

Forecast 2025: China Adjusts Course

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FOREWORD

Damien Ma

“It’s tough to make predictions, especially about the future.”

– Yogi Berra

Forecasting is a fraught exercise. It is made all the more daunting when paradigms shift, testing basic assumptions and altering drivers of change. If 2020 has yielded any lessons, it is that the foreseeable future invites more questions than it provides concrete answers.

Yet amid these muddled dynamics, the search for clarity is more important than ever. From the existing global system to relations between preeminent powers, the status quo may be irreparably shaken. What lingers in the air is a palpable sense that an era of creative destruction is upon us. It is an unfolding drama where the ending has yet to be written.

The starring role that China plays in this drama makes understanding its general trajectory—from the economy to domestic politics and technology development to energy policy—of immense interest and import to the world, and particularly for its peer competitor the United States.

So what kind of China should be expected by 2025? That singular question animated this effort to forecast the country’s path forward over the medium term.

Our simple answer: A China that will be near-majority middle class for the first time, with increasing technological parity with Silicon Valley and a less carbon-intensive energy landscape, all under the aegis of a stronger Xi Jinping and his vision of governance. Achieving these outcomes will require trade-offs, in this case a China that will likely redouble on domestic priorities and moderate its appetite for global adventurism.

This view of a more capable yet more outwardly cautious China is based on a composite of four scenarios across specific functional areas, bounded by the timeframe through 2025. It is also predicated on several macro assumptions and key factors that are likely to determine China’s behavior over that time period. In other words, this forecast exists within a defined scope, the elements of which are explained below.

WHY 2025?

We decided on a medium-term time frame for several reasons. First, conditions can change on a dime, but we believe five years, relative to a 10- or 20-year forecast, is a more manageable timeline to provide relatively concrete and specific scenarios for the future of China's political economy.

Second, the five-year cycle also coincides with China's own 14th Five-Year Plan (FYP, 2021-2025) that essentially sets the parameters on what to expect in terms of priorities and key agendas. In addition, the time period also overlaps with the new US administration and veers into the first years of Xi's third term.

Third, Chinese leaders themselves have imbued this next FYP cycle with more significance than usual because it begins the 15-year period leading up to 2035, the midway status point for Xi's national rejuvenation agenda that runs up to 2049. In this context, the 15th and 16th FYPs will be building directly on the outcomes of this five-year cycle even more so than in the past.

Still, five years can be an eternity in an environment where current shifts accelerate and unexpected factors manifest to knock China from its intended path. These uncertainties could lead to various permutations of China's trajectory and a wider range of outcomes than we currently expect.

Recognizing this degree of uncertainty, we nonetheless aimed to distill, to the best of our abilities, a clear and comprehensive view of how China's political economy will be shaped.



MACRO ASSUMPTIONS

Grappling with the complexity of current dynamics and the numerous factors at play is important. As such, it was necessary to bound our forecast within clear assumptions for the five-year time period. These assumptions are:

01

China's political economy will remain largely what it is today, ruled by a strong Chinese Communist Party (CCP) led by General Secretary Xi Jinping.

02

Direct US-China military confrontation is unlikely, but competitive dynamics and tensions will become more explicit and play out across all major geographies.

03

Globalization will likely continue to stall as countries turn more inward and regionalism becomes more prominent.

We also eschewed low probability, high impact “fat tail” scenarios, such as a “Taiwan confrontation” or a “political transition crisis.” Such scenarios remain possible, but what’s possible is not necessarily what’s probable. They are, however, certainly worthy of discussion and continued monitoring beyond this product because of their outsized impact on the future of China and global markets.

In our view, these macro assumptions preclude entertaining the outlier scenarios above and set parameters on the domestic and global environment in which China will operate—an environment that can both facilitate and constrain China’s behavior. If these key assumptions are undermined over the medium term, then the entire forecast will need to be reevaluated accordingly.

KEY FACTORS

In addition to these macro assumptions, it's important to determine what key factors may have changed that inform how we think about China going forward, to help avoid over-reliance on simple, straight line projections. We believe there are two key factors, one domestic and one external, that have changed and that matter for our forecast to a considerable degree:

- 1. Stronger center, weaker localities:** from dealing with debt and growth to executing on reforms and environmental initiatives, local governments are being kept on a much shorter leash and are less able to freelance relative to just five years ago. The main manifestation of this dynamic will be Beijing's continued fiscal hawkishness and increased actions to induce local compliance with central mandates.
- 2. Global power under global scrutiny:** Beijing faces its toughest external environment in about a generation, centered on US-China tensions. China likely can no longer count on a relatively stable external environment, one of the key ingredients that has facilitated its economic success to date. Its conduct and intent, both domestic and foreign, will be put under a global spotlight, forcing it to respond.

Building on these factors and the macro assumptions, our team constructed base case scenarios for China's economy, politics, technology, and energy. Each base case represents the most likely outcome over the five-year time period. Needless to say, these base cases do not represent the totality of scenarios. But we believe they are the most probable realistic outcomes based on our understanding and approach to analyzing China.

SUMMARY OF BASE CASES

This forecast product has four components: economy, politics, technology, and energy. Each section contains the lead analyst's base case calls, followed by specific assumptions and leading indicators, and then in-depth analysis of each base case with assigned probability. Each section then concludes with a less likely secondary scenario as a complement to the base case.

Eluding the Middle Income Trap

Economy

- By 2025, Beijing will have had little choice but to reform its way out of challenges that result in a Chinese economy that will likely become more open, balanced, and efficient.
- China faces one of the most daunting external environments in decades, which ironically will likely push Beijing to further embrace foreign direct investment (FDI) and improve the business environment.
- On the domestic front, China's "internal circulation" agenda will be less about self-reliance but focus on improving productivity and inducing more local competition, while keeping a lid on financial risk.
- The pursuit of reform priorities means that at the end of the 14th Five-Year Plan (FYP, 2020-2025), China will likely have eluded the "middle-income trap" and become a near-majority middle-class country.

