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E-PAPER

Political Economy of Climate and Clean Energy in China

Opportunities and Limits of International Influence on the Chinese Emissions Pathway

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Abbreviations

BCA	border carbon adjustment
BRI	Belt and Road Initiative
CREA	Centre for Research on Energy and Clean Air
EU	European Union
FYP	Five-Year Plan
GDP	gross domestic product
Gt	gigaton
ICCSD	Institute of Climate Change and Sustainable Development
Mt	megaton
NDC	Nationally Determined Contribution
NDRC	National Development and Reform Commission
NEA	National Energy Association
SOE	state-owned enterprise

Foreword

China's emissions pathway during the coming decades is probably the single biggest factor in determining the achievability of the climate targets agreed in Paris, and henceforth the conditions for life on this planet for centuries to come. This fact is due to the still growing size of the Chinese economy and its carbon intensity, based on its reliance on coal to fuel the power system. Stating this fact means not deflecting historic responsibilities concerning a changing climate – a responsibility that lies overwhelmingly on European and North American countries. It simply pinpoints the common interest that Europe and the rest of the world have in the accelerated transition of China to a zero-carbon economy.

What are the recent trends and the underlying conditions and drivers of domestic political economy for Chinese ambition on climate action? And what role could Europe eventually play in encouraging Chinese climate ambition? These were the questions we asked our authors to answer in this paper.

«We aim to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060.» Xi Jinping's terse announcement on 22 September 2020 addressing the UN General Assembly took many by surprise (UN News, 2020). It changed the global climate outlook: Climate Action Tracker – the website translating climate action promised by countries' into global temperature rise – announced that this step alone would lower global warming projections by 0.2 to 0.3°C (Climate Action Tracker, 2020).

The analysis of the Centre for Research on Energy and Clean Air (CREA) was well underway when Xi's statement hit the news. It now includes a first analysis of the challenges this new target will entail for the Chinese economy, and in particular for the power sector. It clearly shows that greenhouse gas emissions will need to peak in China well before 2030 if it wants to avoid very disruptive and costly transitions from 2030 onward – transitions that even an authoritarian regime such as China may find very difficult to implement.

China faces the challenge of transitioning from several decades of growth – driven mainly by large-scale infrastructure investment and exports – to a development model based much more on domestic consumption. The interaction between this transition and climate policy will be critical. So far, the early signs of stimulus in reaction to the Covid-19 shock have not been encouraging. Let us hope that this changes now as a consequence of Xi's announcement in September 2020.

Europe's relations with China have become much more tense since Xi Jinping took the reins in China. The EU now describes China simultaneously as a cooperation and negotiating partner, an economic competitor, and a systemic rival (European Commission, 2019a). This makes Europe's interaction with China on climate change a complex and challenging task.

Clearly, both China and Europe share an interest in stabilising the climate, which is currently threatening to spiral out of control. But an interaction of the EU with China that is productive in terms of climate action must not necessarily be described with the term «cooperation». Sometimes competition – and even confrontation – might be part of the mix. What matters in the end is that both economies transition extremely rapidly to zero emissions. We hope that this paper contributes towards fostering a deeper understanding of the challenges and the potential of Chinese-European interaction in this transition.

Berlin, December 2020

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Abstract

After a worrying increase in coal consumption and CO_2 emissions in the past few years, the 2060 carbon neutrality announcement has changed both the longer-term outlook for China's emissions, and the dynamics of international climate diplomacy. Domestically, the near-term implications are more unclear, but at the very least it is an opportunity to turn around recent negative trends in emissions, energy policy, and investment.

To solidify the announced goal, priorities could include: securing the inclusion of the carbon neutrality target formally into China's international commitments; advocating for a strong scope, including non-CO_2 greenhouse gases – and robust accounting; bringing the targeted CO_2 peaking date forward and making the definition of «peak» more robust; and, naturally, strengthening the monitoring, reporting, and verification of emissions and progress. An alternative to bringing the CO_2 peaking date forward would be to introduce ambitious targets on the sectoral level – particularly for the power sector – in the near term.

Another important policy area is China's overseas energy investment and the Belt and Road Initiative (BRI). Chinese banks dominate the financing of coal-fired power projects in emerging economies – with the exception of India – shaping the energy systems of emerging countries. «Green BRI» and «green recovery» from the Covid-19 pandemic are themes brought up by General Secretary Xi Jinping, but so far they have not developed into tangible standards, criteria, or targets.

The 2060 announcement can also be seen as a demonstration that international pressure and reputation are important factors for Chinese leadership in the current tightened geopolitical situation, even if domestic considerations are the first priority. Effective international climate policy requires balancing co-operation, strategic competition, as well as the application of economic and diplomatic pressure when appropriate.

Besides China's announcement, carbon neutrality ambitions announced by Japan and South Korea as well as moves to reduce or restrict new coal power by Philippines, Bangladesh, and Vietnam open up a new dynamic in international climate policy. There remains a lot of room for negotiation in securing the formalisation of these announcements and defining their scope and level of ambition.

Introduction

The Paris Agreement in 2015 marked a shift in the international regime to address climate mitigation towards a more decentralised paradigm based on Nationally Determined Contributions (NDCs).

The Covid-19 pandemic persists in 2020, and the resulting economic fallout has substantially upended (Myllyvirta, 2020a) global emissions trends and will affect global energy demand long after growth returns to trend. China's industrial output appears to be snapping back much faster. Even so, there is a yawning gap between current climate pledges and the emissions pathways required to maintain the 2°C and 1.5°C targets (Bodnar et al., 2020; Evans, 2020).

The upcoming years till 2023 provide a time window for countries to ratchet up the national targets, given the climate imperative. For better or worse, the European Union (EU) serves as the benchmark for global ambitions with the 2050 carbon neutrality target and more ambitious commitments by some member states. China's pledge to aim for carbon neutrality by 2060, and similar announcements by Japan and South Korea, have significantly changed the dynamic around international climate diplomacy.

The pertinent facts about China's 2060 announcement, made by General Secretary Xi Jinping at the UN General Assembly, are that it was proactive, unilateral, surprising even to most domestic observers and stakeholders, and timed ahead of the US elections, where a Democratic administration with a strong mandate on climate already seemed the most likely outcome at the time. It was also accompanied by an emphasis on green recovery from the Covid-19 crisis.

Importantly, the announcement was very scant: Xi delivered one simple sentence: «We aim to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060.» This leaves all of the details around the scope and methodology of the target open to debate and refinement.

The way to measure the significance of the long term vision is to look at how it changes the policy actions in the short term. Domestically, China still depends heavily on its Five-Year Plan (FYP) regime to influence the economic outlook and guide policy development. The postponed COP26 means that China will finalise its domestic FYP (2021–2025) and the updated international NDC in parallel by 2021. With the tensions between the United States and China – as well as China and many of its neighbours – running high, climate policy has to be adapted to the wider geopolitical context.

In this short paper, we will document and analyse energy consumption, emissions, and investment trends against the NDC targets; provide an overview of the characteristics of

policy-making and investment in China; analyse the implications of China's new carbon neutrality goal for the upcoming NDC and FYP; assess how the decision-making will proceed on the practical level; plus explore the potential challenge of aligning the FYP with stringent climate constraints.

Based on the descriptive and interpretive information, our reflections will follow up in the last section on the possible influence that the EU can exert on China's decision-making and role in the global climate effort.

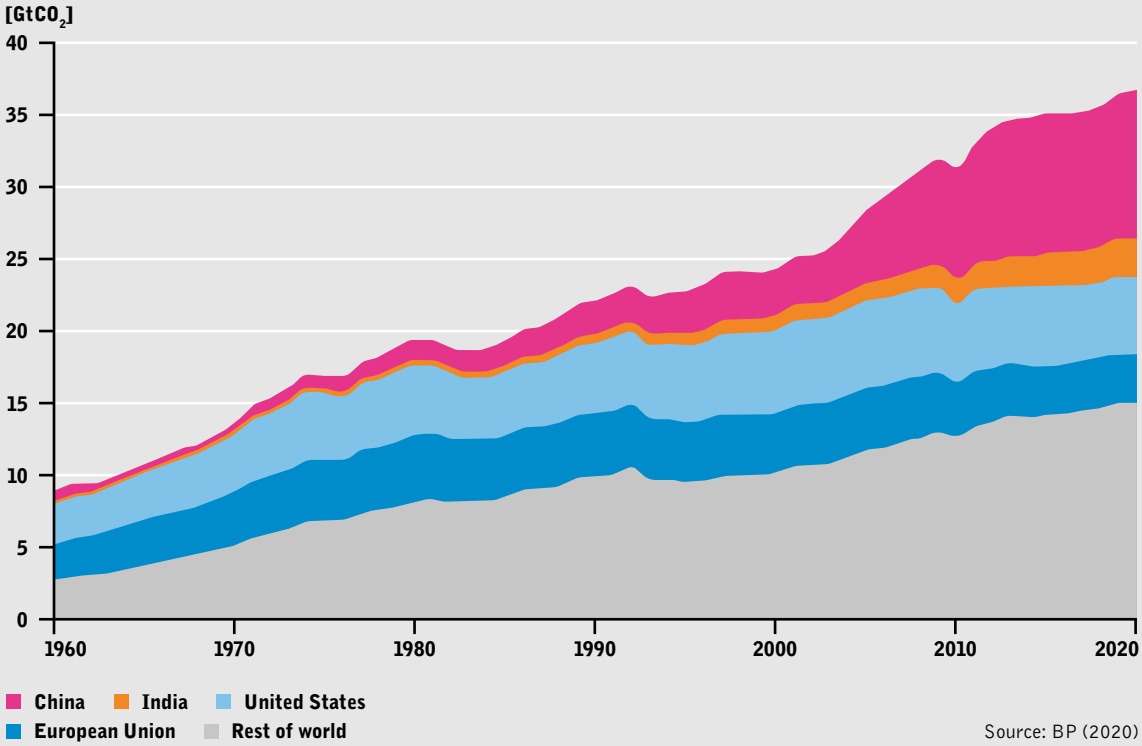
Wind turbines along a mountain ridge.

