasing out coal will reduce the number of older jobs across the entire coal supply chain from mining to fuel processing, conversion, and end-use. Given the fundamental role of coal in the Chinese economy at present, employment in the coal industry will, in the short term, be heavily affected by the low-carbon transition. Due to the combination of stagnating coal consumption and increasing labor productivity as a result of continued mechanization, the number of workers in coal mining and washing has already decreased by over 40%, from 5.3 million in 2013 to 3.2 million in 2018. These changes are inevitable even without enhanced climate mitigation, but will be further accelerated on a pathway towards carbon neutrality before 2060. Moreover, employment and economic impacts tend to have different distributional effects within the provinces. Specific communities that have traditionally centered around a coal economy are expected to be hit the hardest. About 25% of China's total coal employment is in Shanxi province, followed by Shandong, Henan, Anhui, and Heilongjiang. These regions have experienced different levels of challenges in managing the coal job losses in the past five to seven years and will need to continue to find solutions to carefully manage the social implications of these losses along with those that will occur from an accelerated coal phaseout.

Achieving a high-ambition coal transition in China in a just and equitable way must be a policy priority. Possible approaches include carefully designing and implementing a comprehensive policy package that includes resettlement and retirement policies for older workers, retraining and education programs for younger workers, fiscal policies to provide compensation and financial support to both individuals and companies, and economic incentives to create new businesses and development opportunities for the local economy. Coal mining is a tough job with high health impacts and security concerns. A coal phaseout with effective transition management can help provide a better quality of life for millions of coal workers and for China's future energy workforce.

Coal Data Updates

During the first half (H1) of 2021, the Chinese economy grew by 12.7% year-over-year (YOY), which consists of 18.3% YOY spike in the first quarter (Q1) of 2021 and 7.9% YOY growth in Q2 2021. The strong economic recovery was largely supported by energy- and emissions-intensive activities, leading to double digit growth of all fossil fuel during the same period. While national energy consumption in H1 2021 increased by 10.5% YOY, national power consumption rose stronger at 16.2% YOY. Consequently, China's national carbon emissions are estimated to grow by more than 10% YOY during the same period.

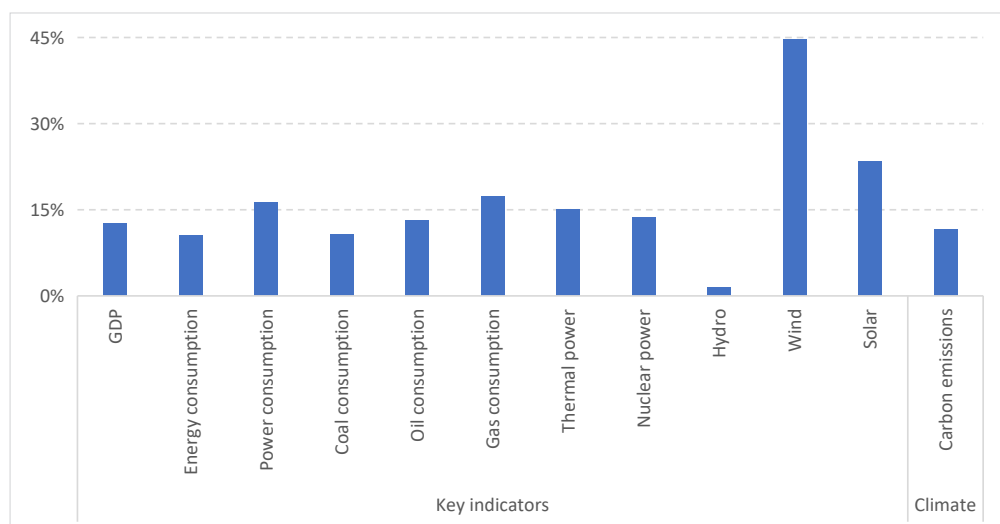


Figure 1. YOY Changes of Key Economic and Energy Indicators in H1 2021

Source: [Agora Energiewende](#)

In Q3 2021, economic rebound of the Chinese economy further slowed down, leading to a 4.9% YOY growth. According to [Carbon Brief](#), China's national carbon emissions see first quarterly fall since post-lockdown surge. The emissions fell due to two reasons: a dramatic drop in demand for construction materials precipitated by the real estate slump and the ongoing coal crunch. Sky-high coal prices affect industrial users directly, as they purchase coal on the market, while industrial electricity demand has also been affected due to electricity rationing.

Coal Production

In H1 2021, national coal production by Chinese enterprises above designated size reached 1,949 Mt, the equivalent of a 6.4% YOY growth. More specifically, national coal production in China is currently dominated by the top 4 coal mining provinces (top4), with Shanxi, Inner Mongolia, Shaanxi and Xinjiang together accounting for almost 80% (30%, 25%, 17% and 7%, respectively) of national total output.

Shanxi is currently China's largest coal producing province by output. Its annual coal production was 1,063 Mt in 2020, accounting for over a quarter of China's total production. Since the inception of the People's Republic of China in 1949, Shanxi alone accounts for 23% of China's cumulative national coal production. The coal industry has dominated Shanxi's economy for many decades. In 1982, China's State Council decided to develop Shanxi as a national coal energy resource. In 2019, almost forty years later, the Chinese central government adopted a new vision for the Shanxi province to be China's key comprehensive energy revolution pilot region. Not surprisingly, Shanxi as well as the remaining top4 region especially Inner Mongolia is key for China's clean energy transition agenda.