Stronger as Xi Goes

Politics

- In 2025, Xi Jinping will remain General Secretary of the Chinese Communist Party (CCP), Chair of the Central Military Commission, and President of the People's Republic of China. He will likely emerge the strongest he has ever been after the 20th Party Congress in 2022.
- It's unlikely that a clear successor will emerge from the 2022 political transition, to avoid diluting Xi's authority as the CCP focuses on executing his domestic reform agenda.
- Xi will likely focus his power on "the politics of execution" in his third term, as the 14th FYP begins his strategy to transform China into a superpower by 2035. This program will strengthen governance, discipline, and ideology to enhance Beijing's ability to transmit policy through central agencies and local governments.
- A strengthening focus on domestic priorities will involve some trade-offs, so Xi is unlikely to announce any major new foreign policy initiatives in the next five years.

This analytical product has been a collective MacroPolo endeavor. We harnessed our specialized knowledge and our broad understanding of how China functions to arrive at a comprehensive assessment of the country's trajectory.

It was a challenging process to say the least, as all attempts at forecasts are. Yet through it all, this very exercise sharpened and disciplined our own thinking. Whether you agree with our assessment, we hope you find it as useful and clarifying as we did in creating it.

Fragile Tech Superpower

Technology

- By 2025, China's technology ecosystem will have matured and be on par with Silicon Valley in terms of dynamism, innovation, and competitiveness.
- That dynamism will increasingly take the form of industrial applications of information technology, as the locus of Chinese innovation shifts from the *consumer internet* to the *industrial internet*.
- China will largely succeed in deploying highly capable "new infrastructure"—cloud computing, 5G networks, smart cities, and surveillance networks, among others—to facilitate this transition to the industrial internet.
- US export controls on semiconductors will act as a modest brake on China's new infrastructure rollout. But expanding restrictions on semiconductor manufacturing equipment will mean that China remains vulnerable to future interruptions to its supply chain for advanced chips.

Setting Course for Peak Emissions

Energy

- By 2025, China will be close to achieving peak emissions as a result of more ambitious actions to bolster renewables, pivot toward market mechanisms, and enhanced energy efficiency measures.
- Renewables will benefit from cost competitiveness relative to coal even in the absence of subsidies.
- Power sector reforms announced in 2015 will see meaningful progress to better support Beijing's decarbonization efforts.
- These factors will mean that non-fossil energy sources such as nuclear, wind, and solar will be the major beneficiaries relative to coal over the medium term.



China Economy 2025: Eluding the Middle Income Trap

Houze Song

OUR CALL:

- By 2025, Beijing will have had little choice but to reform its way out of challenges that result in a Chinese economy that will likely become more open, balanced, and efficient.
- China faces one of the most daunting external environments in decades, which ironically will likely push Beijing to further embrace foreign direct investment (FDI) and improve the business environment.
- On the domestic front, China's "internal circulation" agenda will be less about self-reliance but focus on improving productivity and inducing more local competition, while keeping a lid on financial risk.
- The pursuit of reform priorities means that at the end of the 14th Five-Year Plan (FYP, 2020-2025), China will likely have eluded the "middle-income trap" and become a near-majority middle-class country.

KEY ASSUMPTIONS:

1. Beijing will relearn some of the lessons from Deng Xiaoping by moderating its approach that balances improving its economic relationships abroad while improving its business and investment climate at home.
2. Beijing will continue to be hawkish on local finances as its main tool to induce reforms and local competition by forcing them to operate in a resource-constrained environment.

LEADING INDICATORS:

1. Sustained increases in FDI flows and portfolio investment for consecutive years, while annual surveys of foreign businesses in China show continued improvement and confidence in the business climate.
2. Local debt/GDP ratio stabilizes over the next few years.
3. Surpassing the high-income country threshold as defined by the World Bank (~\$13,000 GNI per capita).

Base Case (70%)

From the vantage point of 2020, the Chinese economy is under considerable strain, both externally and internally. First, China has bungled its relationship with a number of G20 economies that have repercussions for market access. Second, China faces a slew of legacy problems and secular trends that constrain growth, ranging from local debt and an aging population to a less competitive business environment.

These challenges are not intractable, but overcoming them will require Beijing to adapt its current approach to managing both the external environment and domestic reforms. Skepticism abounds over the prospects of reform, but our base case is one in which China reforms its way out of current challenges.

This certainly seems at odds with present trends, but it is premised on Beijing's renewed emphasis on economic security as a result of its assessment of the external environment. That is the single most important variable that has changed significantly over the last few years and that will remain challenging for the foreseeable future. Yet it is precisely because of this pressure that the prospect of meaningful changes in the Chinese economy is more likely than it has been in nearly a decade.

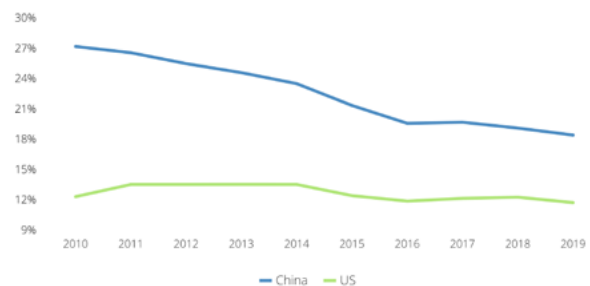
These changes center on three key issues: 1) further openings to foreign investment to stabilize the external environment; 2) domestic reforms to improve the business climate; and 3) prioritizing the expansion of the middle class to bolster domestic consumption. In fact, these will likely be the defining themes in the 14th FYP that takes China through 2025 and that will set a foundation for the next two FYPs through 2035, a crucial year for meeting Xi Jinping's national rejuvenation objective.

