



# CHINA'S COURSE TO CARBON NEUTRALITY: Navigating the Decisive Decade

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## INTRODUCTION: WEAVING CHINA'S CLIMATE POLICY TAPESTRY

China is in the midst of a wholesale economic transformation, driven by the central government's pursuit of sustainability in all its forms: economic, social, and environmental. At the heart of this transformation sit Xi Jinping's "dual carbon" targets: one to peak emissions before 2030, and the other to achieve carbon neutrality before 2060.

However, such straightforward guiding targets belie the monumental complexity of unraveling and then rebuilding the fossil fuel-driven economy that enabled China's rapid rise as a global economic power. The difficulties of moving China's economy up the value chain – particularly from low-grade, emissions-intensive industrial manufacturing toward high value-add, green and low-carbon production – are compounded by the immense political frictions posed by entrenched interests and bureaucratic inertia.

In this context, it is imperative for observers – particularly those keen on *engaging* with China during its grand green transformation experiment – to understand the many pieces, players, and problems involved. To this end, this report takes stock of China's planning and reform efforts across the domains of climate, energy, and industrial upgrading since the 14th Five-Year Plan (2021–2025) was adopted. It then assesses the key drivers and constraints shaping these efforts, with the aim of elucidating the most likely path ahead – even as Beijing itself continues to map it out.

### 1.1 A strategic shift from growth to sustainability

In September 2020, Xi Jinping took to the world stage – the United Nations General Assembly – to announce China's dual carbon targets:<sup>1</sup>

- To achieve peak carbon emissions before 2030
- To achieve carbon neutrality before 2060

Xi's announcement followed nearly a decade of rising political focus on environmental protection, starting with China's first-ever binding energy efficiency targets in 2011. Xi

himself has promoted green development since coming to power in 2012, though primarily with an eye to combating local pollution. Under this paradigm, environmental policy was politically distinct from – and subordinate to – economic policy.

Xi's dual carbon targets, however, heralded a striking new policymaking paradigm, under which "green" fully expanded to include "low-carbon" development, and decarbonization became a pillar of both soft power and economic strategy. With the dual carbon targets, China increased its climate ambitions beyond its nationally determined con-

Coal-fired power station and wind turbines in the distance. Owngarden/Getty Images.

## The question now is how well China's long-term climate goals can withstand countervailing short-term economic pressures.

tributions under the Paris Agreement – and prompted successive net zero commitments from Japan and the Republic of Korea. Meanwhile, Xi's carbon neutrality commitment was the first from any major developing economy, a highly symbolic status that earned China goodwill amid waning international faith in the global climate governance regime.

But the targets were even more impactful at home. Xi's targets signaled to China's vast bureaucracy a fundamental shift in long-term economic strategy: namely, from a growth-centric, GDP-maximizing approach to a more holistic pursuit of sustainability in all its forms – economic, social, *and* environmental. Accordingly, China's decarbonization commitments are now bedrock pillars of national, provincial, and local policymaking in virtually every domain.

For the global climate outlook, the question now is how well China's long-term climate goals can withstand countervailing short-term economic pressures.

### 1.2 Starting to codify a sustainability-oriented economic model

In March 2021, the annual Two Sessions meetings of China's major political bodies approved the 14th Five-Year Plan (FYP) (2021–2025) – or, more precisely, its outline, a 148-page document that provides binding headline targets, along with nonbinding guidance to support their achievement. Building on the outline are myriad sectoral FYPs – still being gradually released in 2022 – that provide both binding and nonbinding targets to support China's 2025 targets.

Among much else, the 14th FYP outline codifies six broad goals to establish a holistically sustainable economic model:

- Move the economy up the value chain

- Increase economic self-reliance
- Improve energy security, both through source diversification and increased self-sufficiency
- Gradually decarbonize the energy system
- Increase domestic production efficiency
- Decrease the environmental impacts of industrial production

Most importantly from a climate perspective, the 14th FYP outline establishes two binding targets for fulfillment by 2025:<sup>2</sup>

- To reduce carbon dioxide emissions per unit GDP by 18 percent compared to 2020
- To reduce energy consumption per unit GDP by 13.5 percent compared to 2020

In addition, the outline issues a nonbinding target to increase non fossil energy sources' proportion of the energy mix to 20 percent, compared to 15.9 percent in 2020 – signaling to local policymakers that binding targets are on the way and providing time to prepare. This target builds on China's "dual control" mechanism, launched in 2016, which limits energy intensity and total energy consumption. Where "dual control" treats energy as a proxy for carbon emissions, contemporary policymaking – like greening the electricity mix – is increasingly focused on direct decarbonization.

Finally, on the industrial policy front, the 14th FYP outline codifies the move toward a more sustainable economic model by calling for:

- Seven percent growth in R&D across heavy industries, petrochemicals, and other resource-intensive sectors, with a specific eye toward increasing efficiency and reducing resource intensity

**Notably, the 14th FYP outline does not include a hard cap on total emissions. Nor do we expect such a cap to be forthcoming, given Beijing's energy security concerns.**

- Reduced environmental impacts from industry
- Reduced energy and emissions intensity across value chains

Notably, the 14th FYP outline does *not* include a hard cap on total emissions. Nor do we expect such a cap to be forthcoming, given Beijing's energy security concerns (see section 2.1 and the case studies in section 3).

The 14th FYP outline also lacks a cap on total energy production, which *had* featured in previous FYPs. Presumably, the target was dropped in part due to Beijing's reluctance to contain its envisioned post-COVID economic recovery. But its disappearance also aligns with Beijing's sustainability-oriented economic strategy: Rather than cut energy production outright, *decarbonize* energy and remove the trade-off. This is critical because, to decarbonize heavy industry, transportation, and buildings, China needs to go all-in on electrification, which will dramatically expand electricity consumption. The goal, then, must be ensuring that electricity is green.