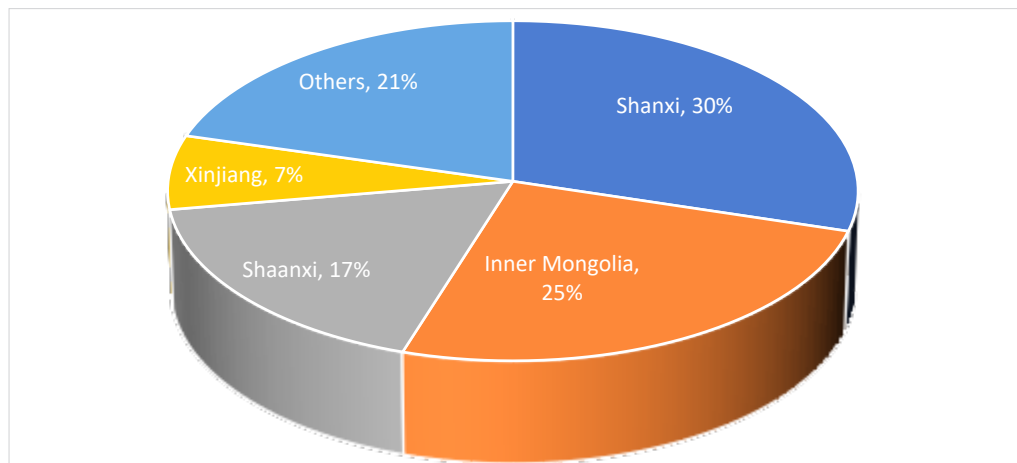


Figure 2. National Coal Production by Region in H1 2021

Source: National Bureau of Statistics

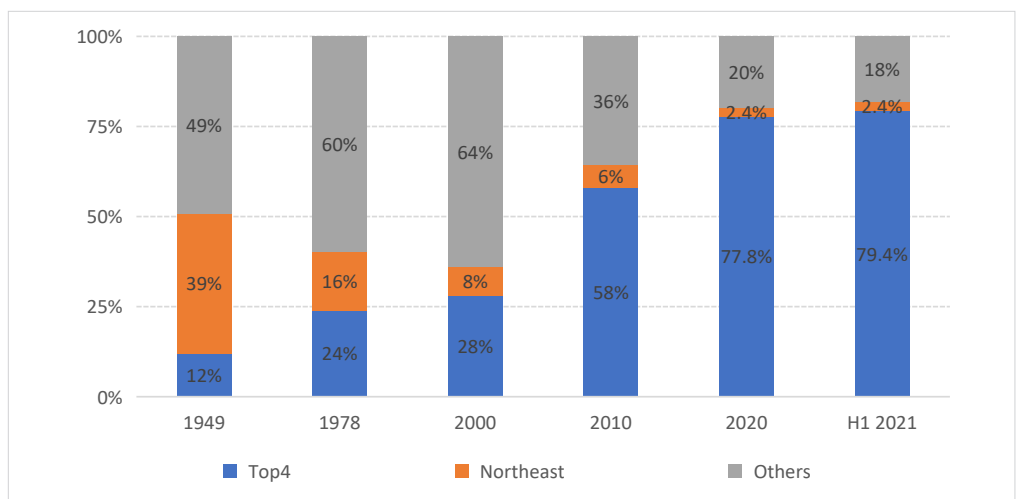


Figure 3. National Coal Production Mix by Region Over Time

Source: National Bureau of Statistics, and Provincial Bureaus of Statistics

National coal production structure by region in China has undergone drastically adjustment over time. When the People's Republic of China was founded in 1949, the current top4 producers only accounts for 12% of national coal production that stands at only 32.43 Mt. In comparison, Northeast China, which consists of Liaoning, Jilin and Heilongjiang, represents near 40% of national coal production back in 1949. 72 years later, coal resources in Northeast China are close to depletion, with aggregate output in this region accounting for a mere 2.4% of national total. In comparison, output level in both Shanxi and Inner Mongolia once exceeded the 1,000 Mt/annum mark. With national coal production in China increasingly concentrates in the top 4 provinces, how to strategically phase down coal production and achieve just coal transition without severe regional impacts deserves more attention from key Chinese and international stakeholders.

Coal Consumption

Compared with national coal production, national coal consumption in China is more evenly distributed across the country. While top4 producers account for 79.4% of national coal output in H1 2021, top 10 consuming provinces only represent 64.5% of national coal demand in 2019. It is worthwhile to point out that all top4 producers are also in the list of China's top 10 coal consuming provinces, indicating the difficulties of transitioning regional economies away from coal in China's key coal producing provinces.

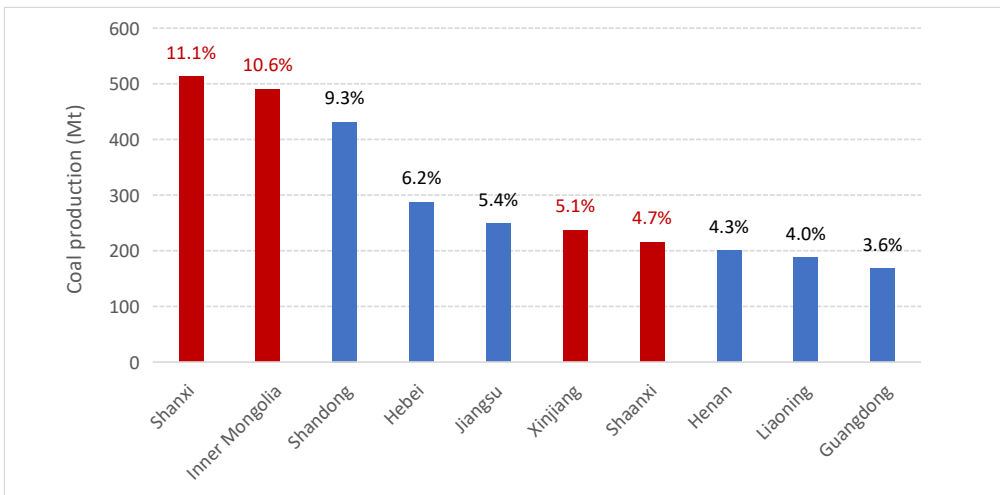


Figure 4. China's Top 10 Coal Consuming Provinces in 2019

Source: National Bureau of Statistics

In H1 2021, national coal consumption in China is estimated to reach about 2.1 billion tons, the equivalent of 10.7% spike YOY. In addition, coal consumed for power generation increased by 15.7% YOY, and coal consumed by construction material manufacturing rose by 12% YOY.