ANALYSIS:

1. More Openness to Stabilize External Environment

For all the talk of China's inward turn, it actually remains a relatively open economy, which means that it is especially sensitive to volatility in the external environment (see Figure 1). The Chinese economy still depends on global markets for demand, technologies, and capital. Yet it is currently facing a confluence of factors: anemic global economic recovery as a result of the pandemic, the rapid deterioration in market access of advanced economies, and continued decoupling of technology supply chains.

Figure 1. Exports Matter Much More to China Than To the US (% of GDP)



Source: Wind

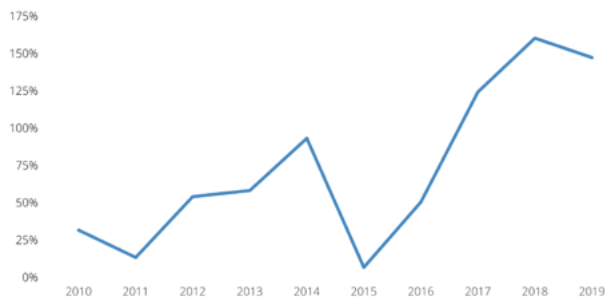
The search for organic demand isn't exclusive to China, and it should be able to withstand the near-term impact on exports. More crucial over the next few years is China's access to markets and technology, which are becoming constrained as tensions with the United States and other major economies mount. Since value-added manufacturing and technology sectors are integral to China's future economic development, current dynamics, if left unat-

tended, could seriously dampen that future. This would in turn undermine Xi’s “national rejuvenation” objective, which is largely defined in economic terms.

Beijing’s latest concept of “internal circulation” has been interpreted as its attempt to offset external volatility by closing itself off. But that would be disastrous for the economy. For example, Huawei has recently admitted that Washington’s latest ban [has effectively](#) crippled its development of advanced chips. Moreover, when it comes to cross-border financial transactions, China will continue to rely on the SWIFT system, which cannot be replaced by a domestic alternative.

Even if China can achieve marginally more technology independence over the next five years (see technology base case), it simply cannot quit global capital. This is because China is increasingly reliant on foreign portfolio inflows to balance its financial account (see Figure 2). If foreign capital senses that China is untethering itself from global markets, capital inflows will quickly dry up as investors swiftly exit. Capital flight of such proportions would create a currency crisis that dwarfs the 2015-2016 episode. These considerations impose limits on the extent of Beijing’s inward turn.

Figure 2. China Is Increasingly Reliant on Foreign Portfolio Inflows (\$ billion)



Source: State Administration of Foreign Exchange

Instead, Beijing will likely respond by making the China market much more open in order to prevent what could become a wholesale isolation of the Chinese economy. Although cognizant of the fact that a return to the old normal before 2016 isn’t likely, Beijing’s wants to arrest

the rapid deterioration in the external environment. A stable external environment was a necessary ingredient in China’s remarkable growth over three decades and the main purpose of Deng’s “hide and bide” principle.

“A stable external environment was a necessary ingredient in China’s remarkable growth over three decades.”

Embracing FDI can help China build significant foreign stakeholders in the Chinese economy that can serve as a counterweight to conflicts in other geopolitical arenas that are less amenable to immediate solutions. This is likely a reason behind accelerated talks on a possible EU-China investment treaty.

While Beijing may well be relearning some of Deng’s lessons, China is also learning its own lessons on the long-term cost of protectionism. In sectors such as financial services and automotives, instead of nurturing globally competitive firms, protectionism has instead led to rampant [rent-seeking](#) and resulted in [less competitive](#) industries. Curtailing the negative effects of protectionism was likely a key reason behind Beijing’s decision to further open both the financial services and the auto sectors, even amid the US-China trade war.

Openness, on the other hand, has been a crucial contributor to competitiveness in the Chinese economy. In many sectors, companies tend to rely more on their incumbency and local protection, rather than innovation, to maintain their market share. Foreign competition can bring that needed “*gaiatsu*” (foreign pressure) to raise the game of domestic firms and create a more competitive environment overall. Therefore, the push for openness is more aligned with domestic considerations and serves China’s own interest, making it more likely in the current environment.

Since protection of domestic firms has been a major source of unfair competition, the State Council has already [rolled out](#) policies for creating a more level playing field, emphasizing the protection of intellectual property. Beijing wants Chinese firms to catch up with the global frontier, and openness predicated on fair competition is the only way to credibly do so. The market entry of Tesla as a wholly foreign-owned enterprise fits with this approach.

2. Reform Execution Will Surprise on the Upside

More openness, however, seems to be at odds with “internal circulation.” But the concept, much like “supply-side structural reforms,” is more of a repackaging of reforms that, if executed well, will make China more productive and more competitive. This is because unlike short-term demand that can be boosted through stimulus, sustained domestic demand over the long term depends on organic growth. That kind of virtuous growth requires productivity enhancements, of which market competition and a healthy business environment are indispensable.

As a result, internal circulation actually complements openness because relying on the size of China’s market alone is no longer sufficient to attract significant FDI. Foreign investors need and expect more assurances on an improving business environment and fair competition—both of which require reforms to achieve. Notable pessimism on reform progress over the last decade has been justified, in large part because reforms resided more in rhetoric than action. But our base case expects much better performance on reform execution over the next five years.

That expectation hinges on a main factor: the central government’s “decoupling” from local governments. That is, local governments will be forced to confront hard budget constraints as Beijing remains hawkish on containing local debt and continues to cut off various borrowing and financing channels ([see MacroPolo’s local government debt product](#)).

This strategy of forcing local governments to operate in a resource-constrained environment means that they will need to seriously reform, rather than borrow and spend, their way out of economic challenges. Out of constraints usually emerge more resourcefulness, which is what Beijing intends. For local governments, competition will intensify across numerous dimensions, chief among them human capital.

As the size of China’s labor force continues to shrink, ever fiercer competition among cities and regions for human capital, particularly skilled labor, will lead to more relaxation of the hukou system. With the exception of a few first-tier cities, most Chinese cities have *de facto* [abandoned](#) hukou requirements for college graduates so they can permanently settle.

