



ENERGY FOUNDATION
能源基金会



COAL TRANSITION QUARTERLY

NEWSLETTER OF ENERGY FOUNDATION CHINA'S COAL TRANSITION TASK FORCE

ISSUE 5

November 2022

Preparation team: led by LI Jie, Cynthia YU, GAO Yuan, ZHANG Lingyue.



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Foreword by Cynthia YU

Director, Coal Transition Task Force

China's economy started to recover since Q3 2022, with GDP growth at 3.9%. However, COVID-19 and recent control obstruct China's path to recovery. The latest data suggest that the economic momentum is quickly weakening and the outlook is not strong. Though China signals COVID control easing recently, the still weak economic data suggests a non-robust growth in terms of coal consumption in Q4 2022.

The summer and autumn of 2022 are featured by the drought weather condition. Consequently, national hydro power output dropped by 10% and 30% in August and September, respectively. Hubei, where Three Gorges Dam located, reported 22% of hydropower generation decrease in October 2022. The highest temperature and the lowest rainfall since records began 60 years ago hit Sichuan and Chongqing and have led to severe power generation shortage in the largest hydro power exporter. The region had to rely on coal power to mitigate the power crisis, given neither enough infrastructure to send power into Sichuan, nor high percentage of wind and solar power to provide alternative solutions locally. Sichuan's thermal power generation (primarily coal power) increased significantly in the summer. Coal power demand nationwide turned to positive growth (0.5% YoY) since September, while national power generation grew by 4% YoY.

China's 20th Congress set the direction of "building the new before discarding the old". Recent policies continue supporting "building the new" under carbon dual control "1+N" framework. The Implementation Plan for Carbon Emissions Peaking in the Industry Sector was released in August, promoting the scrap steel processing and enhancing energy efficiency. The Action Plan for Carbon Peaking and Neutrality Standardization Improvement in Energy Sector, released in October, prioritizes action plans on the standard settings for non-fossil energy, new storage systems and hydrogen, as well as the development of new power system. The Notice on Further Improving Energy Efficiency and Flexibility Standards for Coal Power sets standards for effective coal power flexibility retrofit in order to support the increase in renewable penetration. Finally, Further Exclusion Incremental Renewable Energy from Total Energy Consumption Cap, issued in November, clearly indicated that incremental renewable power since 14th FYP period (2021-2025) will be exempt from total energy consumption control, a strong incentive to promote green power consumption from demand side.

The summer power shortage hinted that climate anomalies exacerbated energy security risk. Lessons learnt from Sichuan/Chongqing summer power crisis, non-hydro renewables and distributed energy system can effectively help overcome/mitigate the power shortage issues. More importantly, a flexible power network can increase power supply efficiency. For Energy Foundation China, we would like to work on climate-sound energy security narratives. Following the establishment of "1+N" policy framework for carbon peaking and neutrality, we would like to prioritize on the implementation of the "1+N" policy framework with activities covering national/subnational plans, pilot projects, standard settings, etc.



Note from WANG Zhigao

Senior Program Director, Low Carbon Cities

Decarbonize Space Heating in China

Space heating is one of the most challenging areas for carbon neutrality in China. It consumes 318 million tons of coal equivalent through CHP (55.6%), direct burners for centralized district heating (17.9%) or scattered furnaces and stoves (159 million tons). There are deep economic, technical, and social challenges for phasing out space heating coal.

The urban areas of 15 provinces in northern China are required to provide space heating by regulation. Traditionally, the mainstream solution is centralized heat sources with big coal burning facility (power plant or boiler) and large-scale pipeline networks, totaled 0.5 million km, the biggest heat networks in the world. Replacing the centralized system with distributed systems like heat-pumps, or replacing fossil fuel generated heat source with zero carbon alternatives but keep the networks are both economically and technically demanding. For example, although the amount of waste heat is substantial (2.46 billion GJ from industrial processing, waste water, data centers etc.), collecting and transmitting the heat to the networks are difficult due to it is widely spread, and in many cases low temperature.

In rural areas, the solution is dominantly distributed and, traditionally direct coal or bio-mass burning. Rural residents are usually less affluent, rural buildings are generally low energy efficiency, and coal were easily available and relatively cheaper, all these add up to the current situation. However, after many years of national coal mitigation campaign and program, scattered coal has been reduced and now estimated left-over accounts for 159 million tons for heating. As people get affluent and technologies develop, new alternatives like heat pumps, electricity heater are picking up, though very slowly.

As China transits to a higher income society, heating demand arises from areas that do not mandate heating supply, such as regions along the mid to downstream of Yangtze River. There are various solutions, including distributed heating by gas boilers, electrical radiators, or heat pumps, and occasionally, district heating that emulates northern China. They could lead to very different scenarios in terms of carbon mitigation. Huge gaps exist in financial models, utility tariff, technical guidance, and incentive policies to lead to the right alternatives. For example, high rise residential towers typically do not have the space to fit-in a high-capacity heat-pump system, which is large in dimension, of high up-front investment, and noisy in residents' perception.

It is out of question that China is going to neutralize, including the heating sector. In 30 or so years, most coal power plants without CCS will be gone, all coal and gas boilers for heating will be gone; decarbonized electricity, bio-mass, low carbon and waste heat from various sources collected, transmitted, and stored by innovative technologies will largely be the future heat sources; high efficiency end-user equipment, such as heat-pumps will play critical roles. Tremendous effort is needed to build a scenario as such.

With our donors' generous support, Energy Foundation China has been working with partners in establishing policy environment for scaling up waste heat utilization, scaling up heat-pump installation, upgrading building codes to accommodate new solutions, reverting market distortion, improving public awareness, and piloting innovative solutions. It is hard, but we'll get there in scale and in speed.

Coal Data Updates

Summary of economic and energy trends

China's GDP grew by 3% YoY in the first three quarters of 2022, slightly recovered from 2.5% growth in H1 2022, but still evidently lower when compared with the same period in 2021. As China gradually recovered from the strict Covid policy in Q2 of 2022, the national energy demand was up by 2.5% YoY in the first three quarters of 2022 and the power consumption grew by 4% YoY.

During January to September in 2022, China's thermal power generation turns from negative 3.9% in H1 2022 to 0.5% growth YoY, due to the dramatic decrease in hydro power output triggered by historically recorded drought in Southwest China. However, the YoY expansion of thermal power generation in the first three quarters has sped down compared with 11.9% YoY at the same period of 2021. Compared with the modest growth in thermal power output in the first three quarters of 2022, non-fossil power generations from hydro, nuclear, wind and solar have increased by 5%, 0.5%, 11.2% and 14.4% YoY, respectively.