Coal-fired Power Plants

During the 13th FYP period, China's national power capacity increased from 1,526 GW in 2015 to 2,201 GW in 2020, the equivalent of an annual average growth rate at 7.6%. While the 13th FYP target for power capacity at 2,000 GW has been greatly exceeded, national coal-fired power capacity at 1,095 GW by the end of 2020 is slightly lower than the 13th FYP target at 1,100 GW. In retrospect, though coal-fired power capacity in China increased from 755 GW in 2012 to 1,095 GW in 2020, its annual average growth rate at 4.5% is significantly lower than that of national power capacity. As a result, coal-fired power plants' share in national power capacity mix declined below 50% for the first time, and share of coal-fired power in national generation mix dropped from 68% in 2015 to 61% in 2020.

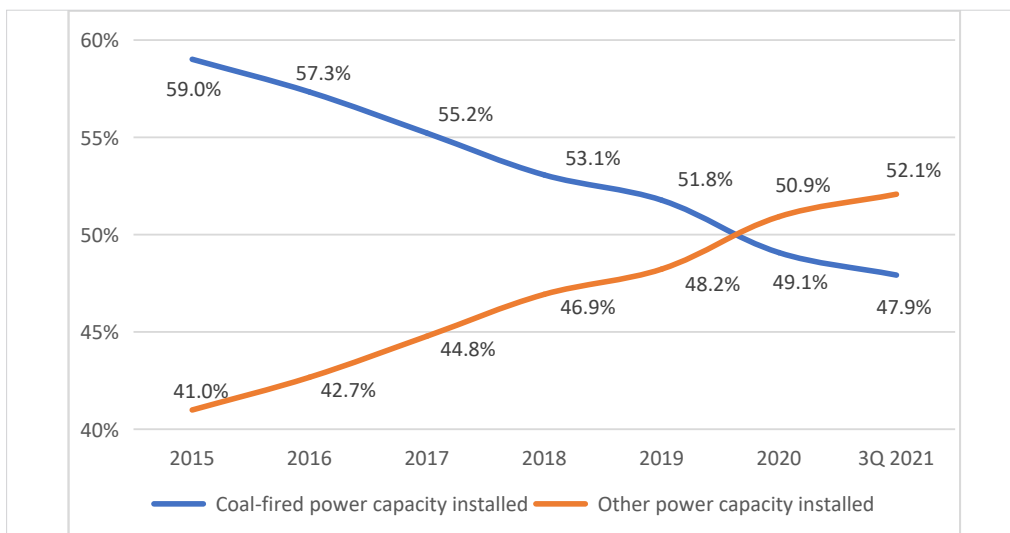


Figure 5. Comparison of Coal-fired Power Capacity vs. Other Power Capacity

Source: BJX Power Info Net and [China Electricity Council](#)

During the first three quarters (3Q) in 2021, the share of coal-fired power plants in national power capacity further declined to 47.9%, indicating additional progress of clean power sector transformation in China.

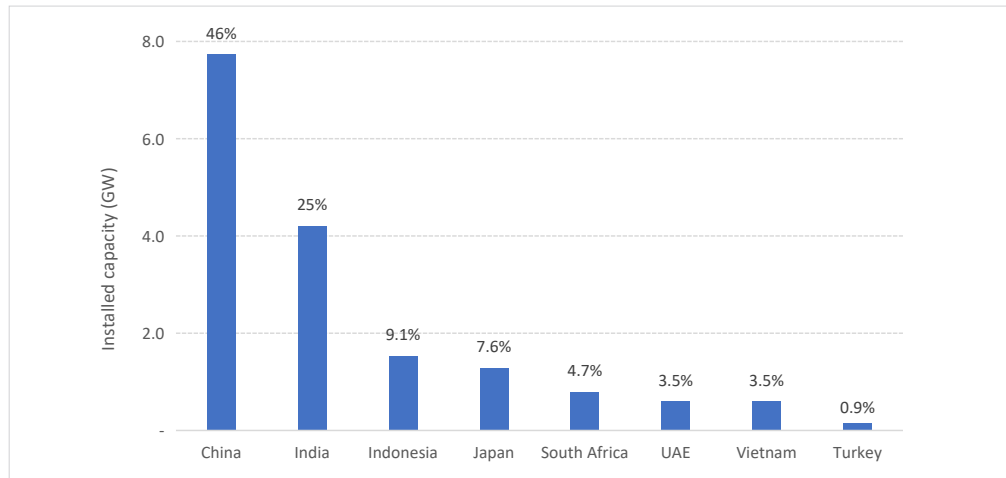


Figure 6. New Operational Coal-fired Power Capacity by Country in H1 2021

Source: [Global Energy Monitor](#)

Following a sizable addition of new operational coal-fired power capacity across the globe at 54.9 GW in 2020, similar indicator stands at 16.9 GW in H1 2021, implying a significant worldwide contraction of new capacity addition. Nevertheless, while China still accounts for 46% of global capacity addition, the size of new capacity addition across the country at 7.4 GW in H1 2021 hints that more than two decades of construction frenzy of coal-fired power plants in China seems to be very close to its end.