These expected changes will also benefit skilled blue-collar migrant workers. Being able to settle down in a city removes a significant factor of instability for migrants, many of whom end up returning to their hometowns in their 40s. Being able to live more permanently in cities will improve the lifetime income of migrants because urban wages are higher and can alleviate some of China’s labor shortage pressures.

“Our base case expects much better performance on reform execution over the next five years.”

Attracting skilled workers is one thing, more opportunities and career prospects will need to be created at the same time to ensure that they stay. This means cities also need to compete harder to lure the most promising businesses into the local economy, including foreign investors. The local business environment matters greatly in such competition, which could actually lead to a “race to the top”

on creating incentives and pro-business regulations that better ensure fair competition.

In essence, Beijing no longer wants, nor can it afford, to subsidize economic development as extensively as it did for decades. Instead, it will prioritize subsidizing public goods and social services to support quality of life improvements and to adapt to massive demographic shifts. As such, the central government is tightening its purse strings to allow competition and market factors to determine the fate of local economies. As a result, investment, industry, and human capital will increasingly agglomerate to more productive regions, and those that fail to improve their business environment will become laggards in this competition.

Controlling the purse strings, however, does not mean Beijing intends to micromanage local development. To execute these reforms necessarily entails a healthy dose of local experimentation. Beijing will be careful to not stifle the well-known entrepreneurialism of local governments. It has simply defined more clearly where local governments cannot color outside the lines. For instance, Beijing will not tolerate more corrupt and rent-seeking behavior, but it has also explicitly stated that local officials will [not be punished](#) for the negative consequences of experiments as long as they're conducted above-board to earnestly support development.

“The end of business as usual for local governments will be a painful process, but it is also necessary to get meaningful progress on reforms.”

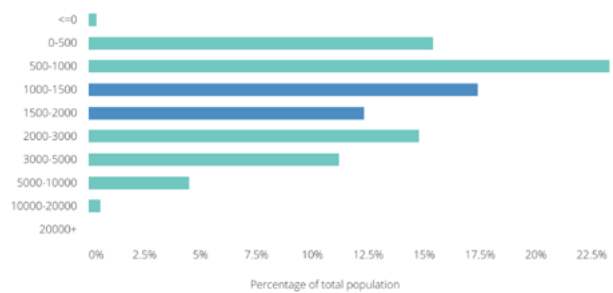
The end of business as usual for local governments will be a painful process, but it is also necessary to get meaningful progress on reforms. This is fundamentally how China's growth model changes.

3. Eluding the Middle-Income Trap: Creating a Large Middle Class

Along with progress on reforms, China by 2025 will likely become a near-majority middle-class country and by implication, a much more consumption-driven economy.

Beijing has long believed a sizeable middle class is integral to China's development. According to China's official income bracket definitions, “middle income” is defined as a monthly per capita income of more than 2,000 yuan (~\$290)/month. In other words, a four-person household requires an annual income of at least 96,000 yuan (~\$13,500) to be considered middle class. As of 2019, only 31% of the population, or 430 million, qualify as middle income or above (see Figure 3).

Figure 3. Fewer Than One-Third of Chinese Considered Middle Class



Source: Wan Haiyuan & Meng Fanqiang (2020)

Raising incomes has been China's longstanding goal, and the first phase of it was focused on poverty elimination, a goal that Beijing will have achieved by the end of 2020. The next cohort that China will focus on is likely the 600 million low-income citizens that [still live on](#) less than 1,000 yuan (~\$150)/month, according to Premier Li Keqiang.

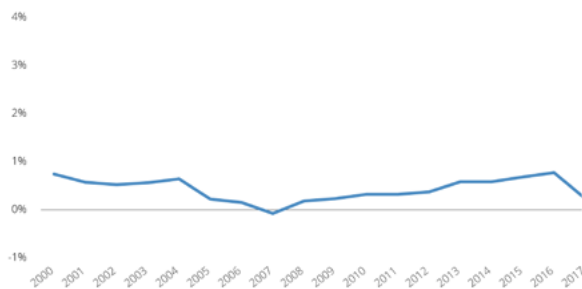
Bringing this income group into the middle class will require an emphasis on income redistribution to households, which will likely be a focus in the next FYP cycle through 2025. To do so, Beijing can rely on two main policy instruments: rationalizing the property market and forcing income transfers.

Property ownership is crucial for raising the income of rural residents. Currently, many types of property are owned by the rural collective, including township and village enterprises, which are a legacy of early reforms. Although rural residents have nominal ownership over these assets, most of them don't receive many benefits from the assets.

But the trend is moving in a positive direction. Rural property ownership has been more clearly defined, ownership certificates [have been](#) issued, and rural residents now have greater freedom to cash out from their land by either renting it out or leasing it long term. These changes will allow rural residents greater control over these assets and generate income from them.

For low-income urban residents, direct income transfers will be necessary. China has not performed well so far on redistributing income from corporates to households (see Figure 4). This is largely a result of China's growth model over the last 20 years—the government used taxes from corporates to finance massive investments rather than transfers to households.

Figure 4. Net Income Transfers to Households Have Been Negligible (% of GDP)



Source: Wind

But as China's growth model shifts gears, so too will the balance between investment and income transfers. For one, there's simply less need for investment in the economy and therefore fewer excuses to not focus on household transfers. After all, Chinese people are effectively the

shareholders of state-owned enterprises (SOEs), and for years they have received almost zero dividends.

Assuming the policy priorities detailed above are executed, combined with the effect of organic income growth, it's likely that hundreds of millions will enter into the middle class by 2025. Breaking this down, currently 12.3% of the Chinese population live on 1,500-2,000 yuan (\$210-\$290)/month and 17% of the population live on 1,000-1,500 yuan (\$140-\$210)/month. The vast majority of the former income group is expected to reach middle income by 2025, while at least one-third of the latter income group should also have a decent shot at making it with the help of pro-income policies and organic growth.