Such is the logic implicit in China's current long-term energy planning – though it poses a clear risk to climate if energy decarbonization takes longer than planned.

### 1.3 Operationalizing the model

#### 1.3.1 The FYP system

By nature, the 14th FYP outline is an extremely high-level document. It establishes China's overall trajectory, but not the path by which to traverse it.

Wholesale economic decarbonization is a mammoth undertaking, with hundreds of elements. But among the most urgent tasks are to:

- Reform power markets to enable greater absorption of renewable energy
- Expand interprovincial power trading, to address geographical disparities between renewable energy generation hubs and industrial power demand hubs
- Fundamentally transform heavy industry production, which is highly coal-dependent and both technically difficult and expensive to decarbonize
- Reduce the economy's dependence on heavy industry and construction, a project that is effectively on hold while the Party staves off economic disaster amid COVID lockdowns
- Throughout the above, overcome bureaucratic inertia and vested interests – including the incredibly powerful State Grid, which manages 80 percent of China's power infrastructure – to enact reforms

Through various subsidiary plans, the 14th FYP targets many of these issues. Most notably, in 2022, Beijing issued the 14th FYP for a Modern Energy System on March 22 and the 14th FYP for Renewable Energy Development on May 30, which together call for:<sup>3 4 5</sup>

- Increasing total national power generation capacity to 3,000 GW by 2025 – up from 2,380 GW at the end of 2021
- Increasing total installed wind and solar power generation capacity to 1,200 GW by 2025 – up from 634 GW at the end of 2021
- Increasing the percentage of non fossil energy in China's total energy consumption to 20 percent by 2025 and 25 percent by 2030 – up from 15.9 percent in 2020
- Raising electricity's share in total end-

**In October 2021, Beijing launched the “1+N” climate policy system – a policy architecture that is consistent with, but separate from, the FYP system, and which is dedicated to operationalizing China’s holistic decarbonization.**

use energy consumption to 30 percent by 2025 – up from 26.5 percent at the end of 2020

The FYP for a Modern Energy System also establishes several aspirational targets:

- By 2025, non fossil energy should account for ~39 percent of China’s total power generation
- By 2035, renewable energy should “become the main power source”
- Creating a unified national electricity market that effectively links medium- and long-term electricity markets with spot and ancillary services markets

In addition, central ministries have also produced:

- A 14th FYP for sci-tech innovation in the energy sector<sup>6</sup>
- A 14th FYP for energy conservation and emissions reduction<sup>7</sup>
- A 14th FYP for sci-tech innovation in the transportation sector<sup>8</sup>
- A 14th FYP for new energy storage<sup>9</sup>
- A 14th FYP for urban planning that will guide green and low-carbon construction<sup>10</sup>

And dozens of provinces have issued local 14th FYPs on everything from rural greening to industrial decarbonization, with more emerging monthly.

Despite all these sectoral 14th FYPs, the FYP system itself is not enough to coordinate the whole-of-economy task of decarbonization.

### 1.3.2 The “1+N” climate policy system

In October 2021, Beijing launched the “1+N”

climate policy system – a policy architecture that is consistent with, but separate from, the FYP system, and which is dedicated to operationalizing China’s holistic decarbonization.

The system is designed to help Beijing manage a complex, multi-stakeholder policy-making process, while leaving room to adapt. It is overseen by the Leading Small Group for peak carbon and carbon neutrality, helmed by Executive Vice Premier Han Zheng, and is closely aligned with the powerful macro planner National Development and Reform Commission (NDRC), confirming its bureaucratic authority.

Starting with a core, top-level guidance document – the “1” – the system builds out with progressively more detailed plans for each domain of decarbonization, in a “snowflake” method of policymaking. As of early September 2022, Beijing had published the following core documents:

- **The “1”:** The central guidance document that essentially reaffirms prior FYP climate and energy targets – including to reduce CO<sub>2</sub> emissions per unit GDP by more than 65 percent from 2005 levels by 2030.<sup>11 12 13</sup>
- **The first and highest-level “N”:** The “Action Plan for Carbon Dioxide Peaking before 2030,” which maps out efforts in over a dozen domains, from fossil fuel substitutions to energy storage expansion, from industrial electrification to circular economy development, serving as the basis for subsequent “N” plans dedicated to each issue area.<sup>14</sup>
- **A second high-level “N” doc:** The “Opinions on Improving Institutional Mechanisms and Policies for Green and

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Low-carbon Energy Transformation,” which collates 34 distinct areas of specific energy policy necessary to achieve China’s 2030 and 2060 climate targets.<sup>15 16</sup>

- **A third high-level “N” doc:** The “Opinions on Providing Financial Support for Achieving Peak Carbon Emissions and Carbon Neutrality,” which establishes the basic fiscal policy framework to guide green investment into China’s energy system, key industries, and consumer markets.<sup>17 18</sup>
- **A fourth “N” doc:** The “Implementation Plan for Synergistic Pollution Reduction and Decarbonization,” which formally links local pollution and national carbon emission management efforts – a boon to both sides.<sup>19</sup>
- **A fifth “N” doc:** The “Implementation Plan for Carbon Peaking in Urban and Rural Construction,” which sets the foundation for much-needed efficiency improvements and waste reduction in the building sector – one of China’s highest-emitting sectors and a source of incredible quantities of preventable waste, rooted in decades of wasteful construction.<sup>20</sup>
- **A sixth “N” doc:** The “Implementation Plan for Carbon Peaking in the Industrial Sector,” which is the long-awaited blueprint for China to slowly, gradually begin moving its industrial economy away from its traditional emissions-intensive roots toward greener goods and production processes.<sup>21</sup>
- **A seventh, R&D-focused “N” doc:** The Implementation Plan for Science and Technology Support for Carbon Peaking and Carbon Neutrality,” which provides

guidance for sci-tech talent development, clean energy tech R&D investment trajectories, and differentiation of key R&D responsibilities across the bureaucracy.<sup>22</sup>