Surges in Coal Imports in Late 2021

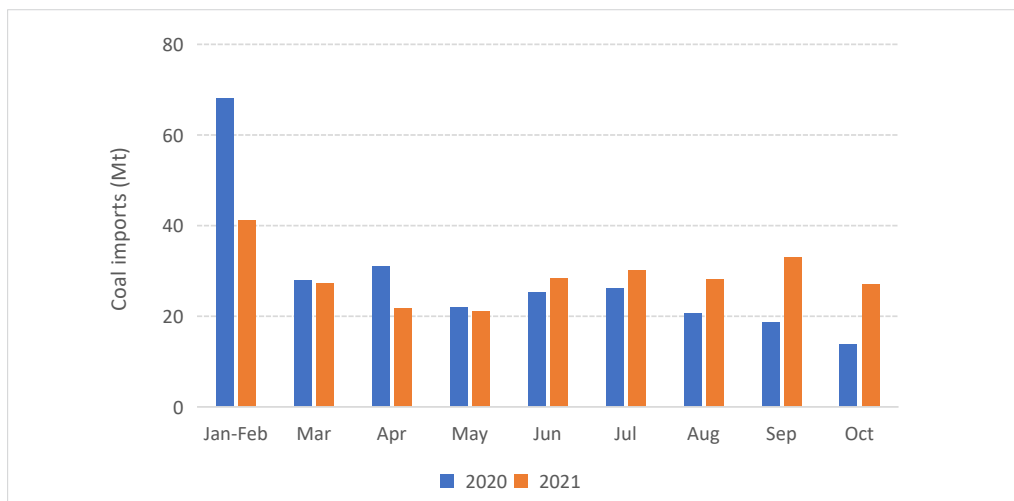


Figure 7. China's Monthly Coal Imports: 2020 vs. 2021

Source: [China Customs](#)

China's coal imports surged by 76% and 96% YOY in September and October 2021 as power plants scrambled for securing fuel supply to ease a power crunch that is pushing domestic coal prices to record highs. As a result, cumulative coal imports during the first 10 months of 2021 reached 257 Mt, the equivalent of 1.9% YOY growth.

Key Development in China



October 28, 2021: China submits updated NDC and the Mid-Century, Long-Term Low Greenhouse Gas Emission Development Strategy to UNFCCC ahead of COP26 in Glasgow

China submitted its updated Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC), which is the first update from China since its first submission in 2016. The main takeaways of the updated NDC are as below ([UNFCCC](#)):

- Aim to peak national carbon emissions before 2030 and achieve carbon neutrality before 2060;
- Lower CO₂ emissions per unit of GDP by over 65% from the 2005 level;
- Increase the share of non-fossil fuels in primary energy consumption to around 25% by 2030;
- Increase the forest stock volume by 6 billion cubic meters from the 2005 level; and
- Bring its total installed capacity of wind and solar power to over 1,200 GW by 2030.

The Mid-Century Strategy also lists policy actions for achieving substantial reductions in non-CO₂ GHG emissions from areas including industry, energy, agriculture, waste sectors, etc., with main actions as follows ([UNFCCC](#)):

- Strengthen the coordinated control of GHG emissions and emissions of air pollutants;
- Gradually incorporate quantitative targets and management for non-CO₂ emissions reduction;
- Actively implement the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, including to:
 - Strictly require harmless treatment and disposal of HFC-23 from HCFC-22 production;
 - Promote low-GWP alternatives during the phaseout of HCFCs;
 - Avoid leakage of controlled substances during production processes;
 - Promote the recovery, reuse, and harmless treatment of controlled substances; and
 - Prioritize HFC phasedown in industries with feasible alternative technologies.



October 2021: China issued a serial of policies to tackle climate change-related challenges

On October 24, the Communist Party of China Central Committee and the State Council of China jointly released a document entitled "Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy." By 2060, China will have fully established a green, low-carbon and circular economy and a clean, low-carbon, safe and efficient energy system. Energy efficiency will be at the advanced international level, and the share of non-fossil energy consumption will be over 80%. China will be carbon neutral, and it will have achieved fruitful results in ecological civilization and reached a new level of harmony between humanity and nature. ([NDRC](#))

On the same date, the State Council of China also issued "Action Plans for Carbon Peaking before 2030, which is formulated to advance actions on carbon dioxide peaking before 2030 under China's overarching dual carbon targets. It means that the "1+N" policy framework ("1" stands for the top-level design guidance and "N" refers to policies and measures for various industries and sectors.) commenced from now on. ([NDRC](#))

On October 27, China issued a white paper on response to climate change. According to the white paper, in order to meet its targets in response to climate change, China has risen to these challenges and formulated and implemented a variety of strategies, regulations, policies, standards and actions, accelerating work on "1+N" policies for peaking carbon emissions and achieving carbon neutrality. Titled "White Paper on Responding to Climate Change: China's Policies and Actions," the document was released by the State Council Information Office. ([CGTN, Carbon Brief](#))



September 22, 2021: China pledges to stop building new coal-fired projects abroad

Chinese president Xi Jinping made a major climate announcement during his speech to the United Nations General Assembly, declaring that China will “step up support for other developing countries in developing green and low-carbon energy, and will not build new coal-fired power projects abroad.” The announcement, which has attracted widespread attention in both China and abroad, came exactly one year after he announced China’s landmark 30.60 dual carbon targets. China-supported development of coal-fired power overseas has already slowed down in the past five years, thanks to the decreasing competitiveness of coal power compared to renewables and declining appetite from host countries. This announcement will significantly boost global momentum for moving away from coal. ([China Dialogue](#), [BBC](#))