This means that an additional 17% of the Chinese population, or roughly 240 million, should reach middle income by 2025, bringing the total size to roughly 650 million. That means for the first time in China's modern history, nearly half the population will be middle class or above.

Secondary Scenario (30%)

Although the base case has a high probability of materializing, a confluence of several factors and political risks will lead to a scenario in which China regresses on both opening and domestic reforms.

For one, Beijing's efforts on opening and creating a better business climate may find little reception among OECD countries, as they do not find Beijing's overtures sincere. A frustrated Beijing will instead concentrate its efforts on consolidating relations with emerging markets, making it less necessary to maintain openness and attract FDI.

In addition, Beijing could veer too far in pursuit of technology independence and expand protections beyond specific vulnerabilities such as semiconductors to cover all high-tech industries. This would naturally accelerate the pace of technology decoupling with OECD countries and directly undermine openness efforts. Finally, OECD countries may turn inward and focus on their domestic challenges in the post-Covid era. This will lessen the pressure on Beijing and buy it more time to kick the can down the road when it comes to openness.

The execution of domestic reforms hinge on continuity in local debt containment and fiscal prudence. But two political risks associated with the outcomes of the 20th Party Congress in 2022 could undermine this condition and disrupt the continuity. The first centers on personnel changes and the second on central-local dynamics.

On personnel, the key risk is the replacement of Vice Premier Liu He, who will be 70-years old in 2022 and is expected to retire in accordance with the age limit norm. In addition to the key portfolio he holds on US-China and SOEs, Liu has held the line on tackling debt throughout

Xi's second term. His departure could mean less emphasis on deleveraging and more lax oversight of local governments' financing activities. This will especially be the case if Guo Shuqing, who is now the second most powerful finance official and aligned with Liu on debt containment, fails to get Liu's job.

On central-local dynamics, the post-20th Party Congress landscape could usher in a political rebalancing that restores power to local governments. More powerful local governments would make Beijing's efforts to deleverage and de-risk the financial system much less likely to succeed. Removing this constraint on local finances would likely mean a return to business-as-usual for local governments, thereby eroding the key condition for reforms and market competition to take hold.

完.



China Politics 2025: Stronger as Xi Goes

Neil Thomas

OUR CALL:

- By 2025, Xi Jinping will remain General Secretary of the Chinese Communist Party (CCP), Chair of the Central Military Commission, and President of the People's Republic of China. He will likely emerge the strongest he has ever been after the 20th Party Congress in 2022.
- It's unlikely that a clear successor will emerge from this political transition, to avoid diluting Xi's authority as the CCP focuses on executing its domestic reform agenda.
- Xi will likely focus his power on "the politics of execution" in his third term, as the 14th Five-Year Plan (FYP) begins his strategy to transform China into a superpower by 2035. This program will strengthen governance, discipline, and ideology to enhance Beijing's ability to transmit policy through central agencies and local governments.
- A strengthening focus on domestic priorities will involve some trade-offs, so Xi is unlikely to announce any major new foreign policy initiatives in the next five years.

KEY ASSUMPTIONS:

1. Xi avoids the kind of ruinous policy mistakes that could trigger widespread and coordinated elite resistance to his continued rule.
2. Power in central-local dynamics tilts further in Beijing's favor as costs are raised and possibilities are narrowed for local noncompliance with central directives.
3. The economic and security costs of potential conflict mean Beijing does not escalate tensions around regional hotspots into kinetic hostilities.

LEADING INDICATORS:

1. Xi is formally elevated to Mao's former position of CCP "Chairman" at the 20th Party Congress.
2. Xi's associates who enjoyed skip-level promotions to the 19th Politburo are elevated to the 20th Politburo Standing Committee (PBSC), as their lack of personal power bases make them less credible challengers for the leadership.
3. Party-State disciplinary bodies notch a record number of investigations and punishments—the most measurable manifestations of the "politics of execution"—in the five-year period between the 19th and 20th Party congresses.

Base Case (65%)

The significant shift from “collective leadership” under Hu Jintao to the “core leadership” of Xi Jinping in the last decade has created a more top-down and controlled political system. Many doubt the effectiveness and resilience of a system that concentrates power, stifles policy debate, and limits public expression. Moreover, the leadership adjustment that occurs in 2022 will be a key test of Xi’s enduring position, creating uncertainty about China’s future direction.

“At the start of this third term, Xi will likely be the strongest he has ever been politically.”

Our base case is that, at least through 2025, Xi will likely beat expectations and achieve many of his political goals, chief among them securing a third term as paramount leader. After the 2022 Party Congress, Xi will sit atop an organization largely purged of alternate power centers and stacked with loyal supporters in crucial Party, state, and military bodies. At the start of this third term, Xi will likely be the strongest he has ever been politically.

That strength, however, will not be channeled exclusively toward wrangling internal power. Even in the Chinese political system, performance and outcomes are important, especially for a leader who has defined his platform as delivering “the great rejuvenation of the Chinese nation” in exchange for exceptional personal authority.

Therefore, to realize his vision for China, and maintain his position with Party elites and the general public, Xi will likely channel a considerable portion of his power toward improving the effectiveness of Chinese governance. For Xi, a more effective political system is the surest way to advance the country’s progress toward “national rejuvenation,” particularly amid the dual challenges of a slowing economy and a less conducive external environment.

Xi’s third term will likely see greater emphasis on upgrading the Party-State’s regulatory, disciplinary, and ideological capabilities, toward the intended effect of “comprehensively deepening reform” in the economy, energy sector, and innovation system. In other words, Xi will likely direct his political capital at the “[higher-hanging fruits](#)” of governance changes seen as necessary to escape the middle-income trap and achieve comprehensive national power.

This “politics of execution” assessment centers on three major judgments: 1) Xi’s hold on power will solidify further; 2) Xi’s political focus will be on improving policy execution; and 3) These governance reforms will help deliver higher living standards for most Chinese people and thereby consolidate elite and public support for Xi’s rule. These developments will ensure his ideas influence or even permeate Chinese policymaking for decades.