Update on China's Energy and Emissions Trends and Policies

Emissions trends to date

China's share of global emissions has increased rapidly, to more than a quarter in 2019 (Climate Action Tracker, n.d.), from less than 10% in 1990. Based on the Intergovernmental Panel on Climate Change default emission factors of coal, oil, and natural gas, our latest accounting shows that CO_2 emissions from China's energy sector has reached around 10 billion tons in 2019. Including cement adds approximately another 600 megatons (Mt) of fossil CO_2 emission.

Fig. 1: The CO2 emissions from fossil fuels in China have increased significantly,both in terms of absolute level and the share of the global total



Source: BP (2020)

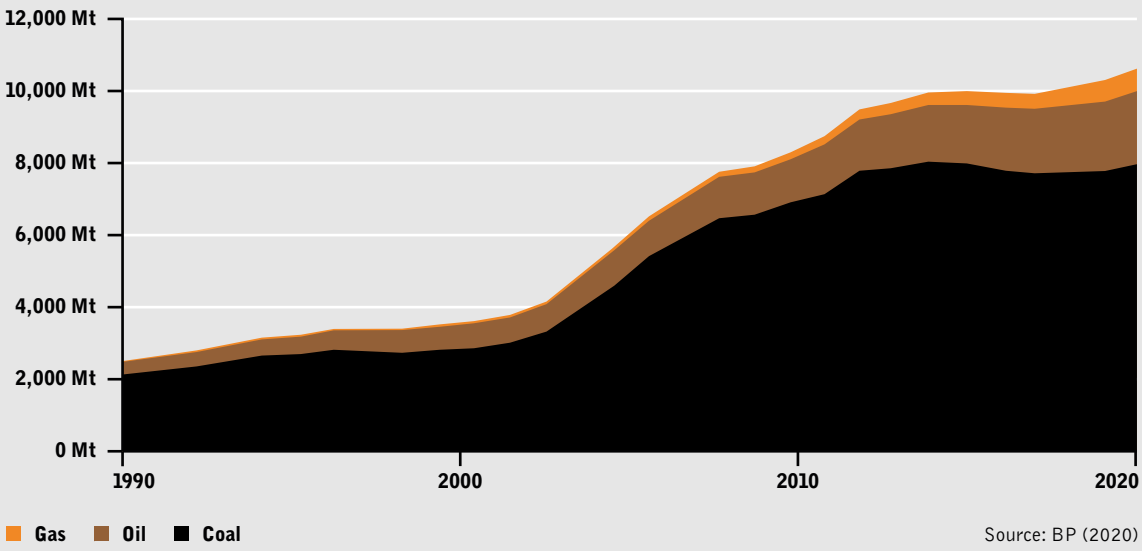
The increase in China's emissions was driven by the export and investment boom started with accession to the World Trade Organization in the early 2000s. This boom came to a head with the global financial crisis. In 2008 the leadership responded with an unprecedentedly large infrastructure stimulus programme that drove even larger emissions increases in the 2009–2012 period than had been the case during the preceding years. The stimulus marked the end of China's market- and export-driven growth period and made the economy increasingly reliant on government-driven spending for growth. This spending was

directed at the most energy-intensive parts of the economy – construction and heavy industry, particularly steel, cement, and other construction materials industry. This imbalance in the country's economic structure was already apparent and had been recognised by the Hu-Wen administration, which launched the stimulus.

When the effect of the stimulus programme started to wear off in 2013, coal, steel, and cement consumption began to fall. This fall was compounded by the war on corruption launched by Xi, curbing local government permits and enthusiasm for construction projects. The fall in heavy industry output also dragged down demand for diesel, slowing oil consumption growth.

The leadership's initial response to the slowdown of the industrial economy was to brand the changes as a part of an «Economic New Normal», in which household consumption, services, and high-value-added industries would become the key drivers of growth. This was also the time when General Secretary Xi and President Barack Obama announced the «climate deal» between the two countries – including China's CO_2 peaking commitment and paving the way for the Paris Agreement – and a time when the air pollution crisis dominated domestic headlines, creating a unique window of opportunity to limit coal consumption, at least in the more prosperous coastal areas.

Fig. 2: China's CO_2 emissions 1990–2019



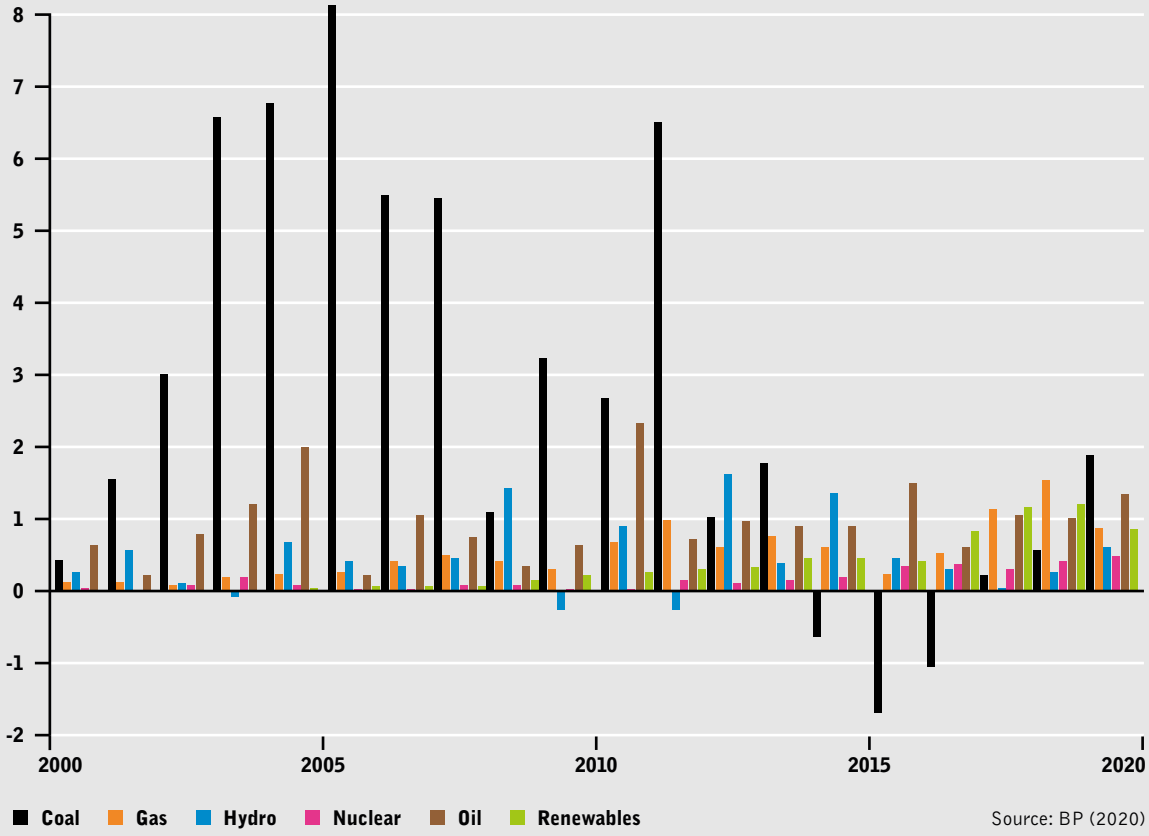
Source: BP (2020)

However, falling demand and prices for key commodities and heavy industry products led to major financial distress at state-owned enterprises (SOEs) towards the end of 2015, which was the point in time when the leadership's tone changed. A new wave of stimulus was launched in late 2015, operating mainly through state-owned, nominally commercial banks and enterprises. Problematically, this enormous wave of lending and construction projects was never formally announced in the way that the 2008 stimulus package was, and

therefore there was little space for discussion or policy directions about how the stimulus should be targeted. This stimulus-driven growth has continued to date, with steel consumption outpacing reported gross domestic product (GDP) growth, showing that the reliance on the construction-industrial complex has not ameliorated.

One notable thing about these swings in China's emissions trends is that clean energy growth was more or less a constant, whereas the economic policies and cycles were the driving factor. This emphasises the importance of China's economic model and policies going forward.