September 7, 2021: China launched pilot scheme for green power trading

The National Development and Reform Commission launched a pilot direct trading of green power between corporate consumers and renewable energy generators on September 7, in a move to further boost renewable energy development. The launch of the pilot aims to tap the potential of market mechanisms in enhancing the cost efficiency of the low-carbon transition in the country's power system. The pilot was rolled out by the Beijing Power Exchange Center and the Guangzhou Power Exchange Center. Under the pilot scheme, users who have demands for green power will directly trade with wind power and photovoltaic power generation enterprises, while other renewable energy generation enterprises will be included in the scheme step by step. ([The Chinese Government](#))

September 2021: Power shortage closes factories and threatens growth

About 20 province-level regions began rationing power in September 2021—a surprising development that was caused by a multitude of factors. Some experts believe this was because that coal output in China is failing to meet the rising demand. Others believe it was a global financial phenomenon caused by undisciplined quantitative easing of the western world addressing economic slowdown. To start, Chinese authorities closed about 1 billion tons per year of coal production capacity since 2016, all while keeping a tight lid on new greenfield coal mining permits. This has led to a much tighter supply. To further control the sprawling and unruly Chinese coal industry, the country made overproducing coal a criminal offense in its new Criminal Law, which caused a sharp drop in price elasticity of coal production across the country.

According to Xinhua, structural and cyclical factors explain the power crunch. As insiders have pointed out, power demand surged quickly after the developed coastal areas of China saw strong recovery momentum. In addition, coal-fired power producers suffer losses due to an overwhelming rise in the cost of coal. The power crunch is not necessarily a stumbling block for the country's economy, but could be a catalyst to improve structural reform. ([Xinhua](#), [Six Tone](#))

July 16, 2021: China launches the largest carbon market in the world

On July 16, China inaugurated its national carbon market, a landmark practice that experts said will not only help accelerate the reduction in domestic carbon emissions, but also promote a broader global response to climate change. The market currently includes over 2,000 companies in the power generation sector and covers over 4.5 billion tons of carbon dioxide a year. It replaces the European Union's carbon trading program (EU ETS) as the world's largest such mechanism, according to the Ministry of Ecology and Environment. Nevertheless, from the trading volume and pricing level perspective, EU ETS is still the world's leading carbon market. In the future, China's national ETS will be extended to include other seven major carbon-emitting industries, including steel, chemicals, papermaking, etc. ([China Daily](#))

May 30, 2021: MEE issued guiding opinions on the prevention and control of the source of energy- and emissions-intensive projects

On May 30, the Ministry of Ecology and Environment (MEE) issued the "Guiding Opinions on Strengthening the Prevention and Control of the Ecological and Environment Sources of Energy- and Emissions-intensive Construction Projects", aiming to retard high energy consumption and high emissions associated with such construction projects (referred to as "Two Highs" projects). ([The Chinese Government](#))



Key Development: International Perspective

November 13, 2021 COP26 closes with 'compromise' deal on climate change

After extending the COP26 climate negotiations an extra day, nearly 200 countries meeting in Glasgow, adopted on November 13 an outcome document that is widely considered as a 'compromise' deal. The pledges on emissions cuts made at the two-week COP26 summit in Glasgow fell well short of those required to limit temperatures to 1.5 °C. Instead, the outcome document, known as the Glasgow Climate Pact, calls on 197 countries to report their progress towards more climate ambition next year, at COP27, set to take place in Egypt.

Though with disappointment, a resolution for coal "phase-down" was made for the first time under the UN climate process. ([United Nations](#), [The Guardian](#))

November 10, 2021 China-U.S. Joint Glasgow Declaration on Enhancing Climate Action in the 2020s

China and the U.S. have agreed to boost climate co-operation over the next decade, in a surprise announcement at the COP26 climate summit in Glasgow. The world's two biggest CO2 emitters pledged to act in a joint declaration. It says both sides will "recall their firm commitment to work together" to achieve the 1.5 °C temperature goal set out in the 2015 Paris Agreement. They called for stepped-up efforts to close the "significant gap" that remains to achieve that target. The unexpected China-U.S. Declaration has paved the necessary foundation to conclude the Glasgow Climate Pact reached on November 13. ([U.S. State Department](#), [BBC](#))

October 26, 2021 UNEP issued Emissions Gap Report 2021

The Emissions Gap Report 2021 shows that new national climate pledges combined with other mitigation measures put the world on track for a global temperature rise of 2.7°C by the end of the century. That is well above the goals of the Paris climate agreement and would lead to catastrophic changes in the Earth's climate. To keep global warming below 1.5°C this century, the aspirational goal of the Paris Agreement, the world needs to halve annual greenhouse gas emissions in the next eight years.

If implemented effectively, net-zero emissions pledges could limit warming to 2.2°C, closer to the well-below 2°C goal of the Paris Agreement. However, many national climate plans delay action until after 2030. The reduction of methane emissions from the fossil fuel, waste and agriculture sectors could help close the emissions gap and reduce warming in the short term, the report finds.

Carbon markets could also help slash emissions. But that would only happen if rules are clearly defined and target actual reductions in emissions, while being supported by arrangements to track progress and provide transparency. ([UNEP](#))

September 2021 Europe is under the first major 'energy shock' in the green era as energy prices skyrocket

As the world emerges from the pandemic and major economies begin to recover, the demand for energy has shot up across Europe. Besides, limited global gas supplies along with low wind generation, have pushed energy prices up across Europe. Governments are stepping in to curtail prices, fearing the growing burden on households will threaten the economic recovery and erode public support of clean energy transition.