ANALYSIS:

1. Xi Consolidates Political Power in 2022

Perhaps the defining theme of Xi’s first two terms has been his contravention of Chinese political norms. He remade the Party in his image, declined to promote a

“Perhaps the defining theme of Xi’s first two terms has been his contravention of Chinese political norms.”

leader-in-waiting, and abolished presidential term limits. These actions all but assure Xi a third term, and could enable a much longer reign, perhaps until around 2035. That’s the year Xi identified in his authoritative [19th Party Congress Report](#) as an accelerated target for the Party to “basically realize” its aim to make China a modernized great power. At that point, Xi would be 82, still three years younger than Deng Xiaoping when the latter left formal office in 1989.

To do this, Xi would have to exempt himself from the age eligibility norm for top leaders that was introduced in 1992. That norm, known as “[seven up, eight down](#)”, stipulated that leaders aged 68 or older in the year of a Party Congress must retire from the PBSC. Xi can ignore this norm because he has spent the better part of the last decade consolidating his hold over the three pillars of political power: the Party, the state, and the military.

In the Party, his fierce anti-corruption campaign crippled rival power centers, like the Communist Youth League and the “Petroleum Gang,” by sidelining numerous followers and imprisoning their patrons. Such moves allowed Xi to stack the CCP Central Committee and its 25-member Politburo with [more personal allies](#) than former leaders Hu Jintao or Jiang Zemin managed to install while in office.

Xi’s position within the Party became more salient as he progressively sidelined the parallel power structure of the State Council and its government bureaucracy. Decision-making and policy coordination are now centralized in Party “leading small groups” or commissions headed

by Xi. A trend toward separating Party and state was decisively reversed, as reflected by the [Party constitution](#) being amended to leave no doubt that “the Party leads everything.”

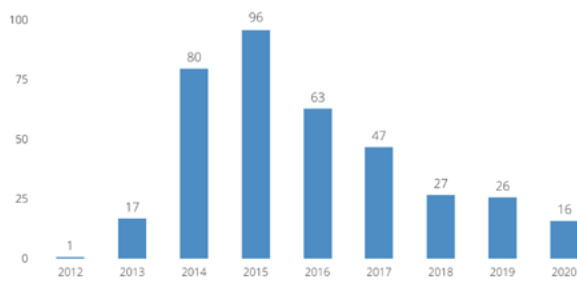
Importantly, Xi appears to enjoy [unparalleled authority](#) over the armed forces and the security services, after orchestrating radical reorganizations of the People’s Liberation Army (PLA) and the People’s Armed Police. [Pro-paganda and education campaigns](#) have made Xi virtually synonymous with the CCP regime to both popular and elite constituencies.

Of course, Xi’s bold moves have faced resistance. High-profile dissidents and disillusioned cadres feed reports of [burgeoning opposition](#) in Beijing, which could compound if China’s growth is imperiled by Xi’s policies. But there is little evidence of a “backlash” against Xi in the ~370-member [Central Committee](#) that forms the main “selectorate” of Chinese politics.

Someone in Xi’s position is well aware of such risks, which is why he has worked assiduously to build public support, in part by projecting China’s power abroad and by increasing the public costs of any move against him by elites. But this is also why Xi is unlikely to push much further on foreign policy issues like Taiwan, the South China Sea, and the Belt and Road Initiative—because he needs to keep China stable to sustain his legitimacy and achieve domestic goals.

A large decline in disciplinary investigations of high-level cadres suggests that Xi believes his position in the Party is increasingly secure—otherwise a rising or at least steady number of top-level purges would be expected (see Figure 1).

Figure 1. Investigations of Central Party-State-Military Cadres Spiked Then Declined



Source: Chinese state media; MacroPolo

Note: Data shows the year of investigation announcements from November 2012 to October 2020. Central Party-State cadres are deputy ministerial level or above. Central military cadres are deputy army level or above.

Over the next two years Xi will focus on shaping the 20th Party Congress in late 2022. He will likely reinstate the title of Party “[Chairman](#),” which only Mao Zedong has previously held. Xi will cement his organizational hold by engineering personnel changes that stack the Central Committee, Politburo, and PBSC with an unprecedented proportion of loyalists who will be reliable executors of Xi’s political and economic programs.

To avoid becoming a lame duck or empowering a potential usurper, Xi will likely avoid anointing an obvious heir apparent on the PBSC, while other PBSC members will still have to abide by the “seven up, eight down” norm. Given that assumption, and the retirement of term-limited Premier Li Keqiang, a new PBSC in 2022 could retain the age-eligible Zhao Leji, Wang Yang, and Wang Huning, and add three allies that Xi parachuted into the 19th Politburo. (MacroPolo’s [The Committee](#) will publish more in-depth analysis of the 2022 political transition in the coming year.)

2. Government Will Become a Better Means to Xi’s Ends

Xi’s extraordinary power stems partly from the extraordinary circumstances he faced on entering office. In 2012, following a “[lost decade](#)” of weak leadership that fueled corruption, indiscipline, and public cynicism, the CCP faced its biggest existential crisis in a generation. Xi

seemed to have won an elite mandate to exert authority and restore the Party’s standing.

Thus, for Xi, political power has a policy purpose. He wants to improve the Party’s ability to “[concentrate power to do big things](#).” He believes the Party needs to “comprehensively deepen reforms” that “[modernize China’s system and capacity for governance](#).” The bottom line is that Xi believes he needs to build a more effective Party to address the challenges facing China’s rise. That’s why his focus will be on the “politics of execution” and the confluence of strengthened Party regulation, discipline, and ideology.

Even Xi’s desire to centralize power in the Party has a policy rationale—to clearly divide the labor of governance at every level between deciders and implementers. At the top, Xi will likely use the 2023 National People’s Congress to pass “institutional reforms” that transfer more responsibilities in key policy areas, such as innovation and science, from state bodies to Party agencies.