At the Two Sessions in March, the NDRC confirmed 11 “1+N” plans for development:<sup>23 24 25</sup>

- Energy
- Industry
- Transportation
- Iron and steel
- Nonferrous metals
- Petroleum
- Petrochemicals
- Natural gas
- Urban and rural development
- Agriculture and rural areas
- Building materials

To support these sectoral plans, the NDRC will also formulate guidance for:

- Science and technology research and development
- Green development budget sustainability
- Green financial development
- Carbon absorption capacity
- Statistical accounting of emissions
- Specialized personnel training
- Environmental inspection and evaluation

These plans will, gradually, filter down into provincial policymaking, much as nation-

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al-level FYP goals are embedded in provincial, then municipal, FYs. And indeed, the NDRC and National Energy Administration (NEA), among other central agencies, are already being bolstered by numerous supporting plans, such as:

- A set of 21 measures that outline continued, indirect central government support for renewables beyond the era of direct subsidies – helping support renewable energy growth without problematic market price distortions – issued May 30<sup>26</sup>
- A plan that gives energy storage its first meaningful path to market-based profitability, issued June 7<sup>27</sup>

#### 1.4 How domestic politics mold the model

Xi's choice to announce the dual carbon targets at the UN served two important political purposes:

- To signal to domestic actors that the commitments are categorically higher on the policy priority list than purely domestic-focused policies, which are subject to behind-the-scenes negotiation
- To implicitly tie the dual carbon targets – and, hence, China's overall climate transition – to Xi's personal credibility

Both purposes help to make the dual carbon targets politically non-negotiable. While the *scope* of net zero was initially moot, July 2021 comments from China's Special Envoy for Climate Change Xie Zhenhua clarified that the target covers all greenhouse gas emissions.

As it stands, China's long-term carbon *goals* appear uncontroversial within Beijing. However, the *means* to achieve them remain hotly

debated, for both technical and political reasons.

Worth mentioning is China's nascent carbon emissions trading scheme (ETS). First announced in 2017, the ETS launched active trading in 2021 in a startup phase covering the power sector. Efforts to incorporate additional sectors were expected this year but have been delayed due to data quality issues. While carbon pricing will be important for China's decarbonization, the current system uses intensity-based allocations that lead to modest results. Incentivizing deeper decarbonization will require reforms that put a price on total emissions. This is unlikely to happen during the 14th FYP period.

On the technical side, experts also debate the proper roles of, and investments in:

- **Nuclear power** – which requires massive investments with uncertain prospects to make viable in China's hinterland, as opposed to the coastline where nuclear is now concentrated<sup>28</sup>
- **Hydrogen** – the viability of which varies greatly across its passenger vehicle, heavy-duty vehicle, freight, rail, shipping, industry, energy storage, and power applications
- **Various power market reforms** – these stand to greatly benefit renewables and energy storage, but at the cost of increased power prices and volatility, which are anathema to current regulators' goals

But the political disagreements are more pernicious: government bodies with differing mandates dispute what short-term economic costs and risks various long-term decarbonization efforts are worth.

**The most fundamental challenge to transforming China's economic model – and fulfilling its climate ambitions – is not one of financing, or innovation, or talent. The most fundamental challenge is incentives.**

In 2018, the Ministry of Ecology and Environment (MEE) succeeded the Ministry of Environmental Protection, claiming the central role on governing greenhouse gas emissions from the National Development and Reform Commission (NDRC), the macro planner. However, between 2018 and 2020, control over the formation of climate policy has largely shifted from MEE back to NDRC, where it is poised to remain.

In part, this transition reflects that climate policy is, ultimately, economic policy. But more broadly, it reflects the fact that the NDRC, representing China's economic interest, remains the most powerful of China's ministries, and is able to exert that influence over environmental authorities.

Meanwhile, the MEE and other environmental actors pursue their mandates with considerable constraints. Most notably, the MEE oversees the nascent ETS. But it has become clear that MEE lacks the political standing to rapidly force compliance in the ETS. Indeed, this political weakness is partly why some observers question the ETS's overall role in China's decarbonization.

This imbalance of power sets up the incentive problems faced by lower-level officials throughout the bureaucracy.

### **1.5 The incentive problem: A rock and a coal face**

Today, the most fundamental challenge to transforming China's economic model – and fulfilling its climate ambitions – is not one of financing, or innovation, or talent. The most fundamental challenge is incentives.

With clear central government policies in place to codify the Party's goals, why do incentive problems exist at all? Effectively, the Party has established two concurrent

high-level priorities:

- 1) Achieving the dual carbon targets in the medium to long term
- 2) Protecting the economy from disruption in the short term

However, in reality, the latter generally takes precedent over the former.

Importantly, there is no *inherent* conflict between China's climate and economic priorities. Indeed, the bright economic future that Xi has proposed reflects an economy in which green, low-carbon technologies drive the economy, where it once was buoyed by oil with a ballast of coal.

But the two priorities have been at loggerheads since power outages disrupted the economy in fall 2021 (see section 3.1). Industrial concerns were piqued amid global market volatility following Russia's invasion of Ukraine (see section 3.2), and exacerbated by the resurgence of COVID in April, which has driven lockdowns and massive disruptions.

The NDRC's central task is preserving economic stability – with energy security a prerequisite. In the current environment, the NDRC fears a coal phase-out will risk energy security, industrial production, and overall economic stability – hence the current perceived policy tension. While ministries continue to advance efforts that support the green transition – e.g., launching carbon-related derivative products for the ETS, designing new green standards, and the like – the most substantive reforms remain chained by economic concerns.