According to the European Commission, the European Union will need around €350 billion euros of annual extra investment in energy systems to achieve its 2030 emissions target, with an extra €130 billion to meet other environmental goals. The energy crunch is poised to shape the debate on whether nuclear energy, which is far less reliant on foreign suppliers, should be labelled as a green source under the EU taxonomy. The Commission has delayed the decision until the end of the year due to profound disagreements between member states. ([DW](#), [Euro News](#))

Progresses of EFC's Coal Transition Task Force

Top Design of the Framework

As EFC started practicing recently, we have applied a renewed approach for program strategy for Coal Transition Task Force: 1) Improving TF strategic structure with a focus on TF Master Plan development; 2) Focusing on three key sectors (power, heavy industries, and scattered coal use) and developing sectoral Action Plans; and 3) Drilling down to local level conducting case studies of good practices in typical provinces.

The preparation of the Master Plan and three sectoral Action Plans were launched in the second quarter of 2021 and are expected to be finalized by the end of year.

Key Event

EFC Sustainable Energy for a Prosperous China Forum: Adhering to the 30/60 Strategy, Ensuring a Safe and Smooth Transition of the Energy System (November 16)

Following the announcement of coal phase-down during the 15th FYP in April and making best efforts to accelerate this work in U.S.-China Joint Glasgow Declaration, the focus of coal transition narrative building is shifting from explaining the “WHYS” to curating constructive debates on the “WHENS” and “HOWs”. In the process, how to ensure the energy security and achieve a stable energy transition is an important issue to focus on. To build discussions and advise the field, EFC and media outlet China News Service held the third session of the annual “Sustainable Energy for a Prosperous China: Adhering to the 30/60 Strategy, Ensuring a Safe and Smooth Transition of the Energy System” forum series in November 2021. This forum focused on reshaping the energy system for the long run by accelerating a low-carbon power system development and shifting the role of coal power in the transition. Experts explored key issues in building new power system, such as energy security and smooth transition, renewable development, systematic solutions for green power cross-provincial transmission, hydrogen economy, and shared insights on the pathway and financial supporting of coal power transition. It is agreed that it's critical to phase down coal in the long-term while guaranteeing the security of energy system and people's livelihood in the short-term, which is the baseline of future constructive discussions on the “HOWs”. The event is widely covered by nearly 30 media outlets. ([EFC #1](#), [EFC #2](#), [EFC #3](#))

Program Updates

Progress on Master Plan

EFC had the draft of coal transition Master Plan prepared, in which the current situation of China's coal use, sectoral coal transition pathway, regional coal transition cases, and other related issues are analyzed. To collect comprehensive comments, a mid-term consultation workshop and multiple rounds of expert consultation have been organized. With the insights and feedback received, the draft report is under final revision. The completion of the final report is expected in January 2022.

Sectoral action plan on coal transition

EFC prepared the scattered coal use sectoral Action Plan. The goal is to make rural as the first breakthrough to phase out all SC in JJJ by 2025, and North China by 2027, and the whole country by 2030 with clean or renewable energy. It is expected to be launched early 2022.

The industry sectoral Action Plans was drafted, and its final review is planned in December 2021.

Communications Strategy on Coal Transition (2021-2023)

EFC launched its 3-year strategic communications goal on coal transition: to curate constructive discussions on the solutions of coal transition in the 14th FYP period, and inspire broad public engagement.

For narrative building, EFC aims to promote constructive discussions and debates on the solutions and implementation of coal transition among stakeholders. For public engagement, EFC plans to improve public understanding on clean energy transition, and inspire field actions.

The aforementioned initiative is expected to lead extensive discussions to support coal transition in the media space and public discourse, as well as to inspire local/public engagement actions.

Provincial coal transition master plan in Zhejiang

Funded by EFC, this study aims to take into account the optimization of coal reduction cost, and put forward the "14th Five-Year" and medium- and long-term coal reduction strategy and roadmap of Zhejiang Province.

The main research results of this project have been integrated into the relevant expressions of the 14th FYP for energy saving and consumption reduction and optimal allocation of energy resources in Zhejiang Province, and the 14th FYP for tackling climate change in Zhejiang Province.

Promote coal power transition by targeted financial tools

EFC supported 2 research projects analyzing financial risks/gaps and green finance for coal transition in

Shanxi province and 2 cities (Erdos and Hologol) in Inner Mongolia. The projects focus on the investigation on local coal industry status and coal transition-related challenges, aiming to explore specific green finance

policy support and investment guidance on coal industry transformation and development.

The projects are expected to be finalized in 2022.



Coal Transition Roundtable

September 23 to November 24, 2021: Europe-China Dialogues on Just Coal Transition

As global policy collaboration is being weakened by the accelerating trend of de-globalization, the joint efforts of China and the EU are becoming more crucial in the fight against rising global temperature. China and the EU have been discussing about climate change via diplomatic dialogues for years, but more concrete actions are needed to tackle many specific and unsolved challenges. The timely announcement of China achieving carbon neutrality by 2060 points at a clear direction for China's post-pandemic development pathway, offering an opportunity for China and the EU to explore how to recover better on both national and regional levels. Against the aforementioned backdrop, Berlin-headquartered Agora Energiewende teamed with EFC to co-organize a serial of Europe-China Dialogues on Coal Just Transition in September to November 2021. About 50 senior European and Chinese key stakeholders were invited to explore the role of coal-reliant corporates in coal just transition, how to develop new economic pillars in coal regions, alleviation of coal transition-related employment impacts, design and implementation of coal transition fund, and technological solutions to move coal transition agenda forward.