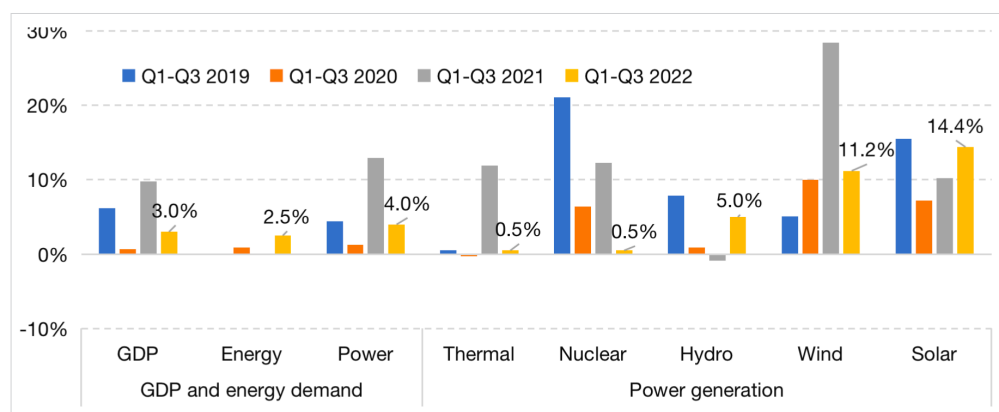


Figure 1. YoY changes of China's key economic and energy indicators, 2019-2022

Source: National Bureau of Statistics and China Electricity Council.

Coal production

From January to October in 2022, national coal production has experienced 10% YoY growth, reaching 3,685 Mt, equivalent to an average daily output over 12 Mt. Based on various market interviews conducted by EFC with experts, the increase in coal production has reached the up-limit. Flexibility for further production increase can be a challenge.

China targets to increase new coal capacity by 300MTPA in 2022 to ensure energy supply security. Indicated by NEA, by mid-November, total 14 coal mining projects with capacity > 62MTPA have been approved. The approved capacity is below the government target, as coal mining sector is regarded as high policy risk and high market uncertainty. Investment in coal mine exploration has dropped from RMB 41.6 billion during 12th five-year-plan (FYP) to RMB 6.9 billion during 13th FYP. Strict capacity offsetting, environmental assessment, land use permitting and HSE requirements put additional high challenges to coal mine investment and operation.

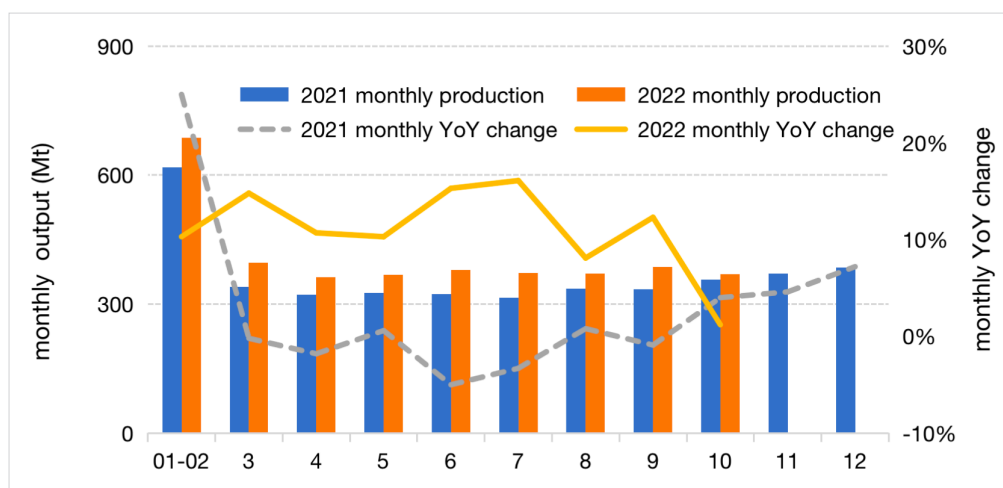


Figure 2. YoY change of China's monthly coal production: 2021 vs 2022

Source: National Bureau of Statistics.

Nevertheless, national coal production is highly concentrated in the top producing regions. More specifically, the top four coal mining provinces (top four), namely Shanxi, Inner Mongolia, Shaanxi and Xinjiang, together accounts for 81% of national coal production. The top 10 provinces stand for 94% of national coal production. Shanxi, China's largest coal producer, produced 1069 Mt of coal from January to October in 2022, accounting for 29% of China's national output. Meanwhile, Inner Mongolia, Shaanxi and Xinjiang represent 26%, 17% and 9%, respectively.

During January to October 2022, the YoY growth rate of coal production in Xinjiang is soaring at 30%, indicating the strengthening position of Xinjiang in the national coal market. Via signing mid- and long-term supply agreement since 2022, Xinjiang started to guarantee coal supply in southwest and northwest regions. However, facing the continuing shutdown of coal mines in east/central regions and the nearly saturated coal output in Shaanxi and Inner Mongolia, Xinjiang coal export cannot solve the regional tightness due to the far distance and high cost.

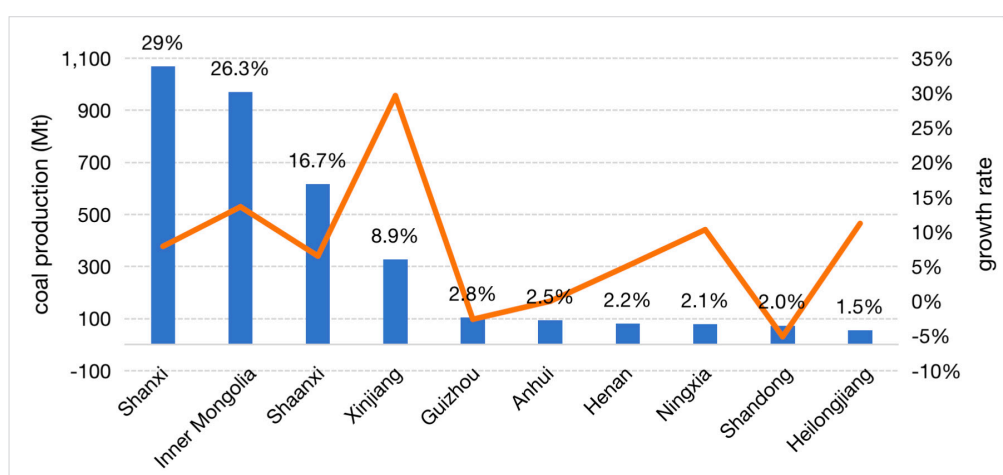


Figure 3. China's top 10 coal producing provinces during Jan-Oct in 2022

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

From global perspective, Ukraine War brought energy security top priority, reflecting in the surging coal production around the main coal producers worldwide. As a result, eight of ten top coal producing countries witnessed positive growth of national coal production in the first three quarters of 2022. Thereinto, the YoY growth rate exceeded 10% in three countries - India, China and Germany. In particular, in India, the second largest coal producer in the world, the YoY growth rate of coal production hit 13.6%, followed by China at 11.2% YoY.