The problem becomes increasingly visible at progressively more local levels. Where a locality is pressed to hit economic and decarbon-

**As of 2021, coal still accounted for 60 percent of China's power generation. Coal is even more critical for China's grid stability, accounting for 70 percent of peak load provision.**

ization targets, they strongly tend to prioritize the former. Why? In large part, because they understand that the real power lies with economic policymakers. Environmental regulators, meanwhile, tend to have less influence over promotions and punishments alike – skewing the pressures for short-term compliance toward economic interests, even as long-term climate goals remain “non-negotiable” – but less immediate.

The realities of the incentive problem are explored in sections 2.1 and 2.2.

## **2. INDUSTRIAL AND MARKET DRIVERS AND CONSTRAINTS**

### **2.1 China's economic dependence on coal**

Heat and power provision is the foundation of both economic and social stability. As of 2021, coal still accounted for 60 percent of China's power generation. Coal is even more critical for China's grid stability, accounting for 70 percent of peak load provision.

Meanwhile, China's economy is highly dependent on industrial production and construction. The former is fueled by coal, while the latter is built on steel – which is fueled by coal.

In 2021, the secondary sector<sup>29</sup> accounted for roughly 40 percent of GDP.<sup>30</sup> Steel production, while perennially subject to official curbs due to overcapacity, remains a mainstay of the economy – and given its geographic concentration, it engenders fierce lobbying by cities like Tangshan that are highly dependent on steel plants for employment.

Renewables can displace coal on the grid, but only to the extent that market pricing mechanisms and physical infrastructure enable it (see section 2.2). But electrifying key industrial applications is extremely difficult – par-

ticularly in steel and other domains of heavy industry.

Industry actors have more interest in maintaining low-cost, coal-fired production than making massively expensive investments in electrification. Economic officials have more interest in keeping industry productive than in enforcing heavy costs that could inhibit output. Neither have strong interests in more ambitious climate-friendly reform, and, by and large, environmental officials have insufficient carrots or sticks to change the situation.

Under current FYP and “1+N” plans, China aims to both lessen its dependence on heavy industry and decarbonize heavy industry. But practically, short-term change happens when the State Council or the NDRC get involved. And during economic crises – e.g., in 2022 – they tend to set climate on the backburner.

### **2.2 Power market and infrastructure inhibitors**

China already leads the world in renewable energy installations. But that capacity is only as useful as the potential for transmission and distribution, which are hindered by two factors:

First, China's power system is designed around coal. Its power pricing mechanisms undervalue electricity to keep prices low and support the economy (and avoid complaints from residential users), which keeps coal entrenched. Meanwhile, the market is not well set up to handle variable supply and demand, as is inherent to renewable energy.

Second, China's power markets are designed around provincial boundaries – interprovincial trading is limited and structurally difficult, with ongoing reforms still struggling

**Economically, the kind of market-oriented reforms needed to phase out coal are difficult to implement – chiefly because they will tend to increase power prices and decrease their predictability.**

to make progress. The issue is that China's greatest renewable resources lie in inland provinces, like Gansu, which, due to both market and infrastructure limitations, are unable to export large quantities of renewable energy to demand hubs along the coast.

Economically, the kind of market-oriented reforms needed to phase out coal are difficult to implement – chiefly because they will tend to increase power prices and decrease their predictability. Regulators are tasked with stability, first and foremost; it is, unsurprisingly, difficult for them to remove the guardrail of reliable coal-fired baseload power.

Who will resolve these problems? Provincial actors are hesitant to be held responsible for increased power prices, as further market liberalization entails. And what of long-distance transmission to unlock renewables' full potential? Trading between contiguous provinces is one thing, but there is no compensation mechanism for intermediary provinces that must maintain long-distance transmission infrastructure to help other provinces trade.

Beijing has plans to develop a unified national power market,<sup>31</sup> but such a system is extraordinarily difficult to establish because provincial power markets are so fragmented. Meanwhile, eight existing spot market pilots have all failed to live up to expectations of finding a solution that can be copied in other provinces – and eight more pilots announced last year are nowhere near launching.

The challenges were already high. However, with 2022 dominated by short-term economic concerns – as Premier Li Keqiang confirmed at the Two Sessions, in the 2022 Government Work Report<sup>32</sup> – some power market reforms may return to the backburner yet again. Instead, the NDRC is, in general,

turning to coal to bandage economic woes.

### **3. THE REACTIVITY AND RESILIENCE OF CLIMATE POLICY TO SHOCKS**

#### **3.1 The fall 2021 energy crisis**

##### **3.1.1 A domestic setback**

In late September, 2021, Jilin, Liaoning, and Heilongjiang provinces in China's northeast abruptly reported power cuts, disrupting industry, commerce, and residential life alike. On paper, a lack of coal had driven electricity shortages. The central government, which oversees national coal production, was caught off-guard by provincial announcements. Local governments, which manage local energy demand and consumption, either didn't know or didn't tell Beijing what was coming.

Within a week, the southern industrial powerhouse provinces of Jiangsu, Guangdong, and Zhejiang also independently issued a flurry of aggressive power rationing measures. In each case, local reports said the cuts were driven by local issues – some referencing recent heat waves, some the increased cost of coal amid ongoing global economic recovery, some provincial targets to reduce industrial energy consumption. By mid-October, 20 provinces had instituted some form or other of power rationing in response to energy supply concerns.

At the time, what confounded observers – and evidently the central government – was that, while each locally indicated driver could have plausibly caused a local power crunch, none explained why none were foreseen despite the systems in place to manage power supply and demand – nor, more importantly, why by mid-October “local” issues had forced *two-thirds* of China's provinces to issue their own power rationing measures.