Experts from both sides agreed that during coal transitions, the economy of coal regions in both Europe and China is inevitably dragged down by diminishing coal-fueled economic activities in absence of new economic pillars. As a result, developing economic drivers beyond coal is prerequisite of a just coal transition. Taking Shanxi as an example, compared to the coastal provinces in the southeast and even its surrounding regions, Shanxi is less attractive to new industries due to lack of comparative advantages. More specifically, Shanxi lags behinds its counterpart regions in terms of qualified talents and innovation capacity, digital and transportation infrastructure, public funds,

etc. The traditional coal regions are in urgent need of transition-compatible regulatory framework to improve their comparative advantages for the purpose of economic restructuring. To alleviate transition-related challenges, government authorities should nurture an increasingly supportive environment, including transition-friendly policies, sufficient financial supports and adequate carbon pricing signal. Key findings from the above dialogues are expected to be summarized in a research paper that will be released in 2022.

November 18, 2021: China-U.S. Dialogue on CCUS

Dozens of countries, include China and the United States, have now made pledges to reach net-zero emissions. Yet the path to achieving these net-zero pledges is uncertain at best. While steep declines in the cost of renewable power and energy storage offer hope for decarbonizing the power sector, retiring operational coal-fired power plants may present significant challenges. Decarbonizing industry, aviation and agriculture may be even more challenging. To help meet the challenge of climate change, carbon capture, utilization and storage (CCUS) technologies are expected to play an important role in achieving net zero emissions. Funded by EFC and co-organized by the Center on Global Energy Policy at Columbia University, this roundtable brought leading experts to explore CCUS potential in China and the U.S., with three sessions as below:

- Carbon capture costs: This session examines current and projected costs of carbon capture, focusing on strategies for reducing those costs most quickly in the years ahead.
- CO₂ utilization: This session examines pathways for utilizing CO₂ in commercial products, focusing on how best to expand markets for those products in the years ahead.
- Policy support: This session examines policy tools most likely to accelerate deployment of CCUS, focusing on policies in the U.S. and China.

November 4, 2021: EFC Coal Transition Roundtable Series: 3rd “Clean Energy for Rural Revitalization in China” Workshop & CCAPP 10th Academic Salon in 2021

On November 4, EFC organized a workshop on incentive policy and practical application of diversified investment and financing channels for clean heating, as one of the Coal Transition Roundtable series. Participating experts pointed out: the problems of green finance in China include the mismatch between capital needs and capital investment, lack of positive incentives, etc. Besides, the clean heating business model should focus on public awareness education and government policy guidance, to fully mobilize the social responsibility of financial institutions. Moreover, the rural clean heating could be combined together with the topic of rural revitalization and rural ecological protection. During the workshop, participants also discussed and shared regional cases of investment and financing for clean heating.

October 15, 2021: Coal Transition Roundtable Series: Coal Power Transition and New-Type Power System

EFC held a seminar on October 15, as one of the Coal Transition Roundtable series, in discussion of coal power transition and new-type power system development. EFC introduced its strategy of work on clean power and coal transition, stressing the interconnection between promoting renewable energy and phasing out coal power and future key directions of the initiative. Experts and scholars from various fields were invited to share their views. They agreed that different regions should explore different transition pathways for coal power in accordance with local conditions. In the process of developing green power, it is crucial to strengthen top-level design, coordinate the distribution of benefits among different industries nationwide, and take advantage of the renewable energy industry supply chain. Experts emphasized that building a new power system requires multiple renewable energy sources to be coupled with each other, integrating all non-fossil energy sources and enhancing the flexibility of the power grid. ([EFC](#))

September 27, 2021: EFC Coal Transition Roundtable Series: 2nd “Clean Energy for Rural Revitalization in China” Workshop & CCAPP 9th Academic Salon in 2021

On September 27, EFC organized a workshop on rural biomass heating case study and technology analysis, as one of the Coal Transition Roundtable series. During the discussion, experts shared views on how to replace scattered coal in rural areas. Participating experts agreed that biomass is one of the best alternatives to coal. To promote biomass utilization, a unified management system involving multiple government departments including the Development and Reform Commission, the Ministry of Rural Affairs, and the Ministry of Ecology and Environment, is required. Also, an integration of new technologies

and sustainable economic policies would be very important. Meanwhile, the government could make full use of biomass, carrying out pilot projects on the basis of local conditions, and then gradually achieve clean energy in rural areas, which will significantly contribute to the achievement of 30/60 goals. ([EFC](#))

August 29, 2021: EFC Coal Transition Roundtable Series: 1st “Clean Energy for Rural Revitalization in China” Workshop & CCAPP 8th Academic Salon in 2021

EFC organized a workshop, as one of the Coal Transition Roundtable series, on August 29, to discuss scattered coal management during the 14th FYP period. To promote clean energy in rural area, experts pointed out the priority is to understand the importance of rural scattered coal replacement deeply under current policies. During the 14th FYP period, focus of scattered coal management is to shift from key regions to non-key areas, from plains to mountain areas, from heating industry to agricultural production, and from gas to renewable energy. Meanwhile, it is important to strengthen the top-level design and involve different stakeholders, establishing a comprehensive management mechanism. From experts' perspective, rural coal management requires new models that are compatible with local conditions, in which innovative technical paths and clean energy like biomass should play an important role. In the meantime, the government could improve the incentive system, integrating government intervention and market mechanism, and guide rural areas to consciously reduce their use of scattered coal. ([EFC](#))