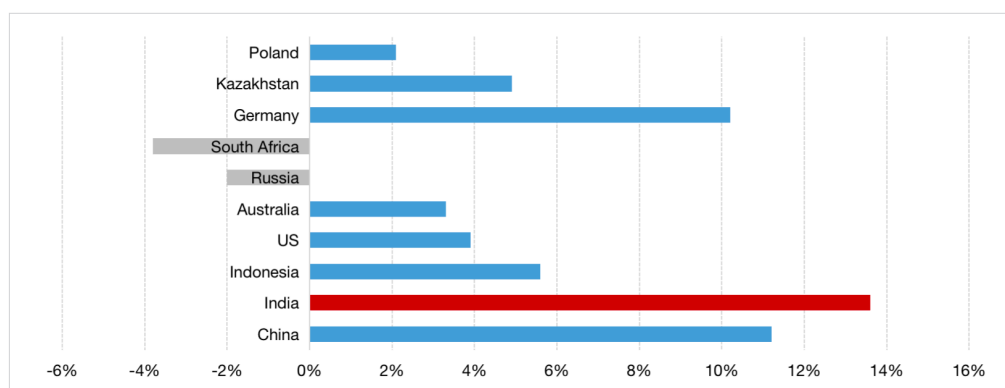


Figure 4. YoY change of coal production in top 10 coal producing countries, Jan-Sep 2022

Source: [China Coal Economic Research Association](#).

Note: South African and Germany are based on data of the first eight months of 2022, Indonesia and Australia are based on data of the first six months (H1) of 2022.

Coal imports

By October 2022, China's year-to-date (YTD) coal import increased to 230MT with a 10.5% YoY decrease compared with the same period in 2021. Due to the domestic pricing control and high international coal prices, consumers that traditionally rely on overseas coal sourcing tend to switch to domestic supply. The trend is expected to be extended throughout 2022. According to the China's imported coal index compiled by CEC, the import price of coal continues staying above RMB 1200/t throughout the year.

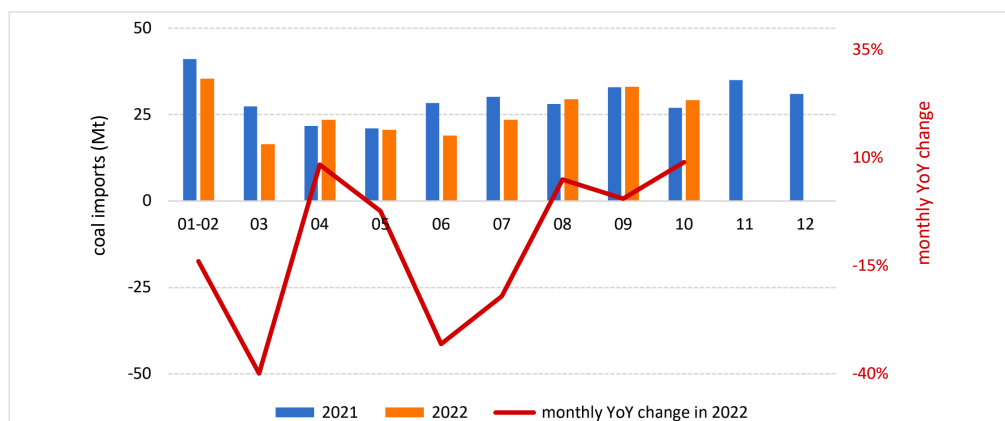


Figure 5. YoY change of China's monthly coal imports: 2021 vs 2022

Source: [China Customs](#) and [National Bureau of Statistics](#).

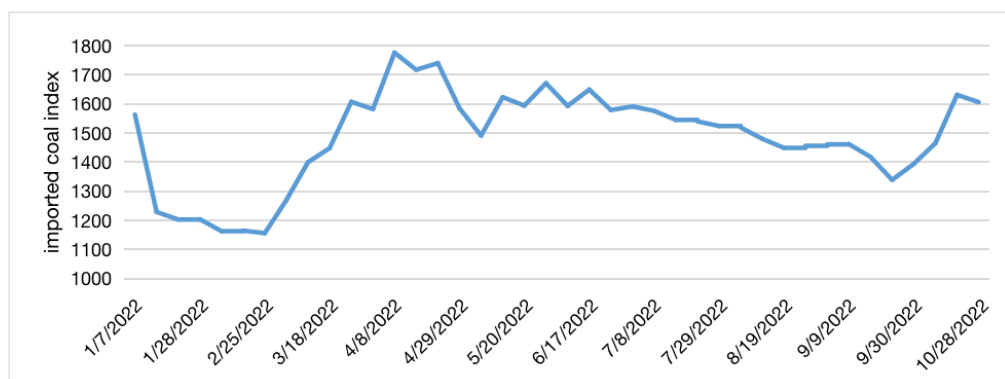


Figure 6. China's imported coal index

Source: China Electricity Council.

Coal consumption

Globally, in the summer of 2022, drought and heat wave in many countries led to surging power demand, coincident with the lowered hydro/nuclear power output. Meanwhile, historical record gas price put more pressure on alternative fuel for power generation. According to the IEA estimation, global coal consumption is expected to reach record levels in 2022.

In 2021, thermal power accounts for 56.7% of China's total coal consumption. The steel, construction (mainly cement) and chemical industries are another three main sectors, accounting for 15.6%, 12.8% and 7.2% of the national coal consumption, respectively.