## Beijing's long-standing approach to energy security could be summarized as "more coal means greater energy security."

State-affiliated reports from September 28, 2021 covered the initial outages with bylines like "Challenges emerge but China not facing an 'energy crisis.'"<sup>33</sup> But from October onward, there was no question that, however localized power issues may have begun, China faced a full-blown national energy crisis.

Beijing was unprepared to respond to the crisis. This lack of preparation, evident in the central government's delayed response and failure to identify effective short-term remedies, has had a clear and enduring impact on Beijing's approach to energy security. Its impact is underscored by continual State Council and NDRC instructions on securing power supplies ever since.

### 3.1.2 Cracks in the foundation

Beijing's long-standing approach to energy security could be summarized as "more coal means greater energy security." That approach was bolstered by the failures of the winter 2017–2018 coal-to-gas transition efforts in China's northeast, which left thousands without power in freezing conditions in the dead of winter.

The ill-timed policy pushed officials to mandate homes switch to natural gas before gas supplies and the infrastructure capable of delivering it were capable of handling the cold snap that soon followed. As the cold set in, local officials reversed the transition policies, allowing coal to save the day – and indeed it did. That failure was also an early progenitor of today's regular directives to avoid heavy-handed, "campaign-style" environmental policies.

However, the fall 2021 energy crisis cracked the credibility of the assumption that coal guarantees energy security. Where coal had

previously saved provinces from ill-advised policy and implementation failures alike – the early coal-to-gas transition failure being a famous case in point – the 2021 energy crisis proved that cracks in China's energy governance regime could undercut even coal's ability to guarantee energy security.

While myriad factors played roles in the power crunch – heat waves, energy commodity costs, and energy policy targets included – China's energy governance regime is designed to manage them all. Beijing invests heavily in ensuring energy resource stockpiles; managing commodity costs through pricing controls; and instructing local policymakers to ensure energy policy reforms do not disrupt livelihoods. Yet China's energy governance regime, with coal as its guarantor, failed to keep the lights on – one of the Party's most fundamental governance tasks.

### 3.1.3 Consequences

Ultimately, central-local coordination and associated governance issues undercut even coal's ability to provide energy security and economic stability. The lesson for Beijing could have been that it is not just the energy source, but also the policy and governance ecosystem built around it, that provides – or fails to provide – energy security.

In principle, this lesson could have emboldened policy makers to directly address China's core energy governance issues. Resetting traditional coal-centric policy to more explicitly incorporate energy supply diversification via renewable energy sources is in line with climate and economic goals and would boost energy security. But, instead, the months since fall 2021 have shown Beijing doubling down on coal, far exceeding expected coal capacity increases and production.

## Should Beijing fail to secure its energy production and economic interests without increasing coal in 2023, officials across China's vast bureaucracy may be pressured to find shortcuts to meeting 2025 energy and climate targets just before the buzzer.

In 2022, in the face of short-term energy security pressures, Beijing – led by the NDRC, and supported by semi-regular State Council policy pronouncements – has ramped up coal procurement and provided the coal industry with various protective measures in the name of preventing power outages.

The net result of the fall 2021 power crunch – driven in part by exogenous shocks, but ultimately a failure of China's energy governance regime – has been a doubling down on coal as a means to reduce energy security risks.<sup>34</sup>

The immediate consequences are clear:

- An effective cutoff of any decrease in coal this year
- An end to hopes that Beijing might accelerate its energy decarbonization efforts while economic challenges persist

But the real problem lies ahead: With the 14th FYP targets to be met by 2025, and 2022 effectively a lost year for energy decarbonization efforts, China has just lost one-third of its remaining time to meet its goals.

Should Beijing fail to secure its energy production and economic interests without increasing coal in 2023, officials across China's vast bureaucracy may be pressured to find shortcuts to meeting 2025 energy and climate targets just before the buzzer – raising the risk of precisely the kinds of economic and social instability Beijing has relied on coal to avoid.

### 3.2 Russia's invasion of Ukraine

#### 3.2.1 An overseas crisis

Russia invaded Ukraine on February 24, 2022. Within days, governments and media across

the West turned their eyes to China, watching for signs that Beijing would provide material economic support for its “most important strategic partner.”<sup>35</sup>

Indeed, China's governmental and commercial actors alike had strong economic incentives to engage with Russia, particularly in coal, oil and gas: with the rest of Russia's major energy trading partners rushing to the exits, Russia's energy goods became massively undervalued for those willing to deal.

#### 3.2.2 Strength in the foundations

What shocked many observers – and indeed, what other observers so deeply took for granted that they didn't realize the facts were otherwise – China largely abstained from new Russian energy goods. Within days of Russia's invasion, the NDRC “advised” domestic coal-fired power generators to avoid Russian coal. Accordingly, Chinese coal imports from Russia plummeted after the invasion.<sup>36</sup> Domestic coal production filled the gap. While this didn't translate directly into more coal consumption, it brought more production emissions into China's borders.

Meanwhile, although Beijing largely remained quiet on the issue of oil and gas imports, China's national oil companies decided in no uncertain terms to avoid any new Russian oil and gas deals as a matter of managing political risk. Deals already in place, which before the invasion were roughly in line with previous years, remained in place, but no new deals were drawn, despite the obvious financial incentives.<sup>37</sup>

Perhaps the most direct impact Russia's invasion had on Beijing was to exacerbate the latter's economic risk aversion – specifically in light of war-exacerbated commodity market

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volatility, which particularly afflicted coal, oil, gas, and key industrial metals. Commodity supply challenges, driven by outlandish market movements amid wartime uncertainty, have applied great pressure on industrial production, further rattling Beijing's sense of control over an already troubled economy.