“Execution is vital for Xi’s ambitious governance agenda because he cannot announce policy into reality.”

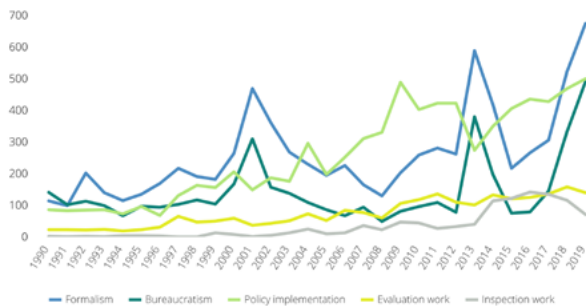
Execution is vital for Xi’s ambitious governance agenda because he cannot announce policy into reality. Central directives can be [circumvented or distorted](#) in their implementation by state agencies or by provincial governments down through the counties, townships, and villages. The Party-State is more “[fragmented](#)” than often assumed, and Xi wants to ensure that his blueprints actually play out across the country.

A perennial challenge for execution is the fact that fiscal activity is rather decentralized. Localities are responsible for ~85% of public spending yet collect just ~53%

of public revenues, a trend that has persisted for some two decades. The proportion of local-level spending rose dramatically under the Hu administration, from ~70% to 85%, giving local officials broader scope to direct resources toward ends that are at odds with central priorities.

Xi wants to remedy this intransigence and noncompliance, both in local governments and in the agencies that implement central policies. But rather than exerting control through more central spending, Xi seeks to improve execution by strengthening the Party’s monitoring and control of its agents, including how they can spend money. This priority is shown by greater emphasis on “evaluation work” and “inspection work” in Party discourse, and by Xi’s revived campaign against “formalism” (shallow implementation) and “bureaucratism” (inefficient implementation) (see Figure 2).

Figure 2. Party Media Focus on Policy Implementation Issues Rose Since 2012



Source: *People’s Daily Database*; MacroPolo

Note: Graph shows number of People’s Daily articles in each year that mention each term.

To improve political performance, Xi will likely prefer to empower internal disciplinary organs, namely the Central Commission for Discipline Inspection (CCDI) and the new National Supervision Commission (NSC), to inspect and evaluate more cadre behavior. Xi’s first term already saw record numbers of investigations and prosecutions, which will likely reach new heights by the end of his second term. The CCDI and NSC’s main focus will likely continue to shift from higher level cadres to lower level policy non-compliance, so these figures are likely to keep climbing over the next few years (see Figure 3).

Figure 3. Record Number of CCP Cadres Under Scrutiny (1000s)



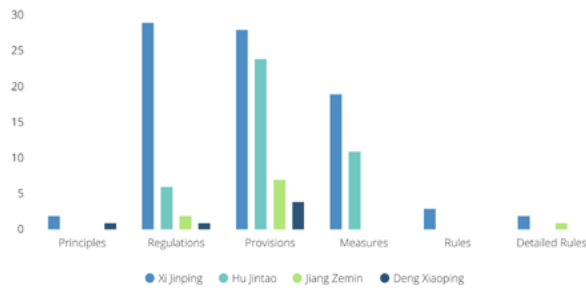
Source: *CCP Central Commission for Discipline Inspection*; MacroPolo

Note: Due to missing data, investigations and prosecutions data for 2018 are interpolated, and the prosecutions data point for 2007 is inferred as the mean of annual prosecutions from 2003-2006.

Beyond disciplinary tools, instilling belief in the Party and in Xi’s leadership will be another focus to generate more fealty on policy execution. Xi believes a major cause of the Soviet collapse was that ideological laxity “[rendered its Party organizations practically ineffective](#)” and so he will likely intensify both ideological study and ideological repression.

Bolstering control of execution will also involve increasing the Party-State’s use of legal instruments to govern. More laws and regulations will [delimit the powers](#) of officials, citizens, and firms throughout the country and establish clearer procedures for governing in all spheres. Xi’s affinity for “law-based governance” is evident in the unparalleled additions and revisions he has made to the corpus of Party regulations (see Figure 4). The passage of China’s first Civil Code in May 2020 shows a similar commitment to the formalization of state governance.

Figure 4. Xi Passed More Party Regulations than Predecessors



Source: *CCP Organization Department; MacroPolo*

Note: Number of operative Central CCP Regulations (*zhongyang dangnei fagui*) that were drafted or amended by each paramount leader, listed by regulation type in decreasing order of authority. These data exclude the CCP Constitution, amended by every reform-era Party Congress.

Valid concerns exist that Xi’s accumulation of personal-ized power means he will be surrounded by “yes men,” leading to more rigid and less innovative governance. The risk is real, yet Xi does encourage “[activism, initiative, and creativity](#)” in local governance and says [the Party](#) will “distinguish unintentional errors made to promote development from disobedient and illegal behavior to seek personal gain.” Put simply, Xi demands absolute loyalty to his overarching policy agendas, but encourages policy innovation within defined parameters.

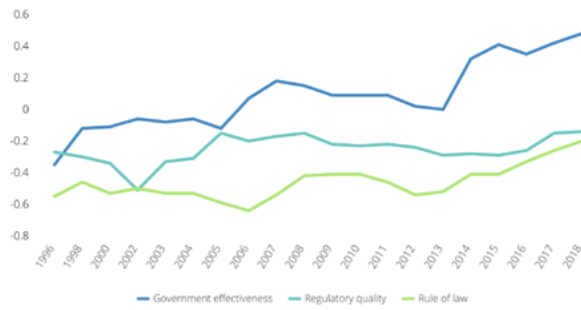
3. Xi’s Party-State Will Deliver More for Most Chinese Citizens

Xi’s muscular leadership and governance reforms will combine to deliver better living standards for most Chinese, not just in terms of income but also on “quality of life” concerns like health, education, and the environment. China will be able to do more with less because its political system—leveraging new technologies for educating, monitoring, and evaluating cadres and citizens—will more efficiently allocate social resources to its desired ends. Success on this front, predicated on a post-growth “[new deal](#)” to refocus policy on “[better life](#),” will create ideological support for Xi’s continued rule and further buttress his politics of execution.