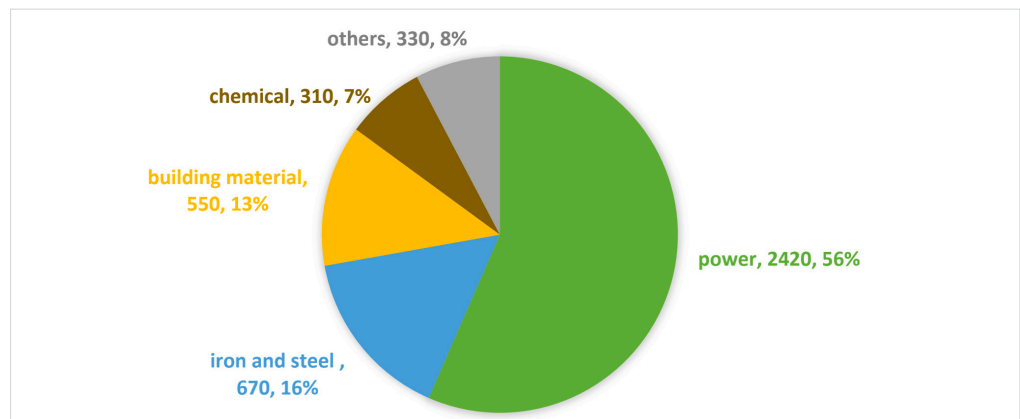


Figure 7. China's coal consumption structure in 2021 (unit: Mt)

Source: China Coal Transportation and Distribution Association.

Growth rate for steel production started to turn positive in September and October but YTD cumulative production still lowered than the output in the same period of 2021. Cement production experienced significantly decrease due to the impact of China's real estate development. Drought condition led more power supplied from coal-fired power plants. By October 2022, coal related key sectors' production data as:

- Thermal power generation: 4819 TWh, increased by 0.8% YoY vs total power generation increased by 2.2%
- Steel production decreased by 2.2%, following 3.0% production decrease in 2021
- Cement output decreased by 11.3%, following 1.2% production decrease in 2021
- Main coal chemical products increased by 2.9%

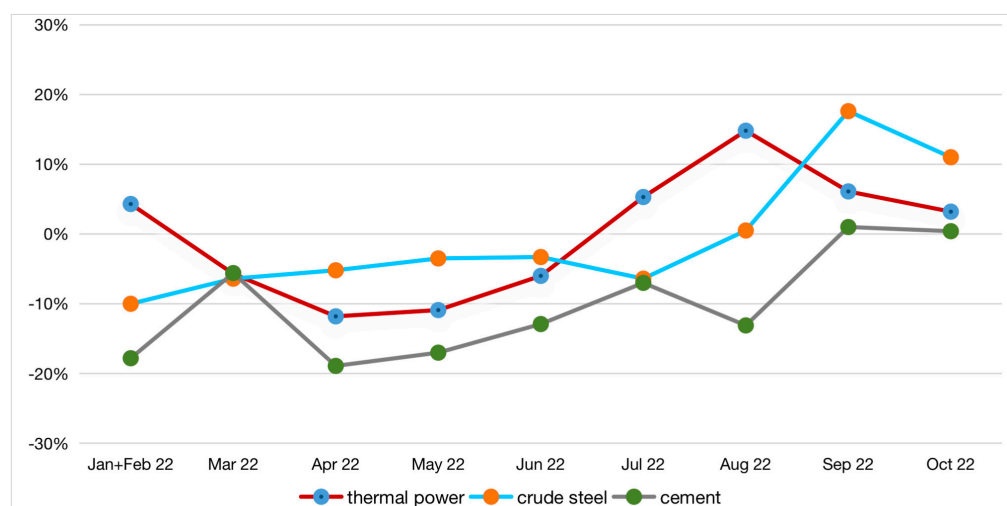


Figure 8. Monthly YoY change of production in main coal related sectors in 2022

Source: National Bureau of Statistics.

Coal-fired power plants

According to China Electricity Council (CEC), China's incremental coal capacity stands at 14.91 GW from January to October in 2022. Meanwhile, China adds 100.37 GW of renewable capacity during the same period, accounting for 78.4% of national power capacity addition with the breakdown as: hydro – 17.74 GW, wind – 21.14 GW, solar – 58.24 GW, biomass – 3.25 GW, representing 13.9%, 16.5%, 45.5% and 2.5% of national total incremental capacity, respectively. Consequently, China's total non-fossil capacity reaches 1,220 GW by October, accounting for 48.9% of the national total power capacity, with a 15.6% YoY growth rate throughout January to October 2022. By comparison, the aggregate coal power capacity is 1,110 GW, roughly equal to 44% of China's power capacity mix, growing at 1% YoY in the same period.

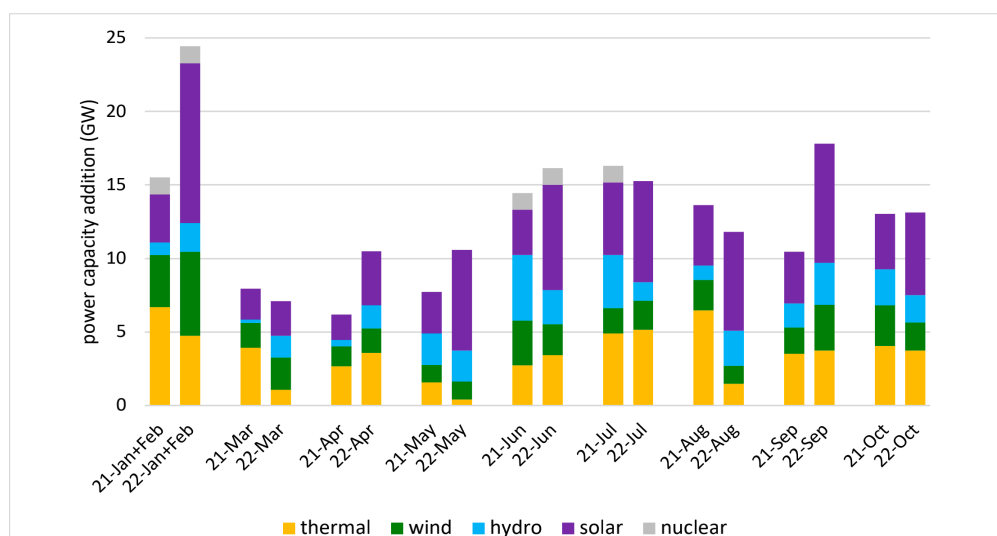


Figure 9. Power capacity additions by technology: 2021 vs 2022

Source: National Bureau of Statistics.