### 3.2.3 Consequences

Commodity market pressures on industrial production, while indirect, have again incentivized officials to turn their attention from decarbonizing industry to pursuing all possible means of stabilizing it. Again, climate policy is ultimately economic policy – but it is long-term economic policy, unlike the tangible short-term issues China faces today. At the end of the day, the most important numbers are the dual carbon targets to peak emissions before 2030 and achieve net zero by 2060; other variables are subject to move based on the constraints of the day. Ukraine is an example of unexpected avenues of influence – and what they do and don't change.

Nonetheless, it is vital to note that Beijing has not indicated any change in long-term climate plans in light of Russia's invasion of Ukraine. The invasion's market consequences have expanded critical cracks between China's short-term energy security and long-term decarbonization aims – issues that Beijing was already reluctant to recognize, but which have only worsened.

Once again, the resilience of China's long-term climate ambitions despite current affairs is evident, even as deep concerns abound about the diminishing time for officials to fulfill their targets.

## 4. THE OUTLOOK FOR CHINA'S DECARBONIZATION

### 4.1 Strong policy foundations, questionable policy connections

#### 4.1.1 Policy foundations

In China, as elsewhere, climate policy is fundamentally a matter of economic policy. What separates China from the rest of the world is the power of its leader, Xi Jinping, to make climate a politically non-negotiable pillar of long-term policymaking.

Where China is far from unique, however, is the large degree to which its long-term climate goals have, despite their high political prioritization, faced competition with short-term economic aims and skewed policy incentives across the governance landscape.

This leaves a questionable set of policy connections:

- The dual carbon targets, for all intents and purposes tied to Xi's political legitimacy, are effectively non-negotiable.
- Also non-negotiable are short-term economic demands, which hinge particularly on energy security – and, for the time being, coal.

But realistically, for now, officials will not sacrifice short-term economic demands for the 2030 target – and certainly not for 2060 – raising the prospect of serious challenges near the end of the decade.

#### 4.1.2 The policy hierarchy

Notably, the “1+N” climate policy system, with its long-term perspective, is here to stay. Its plans hold the weight of the NDRC, even if specific plans are not inherently polit-

**Meanwhile, provincial policy, and particularly subprovincial policy, contains elements of experimentation by nature. While certain targets – such as renewable energy capacity targets – are reliable indicators, other areas of provincial policy are designed to evolve based on trial and error.**

ical gospel (the way the dual carbon targets are) and could change if decided by Xi, the Politburo Standing Committee, or the State Council.

Policies set by industry associations, which help inform national government policies, are themselves entirely subject to change. They represent the efforts of industry associations and embedded Party leadership to enact Beijing's intentions, as reflected in FYPs, "1+N" plans, and the like, but Beijing will form policy as it sees fit – and industry must continually adapt.

Meanwhile, provincial policy, and particularly subprovincial policy, contains elements of experimentation by nature. While certain targets – such as renewable energy capacity targets – are reliable indicators, other areas of provincial policy are *designed* to evolve based on trial and error (see section 4.2). This makes provincial policy both a source of uncertainty in projecting future trends as well as a source of innovative policy ideas, which can later be scaled for national implementation.

#### 4.2 Provinces as laboratories

Naturally, provincial policy experiments revolve around local needs. In many cases, this leads to highly tailored approaches to overcome systemic challenges – including competition with economic interests.

Numerous noteworthy policy experiments have emerged since the 14th FYP was adopted, far too many to list in full. Table 1 highlights several examples of interest just since the beginning of 2022 – in addition to the slew of plans establishing local renewable energy installation targets.

While none of these plans or efforts is guaranteed success, what is notable is:

- None were initiated through central policy, but instead locally initiated based on a combination of local interests and *alignment* with national policies.
- All provide potentially scalable solutions to challenges faced across China – as did various new energy vehicle manufacturing, solar power project, and even carbon trading pricing pilots in the past.

#### 4.3 The question of global influence

The Belt and Road Initiative (BRI), largely on hold amid the pandemic, is nonetheless alive and well.

In September 2021, Xi announced that China would not build new coal-fired power plants overseas. The move came amid diplomatic and host country pressure on China to end its overseas coal finance. In March 2022, the NDRC issued updated guidelines for the BRI, which broadly imply it is a means to support economic upgrading, with clean energy producers gaining new markets much the way coal-fired power generation project developers used to.<sup>44</sup>

While the guidelines clearly lean into a new, green identity for the BRI, they could hardly be called concrete:

By 2025:

- Expand international cooperation on climate change
- Improve the environmental risk mitigation capabilities
- “Achieve remarkable results” in green development – no metrics provided

By 2030:

- Further expand green BRI cooperation

In September 2021, Xi announced that China would not build new coal-fired power plants overseas. The move came amid diplomatic and host country pressure on China to end its overseas coal finance.

**TABLE 1**

DEVELOPMENT	RELEASE DATE	POLICY INNOVATION
Gansu's 14th FYP for cleaner production <sup>38</sup>	July 12, 2022	Establishes first process-specific industrial decarbonization guidelines, complete with quantitative targets, with coverage ranging across iron and steel, nonferrous metals, petrochemicals, building materials, and agrochemicals
Zhejiang's 14th FYP for new energy storage development <sup>39</sup>	June 6, 2022	Calls for novel nuclear-plus storage system development; accompanied by a batch of new energy storage demonstration projects focused on providing ancillary services to the grid
Jiangxi's 14th FYP for renewable energy development <sup>40</sup>	May 17, 2022	Connects renewable energy installation goals to rural revitalization, linking disparate issues to incentivize increased support from local and national economic officials and financial institutions
Yunnan's 14th FYP for ecological and environmental protection <sup>41</sup>	April 28, 2022	Calls for the development of natural resource asset property rights and natural resource valuation and compensation mechanisms, designed to internalize environmental externalities
Hebei's 14th FYP for new energy storage development <sup>42</sup>	April 20, 2022	Supports diversified energy storage investments, expanding beyond lithium-ion batteries to explore physical storage systems as well as alternative battery chemistries, like vanadium, iron-chromium, and zinc-bromide flow batteries
Zhejiang's Quzhou solar project breaks ground on its first phase <sup>43</sup>	February 15, 2022	The project, developed via local policy support, is the world's first perovskite concentrated photovoltaic solar power station
Beijing municipal government 2022 Government Work Report	January 28, 2022	Promoted efforts to integrate pollution reduction and carbon emission reduction efforts, strengthening both through issue linkage
Anhui's 14th FYP for manufacturing industry development	January 25, 2022	Calls for the construction of three to five "influential" vehicle enterprises and a group of "globally competitive" supporting enterprises; further calls for the province to achieve mass production and sales of fuel cell vehicles, along with intelligent manufacturing upgrades to move Anhui's automotive sector up the value chain