Fig. 3: Annual increase in primary energy consumption by source in Exajoule (EJ)



Source: BP (2020)

Energy investment developments

The return to emissions increases was mirrored by some worrying changes in policies. In 2018–2019, coal power projects that had earlier been suspended were reactivated, resulting in continued capacity additions. Tariffs for wind and solar projects and subsidies for electric vehicles were cut – a move that can be argued improves the long-term strength of the industries by promoting cost-competitiveness. Because of the rapid and steep nature of the cuts, they nevertheless resulted in a sharp drop in the market size at a time when electricity demand was rebounding.

The economic policy response to the Covid-19 pandemic has further increased the role of government-driven infrastructure, construction, and industrial projects in driving GDP growth. After the Covid-19 lockdowns ended, permitting for new coal power plants accelerated immediately, with more permits being handed out in the first half of 2020 than in all of 2018–2019 (Myllyvirta et al., 2020). Permitting had already resumed in the last quarter of 2019 as controls on coal power overcapacity were relaxed, in addition to the resumption of already permitted but suspended projects in years prior.

China's economic recovery since the Covid-19 lockdown has been driven by the construction and heavy industry sectors, which have rebounded much faster than the household consumption and service sectors. This is partially a natural result of the impact of restrictions and social distancing policies, but it has been exacerbated by the recovery policies of the government that have emphasised infrastructure construction and support to businesses, and by the modest support for household incomes and consumption.

As infrastructure investment is accelerated, a key instrument for directing that investment are the «major project lists» that every province publishes each year. CREA mapping of the project lists in the eight largest energy-consuming and -producing provinces found that provincial governments were still channelling three times more investment to fossil fuel projects than to clean energy (Myllyvirta and Yedan, 2020).

Along with the carbon neutrality announcement, the crucially important policy developments affecting the energy sector are the «energy security» emphasis, first articulated by Premier Li Keqiang in October 2019, and the «dual circulation» economic strategy, which is the major focus of the upcoming FYP. «Dual circulation», introduced by Xi in May, means that China should rely mainly on «internal circulation» – domestic production of goods and services for domestic consumption, investment, and exports – supported by innovation and upgrades in the economy. This is a major departure from the «rebalancing» and «New Normal» economic strategies introduced around 2012, which focused on boosting household consumption and reducing reliance on exports while accepting that this would mean more imports and a more balanced trade account.

Increased wariness of relying on imports is likely a result of the more hostile geopolitical and trade environment. The emphasis on domestic supply is good news for both the coal and clean energy industries with fully domestic supply chains, while the focus on import substitution should mean reducing reliance on oil and gas, as well as on coal imports, but it is giving a major boost to domestic coal mining, transport, and conversion projects.

NDC targets and progress to date

In China's NDC submitted in 2015, in the energy domain, China pledged to:

- peak CO_2 emissions by around 2030 and make best efforts to peak earlier,
- lower CO_2 emissions per unit of GDP by 60 to 65% from 2005 levels,
- increase the share of non-fossil energy sources (renewable and nuclear) in the energy mix to around 20% by 2030.

Table 1: Main economic and energy indicators till 2019/2020

	2005–2010	2010–2015	2015–2019
Real GDP growth, %/year	11.31%	7.87%	6.50%
Energy consumption growth, %/year	6.65%	3.58%	3.11%
Energy-intensity reduction	-19.15%	-18.42%	-12.90%
CO_2-intensity reduction	-21.88%	-20.00%	-20.00%

	2005	2010	2015	2019/2020
Non-fossil fuel share of primary energy	7.4%	9.4%	12.1%	15.7%
Non-fossil electricity share	18.0%	20.5%	26.7%	30.5%
Wind and solar share in electricity mix	0.0%	1.1%	3.9%	8.6%

Source: Authors' calculations based on China's yearbook, China's energy yearbook, and the electricity flash report by CEC by 2020, China

In sum, the NDC consists of targets on the total emission, emission intensity, and the share of non-fossil fuel. It was a follow-up of the 2009 Copenhagen COP meeting commitment. There, for the first time, China set quantitative targets on carbon intensity (-40 to -45%) and non-fossil fuel share (15% in energy mix by 2020).

For the first one, emission peaking is neither absolute nor relative to historic level. It can be judged precisely only ex post. That is, we can only assess whether this target was achieved well after 2030. Furthermore, if fossil fuel consumption continues to grow until 2030, the credibility of the commitment is undermined, given the inertia of the economic and energy systems.

There is a link between the carbon emissions intensity and the non-fossil energy target. The larger the share of non-fossil energy, the lower the carbon intensity of energy, although the mix of fossil fuels also plays a role. Zhang and Bauer (2013) analysed the interaction between carbon intensity of GDP, GDP energy elasticity coefficient, energy carbon intensity, and non-fossil energy share. The overall finding was that, in most cases, the realisation of the non-fossil energy target is a sufficient condition for other objectives, and thus the most ambitious one. The premise of this conclusion is that the proportion of coal in the mix of fossil energy must at least remain unchanged, if not decrease.

Taking 2005 as the base year, He (2019) estimated the progress of achieving the goals by 2018 and the prospect of achieving the goals by 2030. By the end of 2018, the CO_2 intensity of GDP had decreased by 48% compared with 2005. Based on the latest updated GDP, CO_2 intensity decreased by 47.2% in 2018 and 49% in 2019, according to the preliminary communique data in our calculation. This puts China well ahead of the targeted 60–65% reduction by 2030, with an extension of the current trend getting closer to 70%.

Similarly, the 15% target for the share of non-fossil energy in the primary energy mix in 2020 will be overachieved, with the share bound to reach 16% this year; the pledged 2030 target of 20% would allow the rate of non-fossil energy growth to slow substantially compared with the past decade. This is not an outcome anyone expects, so China is well ahead of this target as well.

Water being discharged from the Three Gorges Dam in central China's Hubei Province.

Energy Policy and Investment in China

Drivers of fossil fuel investment

Investment in coal power plants, the coal-to-chemicals industry, coal mines, and other types of infrastructure is very attractive to local governments because it not only creates economic activity and boosts GDP through construction, but also creates demand for locally mined coal and lowers the local coal price due to excess supply (Yang et al., 2019). Coal mining and other forms of resource extraction are attractive for local governments due to tax revenue and jobs created at local SOEs (Zhang et al., 2017). The opportunities for corruption associated with large infrastructure projects are also an important driver for local government officials (Zheng and Xiao, 2020).

Local governments are able to promote investment in excess capacity by offering free or heavily subsidised bank loans, land, water, and other inputs, due to soft budget constraints in the financial system and local utilities, as well as a lack of robust land and property rights (Geng et al., 2011).

SoEs are responsible for almost all of the investment in fossil fuel production and conversion, and for most investment in the energy-intensive industry. They enjoy preferential access to capital, soft budget constraints, and tolerance for low returns on assets, which allows them to prioritise market share and empire-building over profitability considerations. SoE manager performance is rated not only on profitability, but also on the amount of investment and output the company produces, with the latter collectively receiving more weight (Xin et al., 2019). Furthermore, SoEs are expected to serve government policy goals in addition to commercial goals, which gives them little say over investments promoted by the government.

China's major power utilities are diversified: They are both the world's largest coal power and renewable energy developers and operators. However, they tend to operate as loose corporations of different divisions and province-level entities, rather than as unified organisations with a coherent strategy. The thermal power and hydropower divisions are in most cases internally more powerful than the wind and solar divisions. Pure-play renewable energy companies tend to be privately owned, which puts them at a disadvantage vis-à-vis thermal power and hydropower equipment suppliers, which are state-owned.

It is important to note that in the Chinese economic system, capital is treated as being much more disposable than in market economies. There are numerous examples of coal-fired power plants, industrial plants, and other assets being abandoned or dismantled soon after construction without much ado. The banking system is designed to tolerate a large amount of non-performing loans and assets. Therefore, Chinese policy-makers are generally much less worried about stranded assets than their counterparts in other countries.

This does not mean that investment does not matter – it obviously does. A large asset base confers economic and political power and creates an incentive to oppose change and can therefore complicate the transition. However, a mechanistic reasoning that simply because a coal power plant or steel plant was built, it is going to be operated for decades at a high rate of utilisation, does not hold water.

On the other hand, as the factors enabling a very high level of investment in – and obsolescence of – fixed assets unravel in the coming decades, the «lock-in» in fossil fuel infrastructure could turn out to be a much larger problem than policy-makers currently anticipate.

Understanding energy policy and regulation in China

Deemed by some scholars as a fragmented authoritarian regime (Grünberg, 2017), China is «ruled by the division chiefs» (two levels lower than the ministerial level in the official hierarchy system) («处长治国», Chu Zhang Zhi Guo). That implies that – in China's bureaucratic administrative system, from division to bureau to ministry and the national level – mainly the division level conducts concrete policy design work, and all the layers above have the role of granting or denying approval as authoritative superiors, rather than dividing and sharing the effort.

In the case of economic, energy, and power sector management, the project approval authority «power» can either be designated to the professional ministries in the sectoral regime (e.g. National Energy Administration), or to the respective provincial government belonging to the regional hierarchy of the bureaucratic system. Such a «power» division is not stable or absolute. The central government has the «controlling power» to reverse decisions at lower hierarchical levels or change the rules at any time (Li and Zhou, 2005).