Coal power generation is highly correlated with China's overall economy, reflecting as the flexible power supply. Throughout Q2 2022 when China experienced the strict COVID-19 control, coal power generation decreased significantly following the economic downturn, while short of hydro power output, economic recovery and heatwave drove the increase in coal power generation. By October 2022, China's thermal power generation increased by 0.8% YoY, while YTD coal production increased by >10%. To avoid 2021 nationwide coal shortage, China continues with building coal inventory at power plants. The coal inventory level at the power plant has been keeping above 170 million tons, enough for 19.5 days.

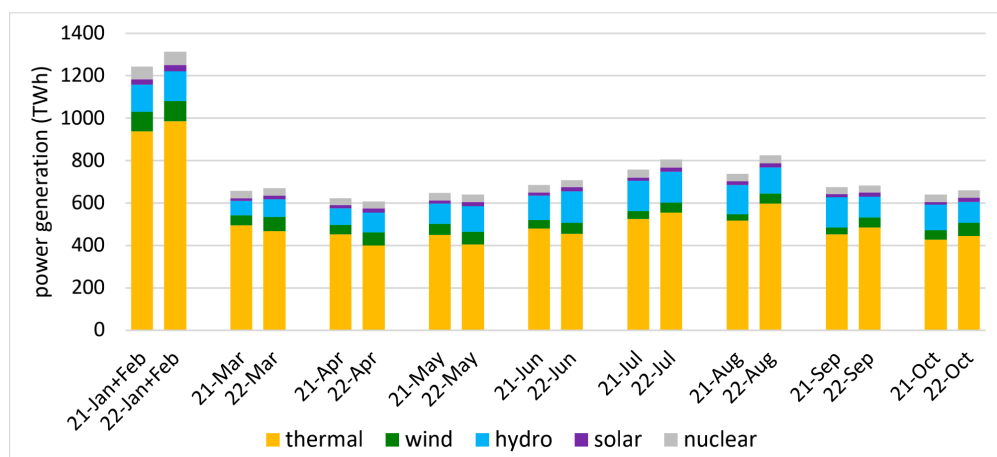


Figure 10. Power generation mix by technology: 2021 vs 2022

Source: National Bureau of Statistics.

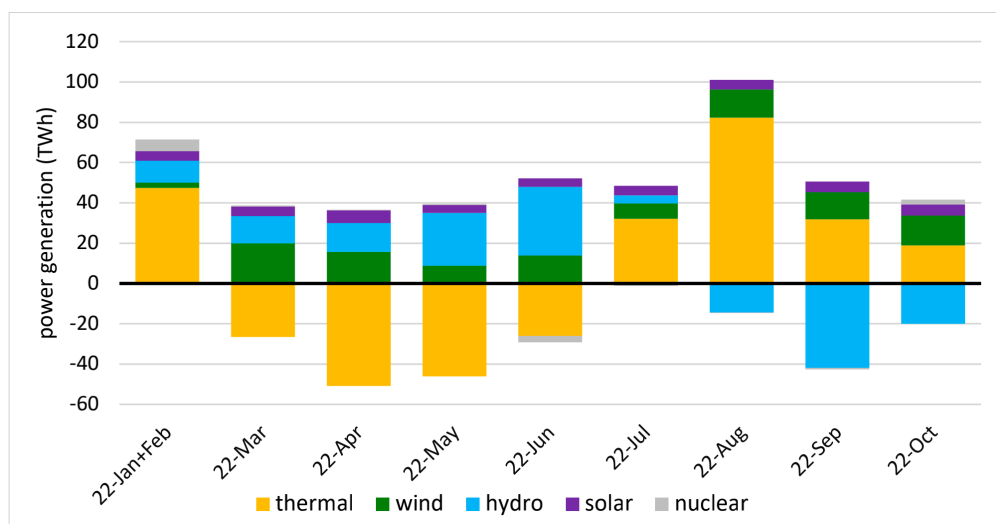


Figure 11. Power generation addition by technology: 2021 vs 2022

Source: National Bureau of Statistics.

From January to October 2022, the investment in power generation reached RMB 460.7 billion, 27% higher than the RMB 362.8 billion at the same period of 2021. The thermal power expanded by 42.8% YoY, accounting for 14% of the total generation investment. Investments in clean power, focusing on hydro, nuclear, wind, solar and biomass, accounting for 86.6% of the total investment.

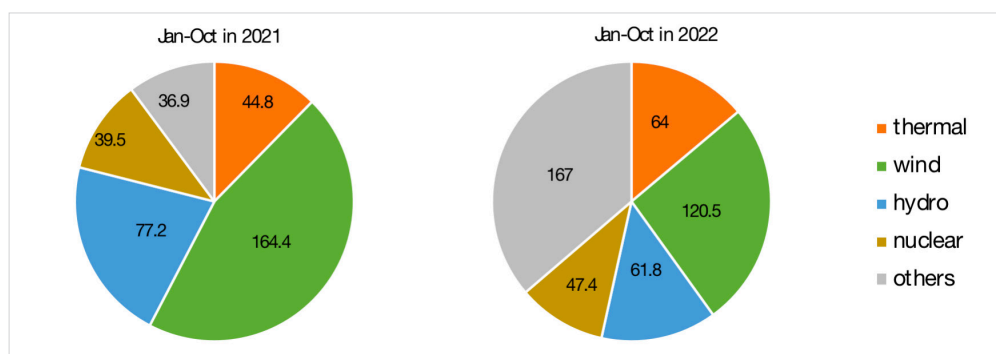


Figure 12. Power investment by technology (unit: billion yuan)

Source: China Electricity Council.

Key Developments in China



Summary of coal-related policies in Q3 2022

In 2022 Q3, energy security became the top priority. Coal is taken as the “energy cornerstone” in China. Due to the high temperature as well as the unusual drought in July and August, “supply guarantee” was highlighted. National policies focused on coal capacity release, price stability and quality control. Particularly, in the key report to the 20th CPC National Congress, President Xi emphasized again “building the new before discarding the old” and “China will use coal in a cleaner and more efficient way”.