August 26, 2021: EFC Coal Transition Roundtable Series: Coal Transition Pathway in China

EFC organized a seminar, as one of the Coal Transition Roundtable series, on August 26, in discussion of China's coal transition path in the context of carbon peak and neutrality. Experts and scholars from the fields of energy, industry, building heating, coal industry, and many other related organizations shared opinions. Experts agreed that in order to facilitate the coal reduction, it is first necessary to sort out the whole picture of China's coal supply and demand, and to clarify the short- and long-term strategies for energy transition under the context of carbon neutrality. It is important to outline a 10-year technological roadmap for major coal-consuming industries, such as power, heating, and others, while tackling the current technological challenges by learning from advanced international experience and seeking international cooperation. These are crucial to peaking national coal consumption as soon as possible. At the same time, experts agreed that local government should take into account the regional resource endowment and local social conditions comprehensively during policy decision-making process, which should lead to a just transition. Also, exploring new investment opportunities and leveraging the role of market to drive a bottom-up coal reduction are crucial. In the long run, fundamental supports from financial and fiscal policies are needed to achieve a steady transition.



Highlights of Knowledge from the Field

Kevin TU and YANG Zhou

COVID-19 China Energy Impact Tracker #4 ([Agora Energiewende](#), forthcoming)

The novel coronavirus (COVID-19) pandemic is inflicting high human and economic costs in China and around the world. Since the outbreak of COVID-19, Agora Energiewende has been tracking the pandemic-induced impacts in China's energy sector. The upcoming 4th issue of the COVID-19 China Energy Impact Tracker will review the first three quarters of 2021, with a focus on the policy-driven changes in China's energy sector in the global recovery.

2020 is not only about coronavirus. It is also the year when China announced its climate neutrality pledge. In the fourth issue, Kevin Tu and Yang Zhou will follow the subsequent changes after the announcement and dive into the regional level to interpret how China's climate efforts would make a difference in practice. To better understand the challenges that China is facing with its climate ambition and the uncertainties caused by virus mutations, the authors plan to provide an estimation of China's monthly coal consumption and carbon emissions in 2021. With the up-to-date information of China's economic development, energy sector, carbon emissions, and industry performance, the authors strive to better inform the international community and Chinese audience about the status quo of the Chinese energy economy in the post-pandemic recovery.

CHEN Xinyu

Pathway toward Carbon-neutral Electrical Systems in China by Mid-century with Negative CO₂ Abatement Costs Informed by High-resolution Modeling ([Joule](#), [Harvard](#), October 2021)

With the increasing conflict between China's carbon neutrality goal and the severe domestic power supply security problem, it is urgent to explore a reasonable pathway of power transition, considering low-carbon development, energy supply security, as well as operational and economic feasibility. This research developed a cross-sector, high-resolution assessment model to quantify optimal energy structures on provincial bases for different years. The research results indicate that to realize the goal of 80% renewable penetration by 2050, coordinated deployment of renewables, ultra-high-voltage transmissions, storages, power-to-gas and slow-charging electric vehicles will have a lower decarbonization cost than the conventional strategy of deploying local wind, solar, and storage. In the transition process, the research also presents the following policy recommendations: strengthen the top-level design of the power system; increase investments and R&D inputs in offshore wind power; coordinate the cross-provincial transmission grid pattern at the national level; and optimize the layout of electric vehicle charging infrastructure. The research is supported by EFC.

WANG Zhixuan

Outline for Development of New-type Power System - Thoughts on the Overarching Design ([EJX](#), September 2021)

Establishing a new-type power system is fundamental to achieve carbon peaking and neutrality goals, the basis of which is the overarching design. At the same time, the policy making process should reflect stability in direction and principle. This article describes different elements of the aforementioned power system, including its features, functions, mechanisms, driven factors, development processes, and others, providing policy recommendations on facilitating energy transition and achieving 30.60 goals.

According to the article, a renewable-dominant power system with zero/near zero carbon electricity consumption is the trend of power system development in the context of China's dual carbon goals. Building such a system requires considering not only the energy security and economic factors but also the national coordination and the ecological civilization development. Prioritizing innovation as basic driving factor and deepening power system reform are also of great importance to the phase-out of fossil energy. Specifically, such new power system should meet the needs of national economic and social development, power security, as well as ecological and environmental protection. Moreover, the article points out that the operational mechanisms of such a new power system consist of diversified power source, integrated on-grid and off-grid coupling mechanism, and risk prevention mechanism.

YUAN Jiahai

In the Carbon Neutral Power System, Is Coal Power still a “Ballast Stone”?
([China Energy News](#), July 2021)

In the context of China's 30.60 climate goals, the development of a renewable-dominant power system is critical. However, coal power is still expected to play an important role in terms of power security in the short term. As for the role of coal power in the future power system, there are still some ongoing heated discussions. This article analyzes the following issues: 1) debate on coal power in China; 2) international progress on phase-out of coal power; 3) new and frontier findings of research on power system decarbonization; and 4) long-term prospect of China's coal power under the carbon neutrality goal.

The article emphasizes coal power's fundamental role in power generation, flexible services, and power security in recent years; but in the long run, the conventional coal power for baseload generation should be phased out in the power system, and the system should focus more on non-fossil energy such as hydropower, wind, solar, nuclear among others. In the process, bioenergy with CCS (BECCS) technology will play an important role in gradually converting the conventional coal power to regulating, supplementary, and backup energy source, and then eventually achieve its phase-out. During the 14th FYP period, the termination of new coal power projects is crucial due to the potential risks of overcapacity, costs of existing coal power assets' transition as well as the international commitment and cooperation. This article and related research are supported by EFC.