Take the approval of new coal power plants as an example. In previous years, before 2015, the National Energy Association (NEA) had been the agency to validate and approve projects in the pipeline. Due to severe corruption, this authority to select the «candidate» projects was distributed thereafter to the individual provinces. This is still a «formal» arrangement. Furthermore, many informal arrangements still exist to intervene, distort, or even overcome the decision derived from this formal rule.

Therefore, there are complex interactions between the central government, the local government, the SOEs either belonging to the central or local governments, and new renewable players including manufacturers, developers, and environmental advocates. The outcome may be unpredictable due to many specific factors, even on a case-by-case basis. A vast conflict of interests definitely exists but is seldom openly discussed.

A telling example is a coal power project in Henan province. First of all, it was halted at the command of the central government, represented by the National Development and

Reform Commission (NDRC)/NEA. But after some time, satellite imaging by an international observer revealed that the construction had been completed (Feng, 2018). After this finding, an informal query to the NDRC indicated that this project was given a «green light» later due to the changing electricity demand. The administrative process was continued, but not all of the decisions were publicly disclosed.

The various stakeholders, in our analysis, took supporting or opposing roles in this process, which we list in Table 2.

Table 2: The stakeholders in the policy process and their interactions with the case of approving coal power

Stakeholders	Role in the policy process	Incentives and constraints
State Council	Balance the interests of provinces; cares about the economy, employment, and international image. Worries about the excessive coal capacity.	Relies entirely on the lower government system to implement any changes. Few policy instruments beyond «command and control».
NDRC/NEA	Watchdog for the energy balance and economic health issues. Worries about excessive coal, but has strong ties to the corresponding divisions in local provinces and needs their cooperation.	Energy security and system adequacy Effective cooperation with provinces Personal promotion
SOEs of central government	Excessive capital owner, strongly pushing all kinds of projects to be built	Investment maximisation rather than profit maximisation
Local SOEs	Always with a huge excess labour force due to their policy role of maintaining and creating employment. Only survive with continuous investment.	Social stability tool Personal promotion
The renewable advocates	Fear of shrinking market for electricity and opposed to new coal investment	Greenhouse gas emissions and visibility
Public media	No independence generally as «news» providers	Self-sustaining and visibility

Source: Authors

It is evident that the policy process was «fragmented», non-uniform, even opaque in some cases. However, as a marginal change, China's policy-making since 2015, in our observation, has become more centralised and is prone to «authoritarianism».

How China's domestic policy-making has changed

In recent years, there have been examples in which less attention was paid to stakeholder opinions and seemingly arbitrary objectives were adopted using blunt enforcement. In the energy and environment domains, the examples include:

- Switching from small-scale coal use to gas and electricity in the residential sector, resulting in tens or hundreds of thousands of people lacking any kind of heating during cold weather in the winter of 2017–2018.[1]
- The abrupt change to cease subsidies for solar PV projects in 30 May 2018, causing an earthquake in the industry before the policy was withdrawn.

In our view, this change is a double-edged sword in terms of China's energy and climate ambitions. On one hand, it may eliminate, to some degree, the mode of «compromise» that prevailed before among varied stakeholders, which largely resulted in non-binding or low-ambition targets. It could be an opportunity for China to make decisions at a relatively high level and achieve ambitious targets without a complicated process. China's goal for carbon neutrality by 2060 is such an example. On the other hand, it means the quality of the decision-making can be compromised, leading to overreach or increased (hidden or even open) resistance to new policies.

1 *https://www.thepaper.cn/newsDetail_forward_1892650* (in Chinese).

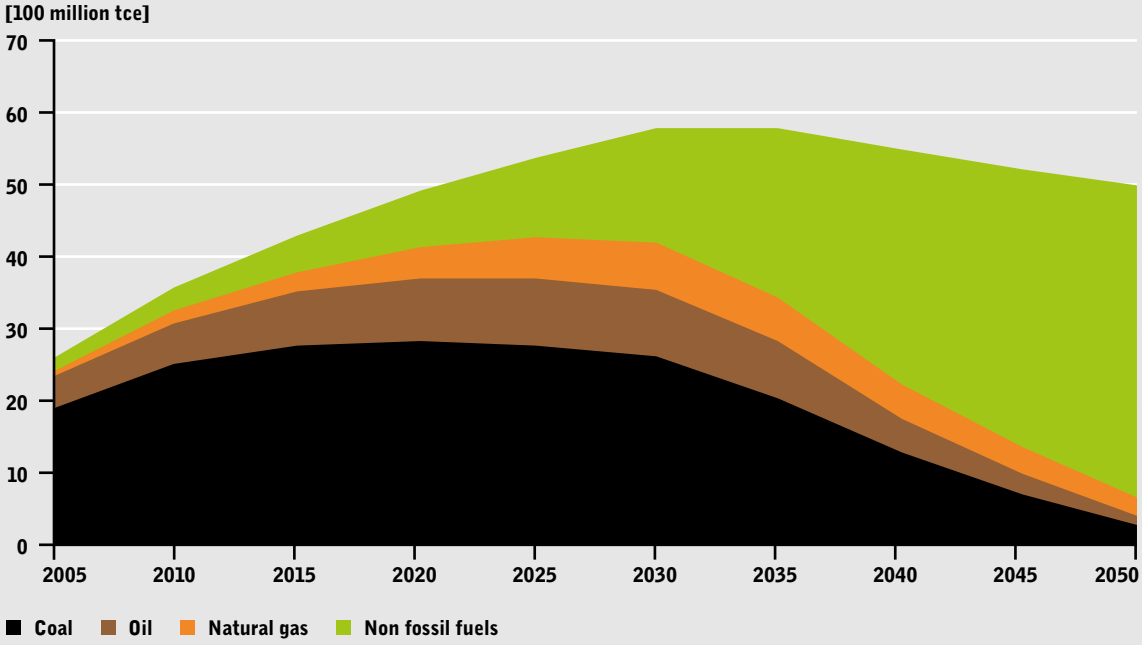
The 2060 Carbon Neutrality Goal and the New Five-Year Plan

How the 2060 announcement changed the energy outlook in China

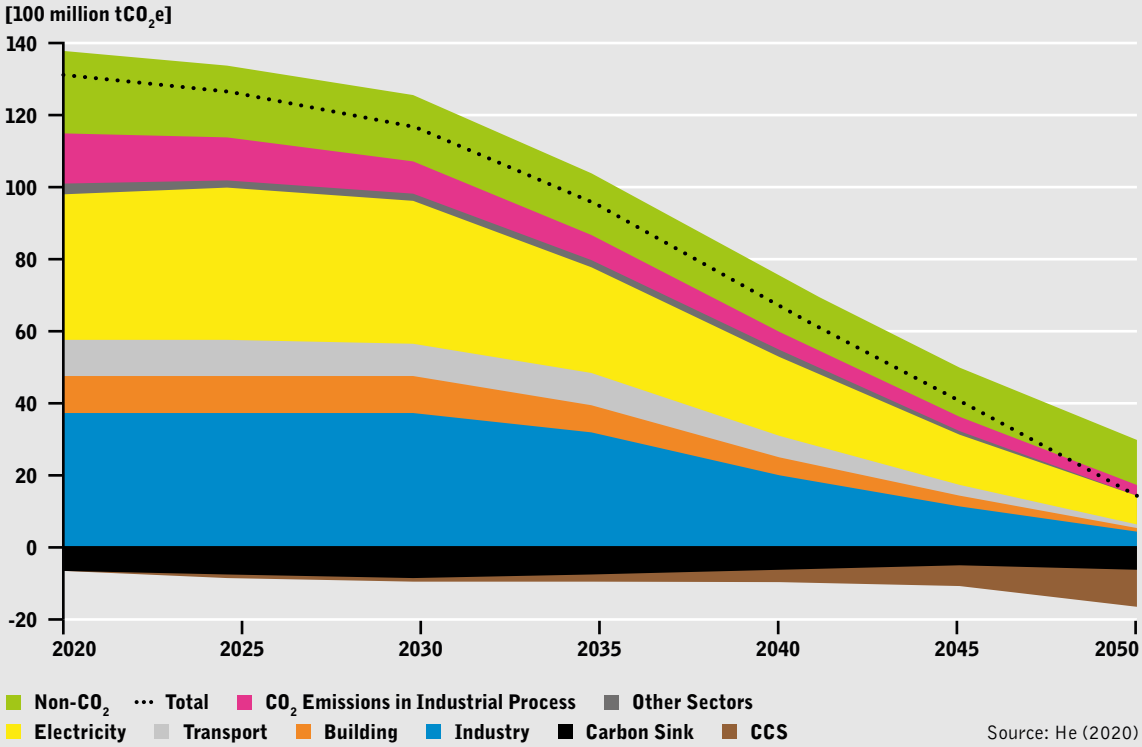
Given the recent emissions rebound and backpedalling on energy policies, the surprise announcement by General Secretary Xi can be interpreted both in light of domestic policy-making – injecting ambition into the five-year planning cycle – and international diplomacy and geopolitics. For the domestic energy outlook, the key immediate effects are:

- Before the announcement, there were no official targets or guidelines for the rate of emissions reductions after peak CO_2 emissions have been reached. Expectations were generally for a long plateau or slow decline of coal use, and especially of CO_2 emissions after 2030. The carbon neutrality target makes it clear that the country needs to achieve rapid emission cuts after the peak level of CO_2 emissions is reached.
- For the development of wind and solar power, the mantra was to keep the market and long-run expectations «stable», that is, maintain the same annual installation rates as in past years, with the implication that the record years were excessive. Now it is clear that wind and solar markets will need to grow fast in the 2020s to deliver rapid decarbonisation.
- The lack of clarity about long-term emissions targets suggested to some that a significant potential for fossil gas to help in long-term decarbonisation – shifting from coal to gas would make, say, an 80% emissions reduction easier to accomplish. However, the carbon neutrality target means that gas will need to be phased out too, limiting the potential role it could play in the transition.
- Electrification was already a major priority before the announcement, but it still received additional support. Ramping up non-fossil energy sources – with fully developed domestic supply chains – and limiting the role of oil and gas are also aligned with the economic policy priorities of the «dual circulation» approach, which emphasises reliance on domestic production and consumption.