Chinese mainstream state medias: take energy security as a bottom line

- In 2022.7, the State Council New Office held a press conference on "Accelerating the Construction of an Energy Powerhouse and Making All-Out Efforts to Ensure Energy Security." Zhang Jianhua, head of the National Energy Administration, said that the general idea of China's energy development was to continue to promote the green and low-carbon transformation of energy under the premise of ensuring energy security. ([SCIO](#))
- In 2022.8, the Economic Daily published an article - Energy security must be domestically oriented. It is recommended to fully ensure the sufficient supply and stable price of coal, promote renewable energy substitution, and increase energy efficiency. ([Economic Daily](#))
- In 2022.10, the People's Daily published an article - Build an energy powerhouse and ensure national energy security. It is emphasized again that security is the precondition of development. ([People's Daily](#))

“1+N” policy framework basically established for carbon peaking and neutrality

The Office of the Carbon Neutrality and Carbon Peaking Leading Group at NDRC stated during a liaison meeting that China's “1+N” policy framework for carbon peaking and neutrality has been initially established, laying a solid foundation for realizing the “dual carbon goals.” The “1+N” policy system started in 2021. By now, most of the implementation plans for key areas such as energy, industry, urban-rural development, transportation, and agriculture, as well as enabling plans for scientific research, financial support, statistics, and personnel training have been published or in development. ([NDRC](#))

China released the Implementation Plan for Carbon Emissions Peaking in the Industry Sector

In 2022.8, the Implementation Plan for Carbon Emissions Peaking in the Industry Sector was released jointly by MIIT, NDRC and MEE. The Plan proposes that, by 2025, the energy consumption per unit of value added in big-size industrial enterprises should be reduced by 13.5% compared with 2020, and the carbon dioxide emissions per unit of industrial value added should decline at a higher rate than the national target, which requires carbon dioxide per unit of GDP to reduce by 18%. A modern industrial system featuring high efficiency, green development, recycling, and low carbon emissions should be initially established by 2025 to ensure industrial carbon peaking before 2030, according to the Plan, which emphasizes accelerating efforts in key industries for carbon peaking. By 2025, the capacity of scrap steel processing should exceed 180 million tons per year, and the comprehensive energy consumption per unit product of cement clinker should drop by more than 3%. ([gov](#))

NDRC: ensure the stable quality of thermal coal

Due to the recently declining quality of thermal coal, in 2022.8, NDRC released the Notice on strengthening the management of mid- and long-term contracts to ensure the stable quality of thermal coal. The measures include: to clarify the coal quality requirements for mid- and long-term contracts for thermal coal; to classify the coal quality and price by marketing mechanism; to establish and improve the incentive and constraint mechanism for thermal coal quality; to strengthen the quality monitoring of thermal coal and the supervision of contract performance. ([bjx](#))

Further implement coal power retrofitting in efficiency and flexibility

To promote the previous requirement on coal power retrofitting in efficiency, flexibility and heating, in 2022.8, NEA, NDRC and State Administration for Market Regulation jointly released the Notice on further improving energy efficiency and flexibility standards for coal power. It is required to organize the revision and issue a batch of binding standards for assessment, as well as a series of key supporting standards. Besides, the governments will appraise and elect the demo projects for advanced standards application. ([gov](#))

Action plan for carbon peaking and neutrality standardization improvement in energy sector

In 2022.10, NEA released the action plan for carbon peaking and neutrality standardization improvement in energy sector. It is targeted that, by 2025, a relatively complete energy standard system that can effectively support and lead the green and low-carbon transformation of energy will be initially established, and energy standards will change from quantity and scale to quality and efficiency; by 2030, a structure-optimized, advanced and reasonable energy standard system will be established, and energy standards will strongly support and guarantee carbon peaking and neutrality in energy sector. Priorities are at non-fossil energy standard setting, new power system development, new energy storage technology standard completion, hydrogen standard completion, energy efficiency standard enhancement, energy value chain emission mitigation. ([NEA](#))

Exclusion of raw material energy use from the total energy consumption control

In 2022.11, NDRC and NBS released Notice on further improving the work related to the exclusion of raw material energy use into the total energy consumption control. The Notice clarifies the specific operation methods for exclusion of raw material energy use into the total energy consumption control, and makes arrangements for defining the scope of raw material energy use, consolidating the statistical accounting foundation, linking the responsibility evaluation and assessment system of energy conservation targets, and coordinating the implementation of energy conservation audit of fixed asset investment projects.

While the governments also indicated that the notice did not aim to encourage the blind development of petrochemical and coal chemical projects, or other related industries. They would continue to curb the blind development of high-energy-consuming, high-emission and low-level projects. ([gov](#))

Further exclusion incremental renewable energy from total energy consumption cap

In 2022.11, China defined that incremental renewable power (wind, solar, hydro, biomass and geothermal) during 14th five-year plan period on top of 2020 base could be exempt from the energy consumption cap. Renewable energy green certificates are deemed as the certificate for renewable power consumption. Monitoring, verification and reporting are based on green certificate held by power users in each province. Meanwhile, nationwide unified green certificate system is to be developed.



Key Developments:

International Perspective

September 8, 2022: Australia passes the first climate legislation in over a decade

On September 8, Australia's parliament passed its first climate change legislation in over a decade, enshrining carbon dioxide reduction targets into law for the first time in the country's history. Drafted by the Labor Party-led coalition that took power in May, the bill mandates Australia to cut greenhouse gas emissions 43 percent below 2005 levels by 2030 and reach net-zero by 2050. The country's Energy and Climate Minister, Chris Bowen, will be required to provide lawmakers with a progress report each year, and government agencies must now take the new emissions targets into account when making financial and development decisions. According to Bowen in a statement, this bill will signal to the world that Australia is serious about driving down emissions and reaping the economic opportunities from affordable renewable energy. ([Grist](#))

September 2, 2022: Norway's last coal mine extends life to feed European industry

The last Norwegian coal mine on the Svalbard archipelago will produce coal for another two years to help bolster industrial production in Europe. Mine 7 will continue production of bituminous coal, used primarily in the steel industry, until July 2025, the government said on Friday. The mine, which was due to close in 2023, delivers about 80,000 metric tons of coal to the metallurgical and chemical industry in Europe. Steel makers are currently completely dependent on such industrial coal, until hydrogen and other emission-free technologies come into place during this decade, the ministry said. ([Bloomberg](#))

August 15, 2022: Thungela pays hefty first half dividend amid coal price rally

Thungela Resources Ltd, South Africa's largest exporter of power-station coal, is searching for assets to buy after first-half profit surged on record-high fuel prices. The Johannesburg coal producer shrugged off shipping disruptions to declare a hefty 60 rand per share dividend after posting record earnings in the six months through June. Chief Executive Officer July Ndlovu is now seeking more coal producing assets outside South Africa, where it's being forced to curb exports due to limited rail capacity. Soaring global demand for coal has propelled a more than fourfold gain in Thungela Resources Ltd. shares this year. Even so, analysts at Morgan Stanley say the market doesn't fully appreciate the potential upside. ([Bloomberg](#))