- Enhance the “going out” capabilities of green developers
- Improve environmental risk and control systems for overseas projects
- Complete a basic green development framework

Meanwhile, oil and gas investments in BRI host countries tripled between 2020 and 2021, making clear that, despite the exit of

coal, fossil fuels are far from out of the BRI equation.<sup>45</sup>

Nonetheless, current plans make clear that green tech innovation is core to Beijing's vision for the next era of the BRI. R&D features prominently, as does the use of demonstration zones and technology parks as hubs for experimentation.

It is too early to predict the net impact of proj-

**The key to China fulfilling its own climate ambitions is to reduce the tension between short-term economic interests and medium- to long-term economic interests.**

ect developers actually implementing BRI on the ground over the next decade. But in the long term, the market outlook points to green projects having the strong upper hand in overseas investment – even if it takes China itself far longer to phase out fossil fuels.

**CONCLUSION:  
THE PATH FORWARD**

The key to China fulfilling its own climate ambitions is to reduce the tension between short-term economic interests and medium- to long-term economic interests. The current nature of China's economy, including its industry- and emissions-intensive structure, means that this tension will likely persist throughout the coming decade, and potentially toward 2060. But China's leaders also recognize that, in the long term, China's development will not be economically sustainable – and hence politically and socially sustainable – until it is also environmentally so.

Hence, the next four decades will likely be marked by a constant balancing act between economic transformation and the preservation of entrenched interests – a transformation strengthened by genuine, politically paramount climate ambitions, just as it is simultaneously weakened by bureaucratic failings and structural disincentives to change.

Technologically, China has all it needs to create a green economy – and the capability to support future growth through R&D. And by Beijing's own assessments, the green transition is economically feasible within the dual carbon target timeline – so long as it is not executed so swiftly that it triggers major industrial or labor disruptions. Indeed, China's dual carbon targets have been carefully selected to reflect what the Party leadership views as the most aggressive target that is

achievable – within a tolerable range of economic costs (the variable with which many climate-minded foreign observers have scruples).

The central holdup, then, is the extreme economic risk aversion exhibited by China's central economic authorities. Because these authorities hold pivotal influence over the shape of national policymaking, their risk aversion trickles down and tends to skew the overall incentives and priorities of the rest of the bureaucracy toward short-term economic interests. Where these authorities are not risk averse – e.g., in the move from traditional internal combustion engine to battery electric vehicles – industry thrives. But the set of such examples still remains, for now, much smaller than that needed for China's true green economic transformation.

In forecasting the decade ahead, the pivotal question is whether the tide will change after 2022 – truly a pivotal year for China's balancing act. This year has already seen China's hangover from the fall 2021 power crisis, Ukraine, and the domestic resurgence of COVID. And, just as importantly, the 20th Party Congress will be held in mid-October of this year: Xi remains incredibly wary of inhibiting the economy until the event has successfully ended with his legitimacy untarnished.

Whether 2023 marks a turning point for China to go greener will depend largely on Beijing's level of economic stress. The question is not whether China will grow more slowly through 2030 than it has over the past decade – it certainly will. Gone are the years of more than six percent GDP growth, as Beijing well knows; indeed, as of late July, it had even given up on its 5.5 percent GDP target for 2022.<sup>46</sup> Instead, progress in 2023 will depend on whether the policymaking elite

**While local plans are more likely to fail, they reflect a structural interest in ambition to create new economic opportunities, in stark contrast with the central government's structural incentive for risk aversion in its target setting.**

in Beijing *feel comfortable* investing in long-term upgrades instead of pulling every string possible to squeeze short-term growth out of the economy, or overprioritizing coal-based energy security, at the price of maximizing emissions.

Coal, of course, remains central to the story. Notably, in the shadow of the fall 2021 power fiasco, Beijing increased its new coal production capacity target to 300 million tons for 2022. Throughout the second quarter of 2021, Premier Li Keqiang warned officials to head off potential power shortages by ramping up coal supplies and production capacity in a wave of crisis messaging – and stockpiles and consumption grew. Despite a streak of historic heat waves and drought, as well as related power rationing in a few provinces, such as Sichuan, summer 2022 largely avoided the broad, coal-driven power cuts seen in 2021 – and that fact itself will help reinforce the notion that coal is the core of energy security.

The long-term situation is not hopeless, however. Local policymaking – at both the provincial and municipal levels – still far exceeds the level of ambition of the national carbon targets. While local plans are more likely to fail, they reflect a structural interest in ambition to create new economic opportunities, in stark contrast with the central government's structural incentive for risk aversion in its target setting.

In particular, numerous localities have made remarkably bold efforts to support energy storage, which will enable renewable energy to take on a progressively greater role in stabilizing the grid – which coal does today. Already, many provinces are laying the foundation for a functioning energy storage market that could help make storage prof-

itable, enabling its further expansion and lessening regional dependence on coal by the mid-2020s.