Fig. 4: Evolution of primary energy demand by source and greenhouse gas emissions by sector under «1.5°C» scenario proposed by Tsinghua ICCSD researchers as the pathway to meet the 2060 carbon neutrality target



Total GHG emission and sources under the 1.5°C scenario



Source: He (2020)

unit: 100 million tCO_2e	2020	2030	2050
CO_2 emission in energy consumption	100.3	104.5	14.7
CO_2 emission in industrial process	13.2	8.8	2.5
Non CO_2 GHG emission	24.4	26.5	12.7
Agricultural and forestry sinks	-7.2	-9.1	-7.8
CCS + BECCS	0.0	-0.3	-8.8
Net Emissions	130.7	130.4	13.3

Translating the long-term ambition to targets for 2025 and 2030

Although the long-term implications are profound, the debate about how the 14th FYP targets should be adjusted is ongoing. The most obvious area of adjustment is non-fossil energy targets – the industry will have to grow dramatically over this decade to deliver the CO_2-free energy needed to meet the long-term target.

Before the 2060 announcement, coal power capacity targets in the FYP were expected to align with industry calls for 1,200–1,300 GW of coal-fired capacity by 2030, up from 1,060 GW currently and leaving space for another 200–300 new coal power units. The carbon neutrality target, according to researchers, means full decarbonisation of the power sector by 2050, meaning that even without any new additions beyond the plants that are already under construction, the average lifetime of the fleet will be limited to around 30 years. Any new projects initiated now will have, at most, 25 years of useful life. However, personal communication from the China Electricity Council – the power sector industry association – indicates that the organisation is still pushing for the same capacity targets, so this is an open question.

Projections and recommendations by the influential Tsinghua Institute for Climate Change and Sustainable Development (ICCSD) (He, 2020) and Energy Foundation China (2020) have provided metrics for what a relatively ambitious FYP might look like.

Looking at these targets one by one:

- Meeting the 20% non-fossil energy target that China pledged for 2030 only requires a very modest increase by 2025, as the share will already stand at 16% in 2020. A linear path to the 2030 pledge would imply a target of 18%, but that would mean substantially slowing down the rate of increase, which no one is expecting. At the same time, there might be reluctance to set targets above 20%, overshooting the Paris pledge. However, a linear path to the energy mix needed by 2050 would imply a level of 25% already by 2025.
- The total energy consumption target will largely be dictated by the GDP target, so it might not be a useful metric for climate ambitions. A high total energy target implies less confidence in economic transformation away from heavy industry, and maybe less attention on energy efficiency, but it directly translates into a larger required amount of non-fossil energy to meet a given target for the share of non-fossil energy sources.
- There have been calls for adopting an absolute emissions cap for 2025 in addition to the intensity reduction. This would fall short of moving the targeted peak date to 2025, but it would guard against some nightmare scenarios in which emissions keep

rising through the second half of the decade. Setting such a cap could be announced in the overarching plan.

– CO_2 intensity of GDP will have fallen by almost 20% in 2015–2020, after recording even larger increases of 21% and 22% in the earlier five-year periods. However, these reductions happened when reported GDP growth rates were very high. Particularly if there is no absolute emissions target, the CO_2-intensity target and the GDP target have to be assessed together. If the GDP target is set at 5.5%, a 20% intensity target will leave space for a 1%/year increase in CO_2 emissions. However, if the GDP target is set at 5%/year, the same target will only allow an increase of 0.4%, which will already bring emissions close to peaking by 2025. For a GDP target of 5.5%, a CO_2-intensity target of 22% would have the same implications for CO_2 emissions. If the GDP target is set relatively high at 6%, an intensity target of 20% would allow emissions to keep growing at the same rate as in 2015–2020, and an intensity target of 24% would be needed to substantially slow down emissions.

Table 3: Increase in CO_2 emissions from 2020 to 2025 under different GDP growth rates (annual increase) and CO_2-intensity reduction (total decrease over the five-year period) targets

GDP growth target (per year)	CO_2-intensity reduction from 2020 to 2025										
	15%	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%
5.0%	1.6%	1.4%	1.2%	0.9%	0.7%	0.4%	0.2%	-0.1%	-0.3%	-0.6%	-0.9%
5.5%	2.1%	1.9%	1.6%	1.4%	1.1%	0.9%	0.6%	0.4%	0.1%	-0.1%	-0.4%
6.0%	2.6%	2.4%	2.1%	1.9%	1.6%	1.4%	1.1%	0.9%	0.6%	0.3%	0.1%

Source: Authors

– Wind power capacity increased by almost 120 GW in the past five years, or 23 GW per year. Installation rates will need to triple to around 75 GW per year in 2025–2035 under the ICCSD projections, and more if hydropower and nuclear fall short of targets, as seems likely. This means that a wind power capacity target of around 500 GW for 2025 would put the country on a linear path; 350 GW would represent a «stable», or stagnant, market, and 400 GW a cautious growth path that would leave most of the heavy lifting to be done in the second half of the decade.

– Solar power capacity increased by around 200 GW in the past five years, or 40 GW per year. Installation rates will need to triple to more than 100 GW per year in 2025–2035 under the ICCSD projections. This means that a solar power capacity target of around 550–600 GW for 2025 would put the country on the right exponential growth path; 450 GW would represent a «stable», or stagnant, market, and 500 GW a cautious growth path.

– For nuclear, capacity additions will be modest in 2021–2025 because the country is falling far short of the target of having 30 GW of capacity under construction by the end of this year – projects missing that deadline are unlikely to get hooked up to the

grid by the end of the period. A new target for under construction capacity will give an indication of whether nuclear is seen as playing a significant role moving towards 2030.

– The ICCSD recommends targeting a 51% share of coal in the energy mix, down from 57% in 2020. This would be a continuation of the trend from 2015, when the share was 63%. EF China calls for a target of below 50%. A linear path to the 2050 energy mix projected by the ICCSD would imply a level of 48%, which would be a substantial acceleration.

The implications of the carbon neutrality target for wind and solar are dramatic, given that overall growth in non-fossil energy must accelerate, but nuclear power and large hydropower face an inevitable slowdown due to different factors – mainly the exhaustion of hydropower potential and the economic and institutional disadvantages affecting nuclear. Under the Tsinghua 3E projections, wind and solar power grow to more than 30% of total power generation by 2030.

Ambition gap?

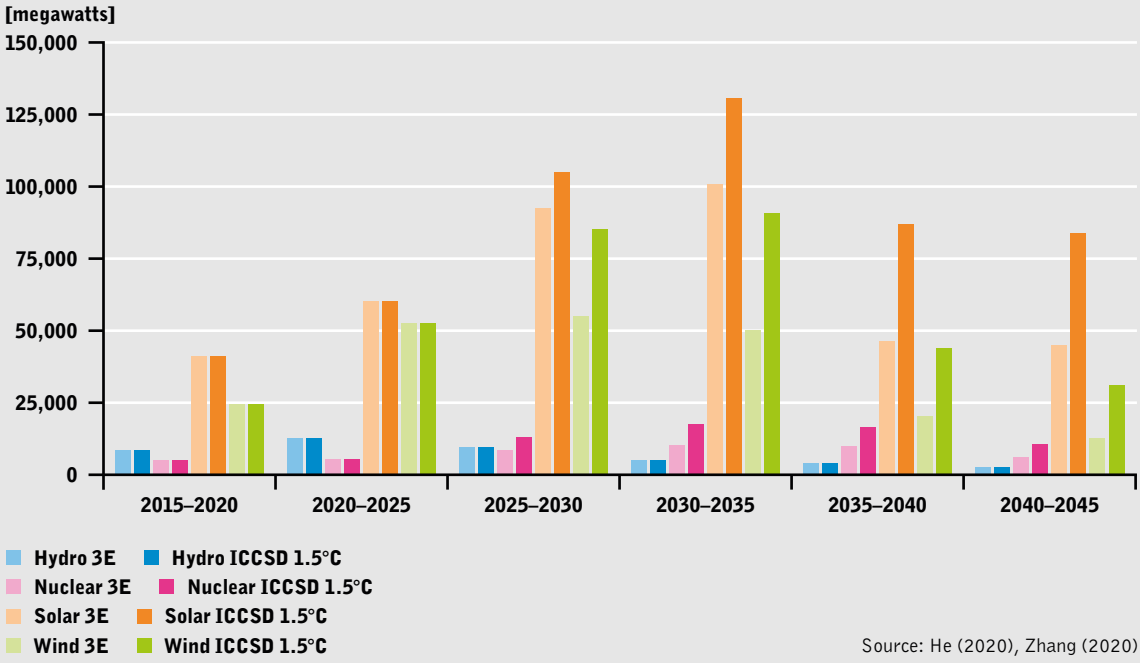
China's long-term goal is now broadly aligned with the Paris targets, but current 2030 targets are clearly insufficient to put the country on track to meeting them. It is evident in pathways proposed by researchers to meet the 2060 target that there is reluctance to go dramatically beyond the targets that China has pledged for 2030 as a part of its Paris NDC. For example, the targets proposed by the ICCSD would keep the rate of increase in the share of non-fossil energy at very close to current levels until 2030, after which it would have to triple in short order to get on track to the target. Similarly, the growth rate of CO_2 emissions would only slow down very modestly, from around 1.5% per year in 2015–2020 to 1% per year in 2020–2025, with growth coming to a halt in 2025–2030 and then going into a very steep decline.