August 10, 2022: EU's ban on coal imports from Russia comes into full force

After a four-month wind-down period for existing contracts since the ban released in April, the EU's ban on coal imports from Russia, the cornerstone measure in the bloc's fifth package of sanctions against Moscow for its invasion of Ukraine, will come into full force on Aug 10. According to the EU executive, the ban will hit Russia hard because the 27-nation bloc is its biggest coal-trading partner, resulting in revenue losses for the country of around 8 billion euros per year. However, the EU itself will struggle to adapt to look elsewhere for around 45% of its coal imports, previously from Russia. Especially for Germany, Poland and the Netherlands, almost 70% of their thermal coal comes from Russia. The ban on Russian coal imports will bring further strain on coal supplies when there is already concern about dwindling supplies of Russian gas and a severe energy crunch in the winter. ([Reuters](#))

Progresses of EFC's Coal Transition Task Force

Final review on the research of China's PEDF building development strategy path

On July 15, the final review meeting of China's PEDF (Photovoltaic Energy-storage Direct-current-distribution Soft-power-system) building development strategy path research project was held in Beijing. Through the research, the group established the development path of the new building power system of PEDF in rural areas and urban areas of China, put forward the analysis suggestions of the technical standard system and standard development roadmap of PEDF, and carried out technical and model exploration in related areas. The demo projects covered the whole county's regional planning scheme, and typical scenarios of urban and rural buildings. The research supported the national dual carbon related policies, as well as buildings, distributed photovoltaics, DC electrical, DC home appliances and other fields. The new obstacles and problems that need to be solved are also identified in the research, pointing out the direction for further deepening technology research, policy guidance, pilot demonstration and application.

Technical policy research on biomass application in power system under dual carbon goals

On August 18, China Association of Circular Economy initiated the project of Development Path of Biomass Energy in China Based on Dual Carbon Goals (Stage 1): Technical Policy Research on Biomass Application in Power System under Dual Carbon Goals, funded by EF China. During the first several months, the grantee systematically studied the requirements of the "dual carbon" goal, including national policies, local policies and energy and power industry policies, especially the impact of policy changes on this project after the transition from dual energy consumption control to dual carbon emission control. Besides, the grantee analyzed the basic requirements of energy and power development, as well as the utilization status of biomass in the power system, and the potential of biomass substitution in power system under current policy.

Deep dive in Inner Mongolia

From September 6 to 9, EF China had a series of office-wide meeting with the energy agency and development and reform commission of Inner Mongolia. Following the signed MOU with Inner Mongolia energy agency in August, the meeting focused on existing projects kick-off/implementation and new projects discussion. All the existing projects moved smoothly, and 4 projects with energy agency and 11 projects with development and reform commission were newly proposed.

Regarding to coal transition team, the collaboration in Inner Mongolia was with the energy agency. We supported the research in the topic of total coal consumption control and the research on the promotion scheme and pilot project of upgrading coal-fired power units in Inner Mongolia, and the two projects held kick-off meetings on September 8. Moreover, two new projects related to coal mine methane mitigation and energy security in Ordos were proposed and discussed with Inner Mongolia energy agency.

Discussion on the future direction of coal transition, clean power and electrification

On September 16, EF China held a roundtable to discuss the future direction of coal transition, clean power and electrification. In the coming years, Coal Transition Task Force will focus on five priority areas, including justice and inclusion transition, the interaction between coal power and new power systems, coal phase-down and carbon reduction in the industrial sector, scatter coal phase-out, and macro research on the coal industry; Electrification Task Force will focus on the friendly interaction between low-carbon power systems and the electrified end-users, as well as the electrification progress of industry, buildings and transportation sectors.

EF China and HBIS signed MOU to support deep decarbonization in the steel sector

On September 19, EF China and HBIS (Hebei Iron & Steel) Group signed a MOU on the deep decarbonization in the iron & steel industry (2022–2025), supported through the China Industrial Deep Decarbonization Program of EF China and the platform of the World Iron and Steel Development Research Institute. The collaboration will promote green and low carbon transition of the iron & steel industry in eight areas focusing on carbon peaking and neutrality implementation plan; energy system renovation and optimization; process optimization and low carbon metallurgical technologies; short process, recycling, digital, green and zero carbon plants; CCUS technology evaluation and standard development; low carbon sustainable supply chain; case studies of industrial organization transformation; and international cooperation and communication. The strategic collaboration on innovative technologies between EF China and HBIS will contribute to building an integrated iron and steel sector, leading to the overall sustainable development of the Chinese and global steel industry.

The 3rd dialogue on the energy transition pathway in the China-U.S. coal region

On September 29, EF China held the 3rd Dialogue on the Energy Transition Pathway in the China-U.S. Coal Region – the role of business in the energy transition. The 3rd dialogue was based on the previous two successful exchanges, and focused on understanding the policies of the United States and China on energy transition and strategies as well as measures of energy transition adopted by traditional coal enterprises under the corresponding policies. It conducted a cross-comparative analysis of energy transition strategies. Also, it showed the low-carbon transition pathways for diversified energy enterprises, including policies, investment options, and case studies from federal to regional levels.

EF China and DEESP signed MOU to explore the strategic path of synergy in pollution reduction and carbon reduction

On October 24, EF China and DEESP (Department of Ecology and Environment of Shanxi Province) signed a MOU on the synergy in pollution reduction and carbon reduction. DEESP and EF China will cooperate to carry out a series of research and practices to help build a beautiful Shanxi and promote the all-round high-quality development of Shanxi Province, including promoting coordinated emission reduction in the fields of clean energy, industry and mobile source management, and promoting the optimization of regional coordinated emission reduction and layout, so as to promote economic diversification through pollution reduction and carbon reduction. At the same time, it will also carry out institutional policy research, capacity building and public participation on pollution reduction and carbon reduction, and help Shanxi Province build an innovation and leading base for the synergy of pollution reduction and carbon reduction in China.