And even at the national level, the dual carbon targets remain among China's most important high-level priorities. Indeed, the staggering success of China's new energy vehicle (NEV) industry makes clear that economic and carbon goals can align, with remarkably positive results – a lesson that Beijing has studied closely, even if it has not found precise analogs to overcome the challenges of decarbonizing GDP staples like steelmaking, refining, and mineral processing.

To that point: Beijing famously poured subsidies into the development of the NEV and battery industries – by some counts, as much as RMB 676 billion between 2009 and 2019.<sup>47</sup> While subsidies enabled the industry's development, however, they alone did not guarantee success. What made Chinese firms industry leaders – notably CATL, now the world leader in battery technology, supplying domestic and foreign brands alike, including Tesla – was the ingenuity of local officials in promoting market opportunities aligned with both economic and environmental goals.

This is where, again, the power of local policymaking becomes so critical to forecasting the decade ahead – and where the structural incentives for increased local ambition, even in spite of long-standing entrenched interests – suggest brighter prospects for China's long-term success.

Ultimately, then, China's path forward depends on both the top and the bottom of the governance system, namely:

- Beijing's ability to expand the overlap between economic and climate goals,

**True success will be achieving that goal in a manner that doesn't cause the pendulum to swing back just as hard afterward, with economic interests in the 2030s holding back further climate transformation because of the traumas of the late 2020s and their aftermath.**

rather than entrenching tension between them

- The ability of policy innovators to fill the gaps in Beijing's high-level decarbonization roadmap with new, green technical solution, financial products, and the like – particularly at local levels, as the model of bottom-up experimentation to enable large-scale innovation remains strong

So long as China's long-term climate plans remain resilient, there is hope that China will live up to its ambitions. In particular, every indication suggests that carbon neutrality by 2060 is in the cards. But so long as short-term economic demands dominate efforts to make incremental progress *toward* China's long-term climate goals – i.e., inhibiting the two abilities noted earlier – the prospect of the orderly, nondisruptive decarbonization

process that Xi envisions remains in doubt.

From today's vantage point, China appears to be teetering on the edge of the path toward peaking emissions before 2030. But success in this decade is about more than simply meeting the 2030 target. True success will be achieving that goal in a manner that doesn't cause the pendulum to swing back just as hard afterward, with economic interests in the 2030s holding back further climate transformation because of the traumas of the late 2020s and their aftermath.

China's dual carbon targets remain within reach, but how Beijing handles 2023 – after it has an even tighter handle on recent macroeconomic shocks and, in particular, after the 20th Party Congress and the associated political fanfare – will be the most important near-term signal of whether it can *succeed* in the pursuit of its green, low-carbon transformation in the decades ahead.

## ENDNOTES

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- <sup>36</sup> Notably, the plummet was driven by thermal coal imports, which then constituted over 80 percent of China’s imports of Russian coal. China’s coking coal imports – used for steelmaking – demonstrated far less elasticity of demand, and actually rose in light of domestic steel demand increases. Nonetheless, with coking coal accounting for just 17 percent of total imports, the net change to overall coal imports was clearly and significantly negative.
- <sup>37</sup> In contrast, China’s small, independent refiners indeed took advantage of cheap Russian oil and gas imports wherever they could, on the principle that they were small enough to avoid international political attention – and indeed they did, for the most part. But by virtue of the same lack of size – and the market domination of the national oil companies – independent refiners’ engagement has also fallen far short of anything approximating material economic support for Russia.
- <sup>38</sup> “甘肃省印发《甘肃省“十四五”清洁生产推行方案》全面推行工业领域清洁生产,” 北极星环保网, July 12, 2022, <https://huanbao.bjx.com.cn/news/20220712/1240336.shtml>.
- <sup>39</sup> “省发展改革委 省能源局关于印发《浙江省“十四五”新型储能发展规划》和浙江省“十四五”第一批新型储能示范项目的通知,” Zhejiang Provincial Development and Reform Commission, June 6, 2022, [https://fzggw.zj.gov.cn/art/2022/6/6/art\\_1229539890\\_4933248.html](https://fzggw.zj.gov.cn/art/2022/6/6/art_1229539890_4933248.html).
- <sup>40</sup> “江西“十四五”能源发展规划印发:新增光伏16GW+、风电2GW+,” 国际能源网, May 18, 2022, <https://m.in-en.com/article/html/energy-2315819.shtml>.
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- <sup>42</sup> Pan Wenjing, “河北省:到2025年布局建设新型储能规模400万千瓦以上,” 中国储能网, April 21, 2022, <http://www.escn.com.cn/news/show-1384102.html>.
- <sup>43</sup> “全球首个钙钛矿光伏地面电站在衢江开工,” 中国能源网, February 21, 2022, <https://www.china5e.com/news/news-1130038-1.html>.
- <sup>44</sup> “国家发展改革委等部门关于推进共建“一带一路”绿色发展的意见,” National Development and Reform Commission of the People’s Republic of China, March 16, 2022, [https://www.ndrc.gov.cn/xxgk/zcfb/tz/202203/t20220328\\_1320629.html?code=&state=123](https://www.ndrc.gov.cn/xxgk/zcfb/tz/202203/t20220328_1320629.html?code=&state=123).
- <sup>45</sup> “Belt and Road Initiative: China ended coal financing last year, but oil and gas investments tripled, study shows,” *South China Morning Post*, February 11, 2022, <https://www.scmp.com/business/article/3166523/belt-and-road-initiative-china-ended-coal-financing-last-year-oil-and-gas>.
- <sup>46</sup> “中共中央政治局召开会议 分析研究当前经济形势和经济工作 审议《关于十九届中央第九轮巡视情况的综合报告》 中共中央总书记习近平主持会议,” Xinhua, July 28, 2022, [http://www.news.cn/politics/leaders/2022-07/28/c\\_1128871681.htm](http://www.news.cn/politics/leaders/2022-07/28/c_1128871681.htm).
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