In the best case, this only means higher cumulative emissions and undermines the credibility of the long-term goal during the coming decade; in the worst case, too much of the heavy lifting is left for later and the required emissions reduction rates prove to be unattainable.

The Chinese government has been prepared to upgrade the CO_2 peaking target to 2025 for at least a couple of years, but it has held onto this as a diplomatic negotiating chip. Now it appears that the current, relatively weak 2030 target has become a «trap» that limits near-term ambitions and makes achievement of the longer-term 2060 target much more difficult, because it would require a step change in a very short time. Getting the 2030 target upgraded through diplomacy should be a priority and should, in principle, be achievable, given that it is evidently in the interest of achieving a smoother transition to the emissions reduction rates required by the 2060 target.

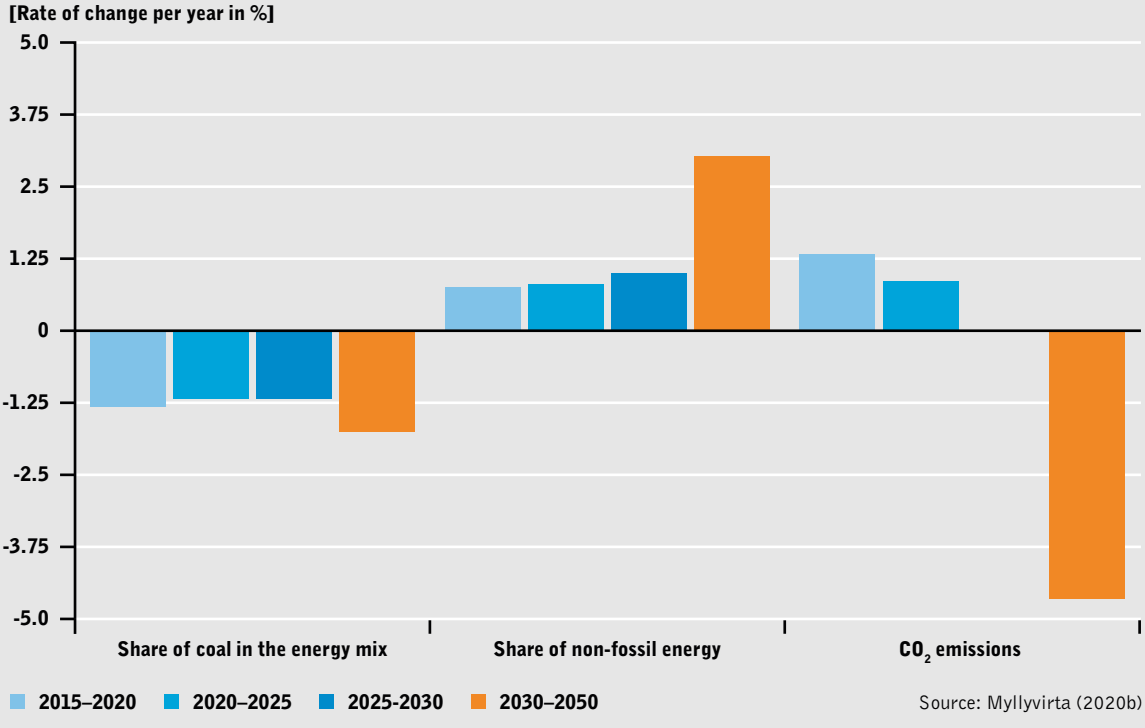
In the absence of an upgrade to the headline targets included in the NDC, setting stronger sectoral targets, such as targets for non-fossil power generation or wind and solar capacity targets, could be a way to align near-term energy plans with the CO_2 neutrality pathways without touching the higher-profile targets.

Fig. 5: Estimated rates of annual non-fossil generation capacity additions in two scenarios aiming to realise the 2060 carbon neutrality goal



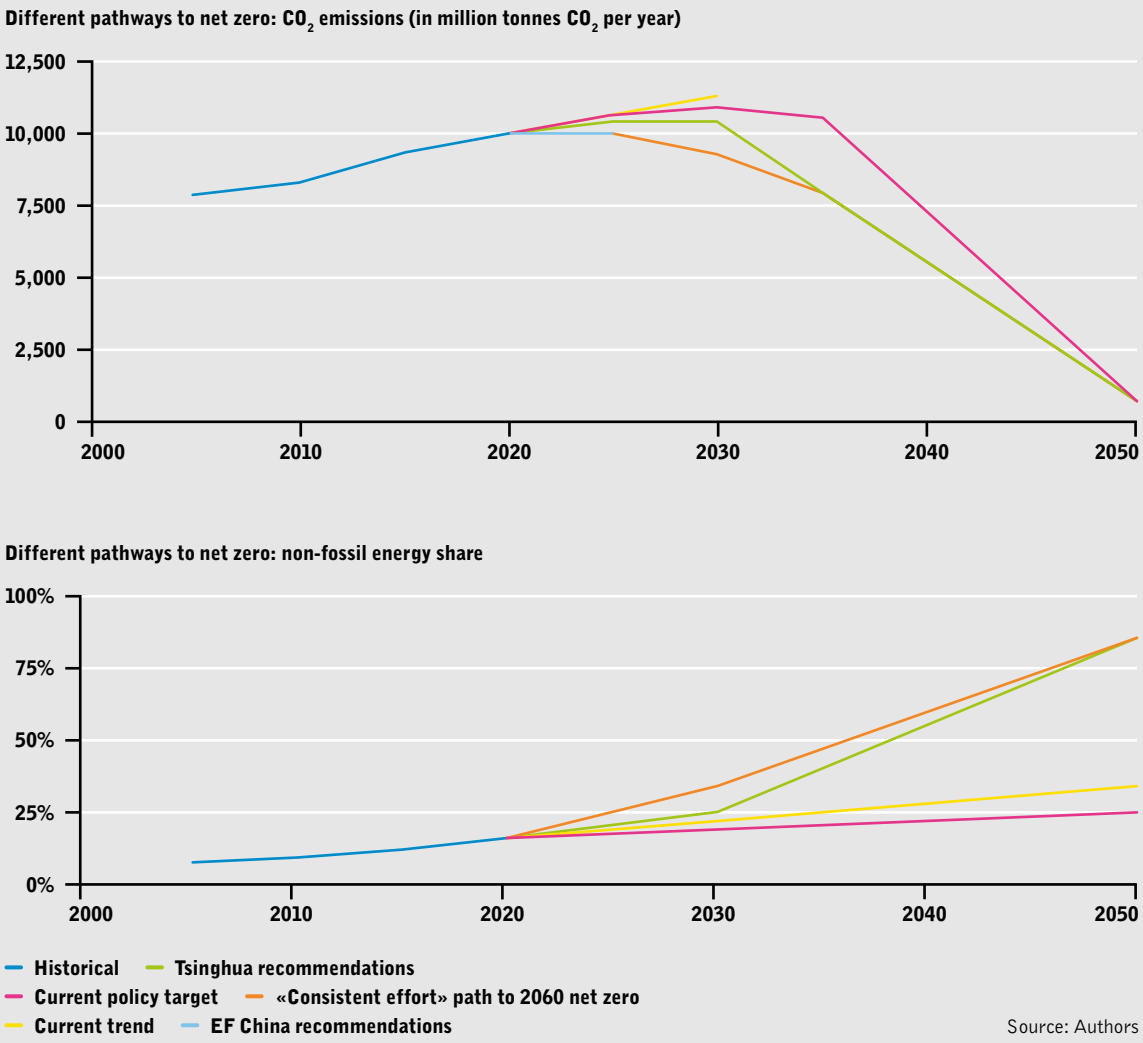
Source: He (2020), Zhang (2020)

Fig. 6: Comparison of the rates of change in three key metrics required by proposed targets before and after 2030
The ICCSD recommendations for 2025, 2030 and 2050 translated into annual rates of change and compared to the rates achievedin the current five-year plan period, from 2015 to 2020.