EFC Coal Transition Task Force held a meeting themed as power crunch and accelerating the coal to renewable transition during the COP 27

On November 15, EFC invited experts from China, Europe and US to discuss how to balance fossil fuel and renewables facing energy crisis. China experts from RMI, former IEF general secretary and China PV Association, introduced their view on China's coal power phaseout and elements needed for building the new power system, while the European expert from Oxford Energy Institute share their experience on ongoing energy reform to overcome the crisis. US speakers indicate the strong influence of IRA on US's climate-sound transition and particularly how it will help to cut emission in power sector. Room is still available for US-China cooperation on clean energy.



Highlights of Knowledge from the Field

IEA World Energy Outlook in 2022 ([IEA](#), October 2022)

According to the newest World Energy Outlook (WEO), the record-high gas and coal prices have stoked inflationary pressures and created a looming risk of recession, as well as brought a huge USD 2 trillion windfall for fossil fuel producers. A new energy security paradigm is needed to maintain reliability and affordability while reducing emissions. In China, new targets continue to spur the massive build-out of clean energy, meaning that its coal and oil consumption will both peak before the end of this decade. The rise in China's energy use will slow and then halt altogether before 2030 as China shifts to a more services-orientated economy.

Managing the social consequences of the transition away from coal: the case of clean heating in Shanxi Province, China ([OIES](#), September 2022)

Many countries, including in Asia Pacific, have announced pledges to variously peak greenhouse gas emissions or achieve net zero emissions in the coming decades. In many countries, the low-carbon energy transition will require a radical change in space heating and cooking, especially in regions with long, cold winters. Whilst many of these regions today rely on electricity or natural gas, China is an exception where coal and traditional biomass respectively accounted for 12% and 13% of final energy consumption in buildings in 2019, comparing to a global average of 4% and 19% respectively. The coal use for winter heating and cooking is particularly prominent in the northern China. In this background, the government has embarked on a program to introduce clean heating and cooking systems across northern China to reduce the use of coal and traditional biomass. This paper focuses on Shanxi Province in northern China, being the country's heartland for coal production and consumption. It is argued that although achieving significant success, China's programs for clean heating encountered significant obstacles, which arose from a combination of the top-down campaign style of the programs that led to poor policy coordination and the inadequate scale of available financial resources.

Paris Agreement compatibility of institutional emission scenarios ([Nature](#), August 2022)

Scientifically rigorous guidance to policy makers on mitigation options for meeting the Paris Agreement long-term temperature goal requires an evaluation of long-term global-warming implications of greenhouse gas emissions pathways. This article employs a uniform and transparent methodology to evaluate Paris Agreement compatibility of influential institutional emission scenarios from the grey literature, including those from Shell, BP, and the International Energy Agency. By comparing a selection of these scenarios analyzed with this methodology to the Integrated Assessment Model scenarios assessed by the Intergovernmental Panel on Climate Change, this research harmonizes emissions to a consistent base-year and account for all greenhouse gases and aerosol precursor emissions, ensuring a self-consistent comparison of climate variables. An evaluation of peak and end-of-century temperatures is made, with both being relevant to the Paris Agreement goal. Of the scenarios assessed, it is found that only the IEA Net Zero 2050 scenario is aligned with the criteria for Paris Agreement consistency employed here.

Road Map Update for Carbon Capture, Utilization, and Storage Demonstration and Deployment in the People's Republic of China (ADB, August 2022)

China has made significant progress on the research and development of Carbon Capture, Utilization, and Storage (CCUS) technology and is carrying out several CCUS demonstration projects. By 2020, China has over 30 CCUS projects, with a cumulative CO₂ injection of 0.5 million-2 million tons. During the 13th FYP period, two post-combustion CO₂ capture pilot facilities were constructed: one by the Conch Group Baimashan Cement Plant and the other in China Resources Power Haifeng Power Plant. In China, the development momentum of CCUS is strong spanning from policies, technology, scale and competitiveness. However, obstacles to CCUS development include lack of regulatory and standards frameworks; concerns over leakage risk, safety, and liability; lack of public awareness; the absence of an evaluation system; knowledge gaps in relation to some core technologies; and the unbalanced development of the existing CCUS technology chain.

To achieve China's carbon peak target and carbon-neutrality vision, it is necessary to strengthen and accelerate the application range of CCUS from the coal chemical industry and thermal power plants to iron and steel, cement, hydrogen production, and other sectors. To further develop CCUS in China, the following principles are suggested:

- Through source and sink matching, identify priority areas and storage sites and early projects in CCUS technology development
- Further promote the application of enhanced oil recovery in the 14th Five-Year Plan period to drive the successful demonstration of capture projects
- Promote commercialization within 10–15 years through large-scale CCUS demonstration projects
- Accelerate infrastructure-sharing and promote CCUS clusters

Global coal demand is set to return to its all-time high in 2022 (IEA, July 2022)

Despite a slowing global economy and lockdowns in China, soaring natural gas prices following Russia's invasion of Ukraine are propping up the world's use of coal this year. Economic trends in China will determine whether global coal demand will increase in 2022. According to the IEA's July 2022 Coal Market Update, global coal consumption is forecast to rise by 0.7% in 2022 to 8 billion tons based on current economic and market trends, assuming the Chinese economy recovers as expected in the second half of the year. Based on the IEA's prediction, the global total would match its all-time peak reached in 2013, and coal demand is likely to increase further next year to a new all-time high. Moreover, thermal coal demand for power generation is expected to increase by 1% in 2022, considering that the developments in recent weeks suggest higher coal power generation in India and Europe.

Carbon Pricing, Clean Electricity Standards, and Clean Electricity Subsidies on the Path to Zero Emissions ([EPIC](#), July 2022)

This paper categorizes the primary incentive-based mechanisms under consideration for addressing greenhouse gas emissions from electricity generation—pricing carbon, setting intensity standards, and subsidizing clean energy—and compares their market outcomes under similar expansions of clean electricity generation. While pricing emissions gives strong incentives to first eliminate generation with the highest social cost, a clean energy standard incentivizes earliest phaseout of the generation with the highest private cost. The research shows that the importance of this distinction depends on the correlation between private costs and emissions rates, and then estimates this correlation for US electricity generation and fuel prices as of 2019. The results indicate that the emissions difference between a carbon tax and clean energy standard that phase out fossil fuel generation over the same timeframe may actually be quite small, though it depends on fossil fuel prices during the phaseout. This article also discusses how each of these policy options is likely to impact electricity prices, quantity demanded, government revenue, and economic efficiency. Large preexisting markups of retail electricity prices over marginal costs are likely to considerably weaken or even reverse the usual assumed efficiency advantage of carbon pricing policies over alternatives, including direct subsidization of clean electricity generation.