Source: Myllyvirta (2020b)

Fig. 7: Pathways to energy sector's net CO_2 emissions and the non-fossil energy share required in 2050, according to Tsinghua ICCSD, following different pathways.
The «consistent effort» pathway for CO_2 emissions is a pathway that minimises the change in trend between five-year periods while assuming a maximum rate of emissions reductions equal to the ICCSD pathway



Source: Authors

The 14th Five-Year Plan process

The level of ambition until 2025 will be set by the 14th FYP documents that are currently under preparation. Following the regular five-year planning cycle, the overarching FYP on economic and social development will be published and adopted at the «twin meetings» of China's legislature in March 2021. This overarching plan will be followed by detailed sectoral plans, including ones for energy, electricity, renewables, and climate later in the year (during the previous round, the key sectoral plans were published in December 2016). The provincial governments follow the same cycle, publishing their top-level plans in March 2021.

The key targets that will set the pace for energy policy and investments until 2025 include the GDP growth target, CO_2 intensity, shares of non-fossil energy, coal, and gas in the energy mix, and capacity targets for different power generation technologies.

The GDP target will determine the space that policy-makers have available to pursue «high-quality» growth as opposed to «high-quantity» or fast-paced growth. Shifting the emphasis to quality has been a key part of the rhetoric since the 2017 Party Congress, but in reality, the preparedness to compromise on quantity has been limited in the short term. The sectoral plans will be finalised by summer 2021 for publication towards the end of the year; most of them are currently in the process of stakeholder consultations, preparation of preliminary drafts, or preparation of revised interim versions.

The Central Committee held its 5th plenum at the end of October 2020 and issued «recommendations» for the upcoming FYP.[2] The recommendations include formulating an action plan for peaking carbon emissions before 2030. This is likely to be a major policy under the environment ministry, and it means translating Xi's announcement of peaking «before» 2030 (instead of «around») into targets and policies. The recommendations call for an earlier emissions peak in jurisdictions where conditions permit. This likely refers to key cities, such as provincial capitals, nationwide.

It is not very ambitious, as many have already peaked, and large cities with more diversified economies naturally have to peak earlier. But politically it is significant that important urban economies are leading, creating a group of front-runners. It is also possible that more detailed targets and plans will be issued that are focused on 2035. The Central Committee plenum introduced a target of declining CO_2 emissions into the 2035 modernisation vision, a centrepiece policy of Xi. This could indicate the preparation of a new long-term energy strategy and CO_2 emissions targets up to 2035.

Comparing the current announcements to the previous FYP cycle, China revealed the Paris NDC in June 2015, ahead of the publication of the previous FYP in March 2016. Key energy FYP documents were released in December 2016 and were already able to incorporate the new targets. These included the FYPs on energy and electricity, as well as a document entitled «Energy Revolution Strategy 2016–2030». This document set a goal of non-fossil electricity reaching 50% of total power generation in 2030 – arguably a more ambitious target than the 20% share in total primary energy by 2030 pledged in the NDC. There is now a window of opportunity to follow the same process after the 2060 announcement.

2 *http://www.gov.cn/zhengce/2020-11/03/content_5556991.htm* (in Chinese).

Table 4: Energy-related targets in the 13th FYP documents

Target	FYP document	First document to include target
Non-fossil energy share in total energy	Economic and social (Mar 2016)	National Plan on Climate Change (Sep 2014)[3]
Non-fossil energy share in power generation	Energy (Dec 2016)[4]	
CO_2-intensity reduction	Energy (Dec 2016)	National Plan on Climate Change (Sep 2014)
Energy-intensity reduction	Energy (Dec 2016)	National Plan on Climate Change (Sep 2014)
Total energy consumption	Economic and social (Mar 2016)	National Plan on Climate Change (Sep 2014)
Share of coal in the total energy mix	Energy (Dec 2016)	
Total coal consumption	Energy (Dec 2016)	National Plan on Climate Change (19 Sep 2014)
Coal power capacity control target	Energy (Dec 2016)	
Wind, solar, hydro, etc. capacity	Energy (Dec 2016)	Renewable energy draft FYP for comments (Jan 2016, targets were downgraded from this proposal)

Source: Authors, based on official documents

Table 5: Progress towards targets set in the 13th FYP by 2019

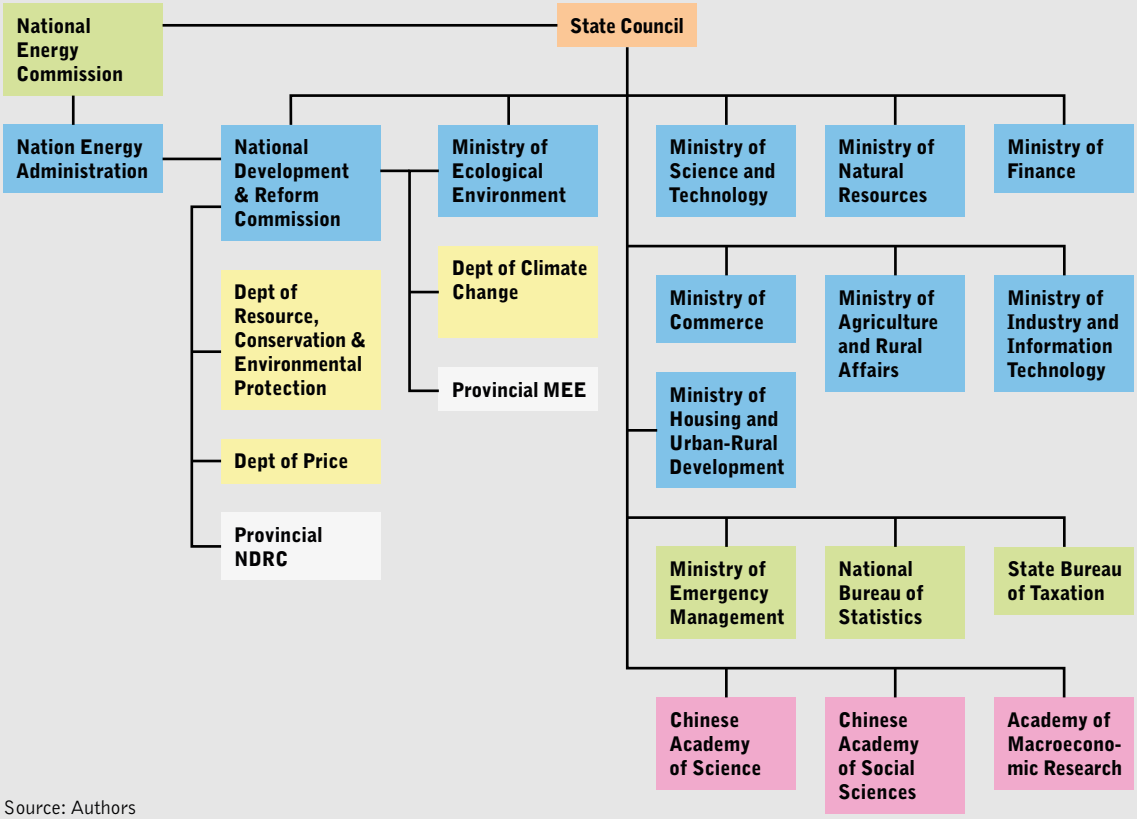
Category	Index	Unit	2015	2019	2020(exp.)	attribute
Total energy	Total primary energy production	Billion tec	3.62	3.97	4	Indicative
	Total installed power capacity	TW	1.53	2.01	2	Indicative
	Total energy consumption	Billion tec	4.3	4.86	<5	Indicative
	Total coal consumption	Billion ton coal	3.96	3.93	4.1	Indicative
	Electricity consumption	TWh	5690	7230	6800–7200	Indicative
Energy security	Self-sufficiency rate	%	84	81.7	>80	Indicative
Energy structure	Non-fossil energy installed capacity	%	35	40.8	39	Indicative
	Non-fossil power share in power mix	%	27	31.1	31	Indicative
	Share of non-fossil energy	%	12	15	15	Mandatory
	Gas share in energy mix	%	5.9	8.4	10	Indicative
	Coal share in energy mix	%	64	57.7	58	Mandatory
	Power coal share	%	49	49.9	55	Indicative
Energy effiency	Energy intensity of GDP	%		-17.8	-15	Mandatory
	Coal consumption of coal power unit	gec/kWh	318	306.9	<310	Mandatory
	Grid loss rate	%	6.64	5.9	<6.5	Indicative
Energy environ-ment	Carbon intensity of GDP	%		-18.4	-18	Mandatory

Source: Authors

3 *http://www.scio.gov.cn/xwfbh/xwbfbh/wqfbh/33978/35364/xgzc35370/Document/1514527/1514527.htm* (in Chinese).

4 *http://www.gov.cn/xinwen/2017-01/17/5160588/files/595b9ac5f61d46c4828b99404578eba5.pdf* (in Chinese).

Fig. 8: China's energy-related government bodies



Source: Authors

Opportunities for Europe to Influence Chinese Decision-making and Trends

The EU, as a major international power based on rule of law (Sinn, 2020), is de facto the leader of the climate change battle after the US withdrawal (Fischer, 2020). Even if the United States rejoins the Paris Agreement in a Joe Biden presidency, its ability to act will be restricted by obstructionist politics in Congress (Tooze, 2020). The EU increasingly identifies China as a competitor and a rival, while energy and climate issues remain an area where the two sides can partner, inspire each other, and reach possible compromise.

Effective climate policy is not a choice between «soft» or «hard» approaches but requires balancing co-operation, strategic competition as well as the application of economic and diplomatic pressure when appropriate.

Diplomatic priorities

An entire new space for negotiations has been opened up by recent announcements of carbon neutrality targets by Japan, South Korea, the EU, and China, along with a moratorium on new coal power projects in the Philippines, reports that Bangladesh and Vietnam are considering a similar move, and the Biden-Harris administration coming in with a strong climate platform that includes 2050 carbon neutrality. India will also need to present an updated NDC. In all these countries, the new policies and targets face substantial domestic resistance, especially when the time comes to translate them into targets for the next 10 years. There remains a lot of room for negotiation in securing the formalisation of these announcements and defining their scope and level of ambition, which opens up a new dynamic in international climate policy.

Diplomatic priorities could include: securing the inclusion of the carbon neutrality target into the updated NDC; advocating for a strong scope, including non-CO_2 greenhouse gases – and robust accounting; bringing the targeted CO_2 peaking date forward and making the definition of «peak» more robust; and, naturally, strengthening monitoring, reporting, and verification. An alternative to bringing the CO_2 peaking date forward would be to introduce ambitious targets on the sectoral level, particularly for the power sector, in the near term.

Opportunities for EU-China climate collaboration

It is definitely necessary for the governments of the EU and China to exchange best practices on energy and environment governance. As the EU aims for carbon neutrality a decade ahead of China, the block will confront many of the challenges associated with deep

decarbonisation in advance of China, creating an opportunity to share and market technical solutions as well as social and regulatory innovations, and establish standards and regulatory frameworks. Relevant areas include:

- power grid and energy system integration, including flexibility, storage, and hydrogen, building on the new EU strategies adopted in 2019 (European Commission, 2019b);
- solutions for industrial processes, agriculture, aviation, and other sectors where zero emissions technologies are not yet mature or fully commercialized;
- accounting, monitoring, and regulation for sinks and negative emissions technologies;
- roadmap towards carbon neutrality and overarching policy design;
- capacity-building to consolidate the data availability, uniformity, and transparency to facilitate international exchange and comparison;
- exchange and cooperation on a «Just Transition», especially for coal and coal power sectors, to make sure the transition is manageable for regional economies and workers; and
- design, standards, and regulation of carbon-trading system.

Collaboration can take the form of anything from informal exchanges to formal capacity-building programmes or agreements to harmonise certain areas of regulation or standards, for example around carbon trading.

Last but not least, the «moral suasion» and the «force of example» (榜样的力量是无穷的, bangyang de liliang shi wuqiong de) can still play a role in the climate domain. The Chinese leadership is unlikely to push through with the required changes to the energy system and the economy without having the example of at least some developed economies to point to, and the United Kingdom and Germany, in particular, are industrial powers that Chinese planners continue to use as benchmarks.

The shape of the emissions pathway to reach carbon neutrality is one key area where the EU and member states should lead by example – the temptation to «backload» emissions cuts to the coming decades is universal, and the EU should be vocal about the need to adopt linear pathways or emissions targets to ensure the feasibility and credibility of the long-term goals.

Strategic competition

China's strength as an international actor is its ability to coordinate across policy areas and leverage its entire economy to either grant or deny market access, mobilise finance, import and export deals, in addition to other moves both by the states and by nominally commercial actors such as state-owned banks and enterprises, in support of diplomatic and policy goals. This is compounded by the country's ability and willingness to take highly intrusive and costly measures to win even symbolic disputes.

At the same time, China is eager to cast itself as an important contributor or even a leader in addressing climate change and other global issues, which was one likely motivation among others for the country to make the carbon neutrality announcement.

The EU is China's largest trading partner, and therefore access to the single market is a major leverage for the EU. We believe that if the EU, as the world's largest single market and strongest diplomatic actor engaged on climate, can make the demand of Paris-aligned emissions targets and commitments a central part of all diplomacy and decision-making towards its counterparts, including issues such as trade, market access, and security, it has the potential to influence China and other players far more effectively. The environmentally damaging subsidies enjoyed by fossil fuel and heavy industry SoEs in China are a genuine trade issue, so this is a genuine synergy between Europe's priorities on trade and climate.

Lack of visibility into China's rapidly shifting emissions patterns and related policies hampers the ability of the EU to effectively exert pressure on the country. If the EU or major EU countries want to pursue a more confrontational approach to China on climate, establishing independent benchmarks for emissions reductions, the realised and planned investment and development of energy and heavy industry capacity will be key, as currently the only benchmarks are the pledges that China has made, which are unambitious even in relative terms. Independent monitoring of energy, investment, and emissions trends to track progress towards those benchmarks will be required, as currently information on CO_2 emissions trends is only available with a long delay, and the reliability of the data is questionable.

In July 2020, the EU decided to design an enforceable border carbon adjustment (BCA) programme by 2021, and to put it into operation starting in 2023.[5] The BCAs, if designed carefully, can potentially work as leverage to promote cooperation in the energy and climate realm (Helm et al., 2012; Nordhaus, 2015).

5 Previously, the inclusion of aviation from and to the EU in the EU Emissions Trading System was similar. It was halted after strong international objections and up to the opt-out option in 2023.

It is important to prepare and maintain the option of imposing countervailing tariffs in case China's progress falls behind targets and/or the country fails to institute a meaningful carbon price signal. This would mean both having a credible carbon-trading system in place – covering the power sector and industrial sectors with the largest emissions – and moving to a system that genuinely puts a price on carbon, away from the current plan for an intensity-based model that rewards marginally more efficient coal plants, but does not create an incentive to cut back on coal-fired power generation, severely compromising the potential for the scheme to reduce emissions.

The BCA should be seen as a negotiating tool rather than an effective policy in and by itself, as the emissions benefits of imposing a BCA are questionable at best.

Having its economic system recognised as market-based in the World Trade Organization context remains a prized diplomatic goal for China. By any objective criterion, there is a very long way to go to eliminate trade-distorting subsidies enjoyed by industrial firms in China, but this is an area where the EU could articulate clear milestones, emphasising the removal of environmentally damaging subsidies and structural advantages.

BRI and third countries

Another important policy area is China's overseas energy investment and the Belt and Road Initiative. Chinese banks dominate the financing of coal-fired power projects in emerging economies – with the exception of India – shaping the energy system of emerging countries. «Green BRI» and «green recovery» from the Covid-19 pandemic are themes brought up by Xi, but so far they have not developed into tangible standards, criteria, or targets.

Although the bias towards coal and fossil fuel projects in Chinese overseas financing is a climate issue, the financing often responds to real unmet needs for energy sector infrastructure. It is therefore important for the EU and other international financiers to develop alternatives to BRI financing to reduce the leverage that Chinese financing can exert on third countries – or partnerships where BRI financing flows to clean energy projects.

International dimensions of the 2060 announcement

Before the 2060 announcement, the first and the last time that Xi made an important overture on climate was the Obama-Xi deal in 2014. This was a time when emissions were declining and clean energy was gaining rapidly in China. After the Trump administration removed climate from the agenda for the bilateral relationship between China and the United States, there was little progress on targets and a lot of backsliding on emissions and policies on clean energy and coal. Much of this had to do with domestic developments, but it still seems significant that the next big international announcement came right ahead of

a potential Democratic presidency, which would put climate back on the agenda and open up the prospect of the United States and the EU building a coalition to put pressure on others, above all on China.

Although there clearly are strong domestic reasons to target carbon neutrality, the timing of the announcement can be seen as evidence that a hawkish approach works: it came at a time of worsened perception of China internationally and the threat of the United States and the EU working together to put pressure on China. At the very least, it is evidence that major progress on climate can happen in spite of increasing conflicts and disagreements on other policy areas.

Even if the decision to set a carbon neutrality target was driven by domestic considerations, it likely was important for Xi to be seen as leading – rather than caving to – pressure from the developed world when making the move. The timing might even enable Xi to turn the tables and be in a position to pressure the United States and take credit for new US pledges and policy.

Aerial view of a photovoltaic power generation project on barren hills at Chaoyang village in Linyi, Shandong Province of China.

Conclusions

China's new long-term goal, a more proactive posture in international climate policy, and positive moves from multiple other Asian countries represent an enormous opportunity. At the same time, the threat of another decade of rising emissions from China remains, and the urgency of peaking global emissions only increases.

As we have seen, China's policy-making has become more top-down, likely making the outcomes harder to predict and creating both opportunities to overcome inertia and risks of sudden changes. This makes a cool-headed evaluation of energy and emissions dynamics and political signals even more important.

The EU and major EU member states need a clear strategy that is prepared to utilise all options for leverage – both «soft» and «hard», and both inside and outside the climate policy envelope – to create an incentive for China to align its policies with the need for global emissions to peak rapidly. At the same time, the spread of «net zero» commitments around the world has shown the power of example, and realising the EU's own carbon neutrality vision will both provide the leadership and example as well as establish and demonstrate many of the technical, regulatory, and societal solutions that are required to pave the way for China's vision of carbon neutrality.

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