There is some evidence that, after eight years of reshaping Chinese politics, Xi’s system of centralization and control may be delivering better outcomes. Measures of

government effectiveness, regulatory quality, and rule of law in China have increased notably after 2012, all of which now sit well above the medians for upper-middle-income countries (see Figure 5).

Figure 5. China’s Scores on Practical Governance Indicators Are Increasing



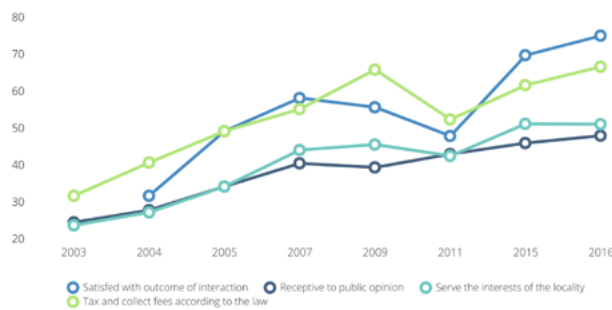
Source: *Worldwide Governance Indicators Project*

Note: Scores range from -2.5 to +2.5.

Central policymaking means little without changing local performance, but progress seems to have occurred on even this thorniest of problems, likely due in part to [greater public consultation](#) in the policy process. Surveys show rising satisfaction with local officials, who are viewed as more law-abiding, more receptive to public opinion, and less abusive of their fiscal powers (see Figure 6). Such developments will help sustain strong public support for Xi’s continued tenure as paramount leader.

“After eight years of reshaping Chinese politics, Xi’s system of centralization and control may be delivering better outcomes.”

Figure 6. Chinese Perceptions of Local Officials Are Improving (% Survey Respondents)



Source: Edward Cunningham, Tony Saich, and Jessie Turiel, *Understanding CCP Resilience: Surveying Chinese Public Opinion Through Time*, Ash Center for Democratic Governance and Innovation, 2020.

Note: Data points are represented by dots on the graph. Some years lack data.

More effective action to address poverty, pollution, and potential financial crises should also help improve living standards. From 2009-2018, the share of pro-social spending in [China's budget](#) trended upward, including for health (5.2% to 7.1%), education (13.7% to 14.6%), communities (6.7% to 9.5%), welfare and employment (10.0% to 12.2%), and agriculture, forestry, and water (8.8% to 9.5%). However, quality of life improvements will not be equally distributed, as the forced assimilation of ethnic and religious minorities in regions like Xinjiang, Tibet, and Inner Mongolia will likely continue.

A growing China will keep expanding its global footprint, but Beijing is unlikely to pursue ambitious new foreign policy agendas in the next five years. Managing the domestic economy will require China to maintain a significant degree of access to foreign markets, investment, and technology, even as it pursues a “[dual circulation](#)” strategy that reemphasizes internal drivers of economic development (see economy base case). Beijing will also look to stabilize relations with the West—at least those that don't impinge on what it considers to be “[core interests](#)”—as Xi works to reduce China's reliance on foreign inputs (see technology base case).

To be sure, Beijing will still face thorny political problems in 2025, with policy execution remaining far from perfect and many policy challenges lingering as long-term concerns. But Xi's governance reforms will improve overall performance in the sense that more of what Beijing wants done around China will actually happen. Practical difficulties and bureaucratic hindrances will persist, but the Party-state's ability to overcome these obstacles will also rise. Together with a nationalist recoil to anti-Beijing sentiment abroad, meaningful policy achievements will buttress public and elite support of Xi's rule.

Secondary Scenario (35%)

A less likely secondary scenario centers on a considerable increase in elite dissension to Xi's continued accumulation of power, which would most likely arise from a sharp downturn in economic growth and social stability.

This scenario would follow a series of unexpected shocks or major unforced errors, which go unchecked due to Xi's growing reluctance to adjust policy trajectories or pull back from risky situations. For instance, one such misstep could be a Chinese decision to massively escalate security tensions in Asia that prompts major multilateral sanctions and military retaliation, especially if the ultimate outcome is not a ready success for Beijing.

A growing sense of regime insecurity would build within the CCP and PLA, leading to serious opposition to Xi's leadership. A range of outcomes could flow from a weakened Xi, including a quiet retirement after his third term, or a more dramatic factional split within the Party. Whatever the specifics, a less united CCP would be less effective at reforming its governance to deal with looming economic challenges and would be a less stable actor on the global stage.

This scenario is less likely to occur because, as the base case stipulated, Xi also came to power in a moment of internal political crisis. Doing what is necessary to adjust course and keep the CCP united to advance China's development will remain his administration's underlying priority.

完.



China Technology 2025: Fragile Tech Superpower

Matt Sheehan

OUR CALL:

- By 2025, China's technology ecosystem will have matured and be on par with Silicon Valley in terms of dynamism, innovation, and competitiveness.
- That dynamism will increasingly take the form of industrial applications of information technology, as the locus of Chinese innovation shifts from the consumer internet to the industrial internet.
- China will largely succeed in deploying highly capable "new infrastructure"—cloud computing, 5G networks, smart cities, and surveillance networks, among others—to facilitate this transition to the industrial internet.
- US export controls on semiconductors will act as a modest brake on China's new infrastructure rollout. But expanding restrictions on semiconductor manufacturing equipment (SME) will mean that China remains vulnerable to future interruptions to its supply chain for advanced chips.

KEY ASSUMPTIONS:

1. Development of new infrastructure will be heavily prioritized in the 14th Five-Year Plan (FYP), in an attempt to generate new sources of growth from applying emerging technology to traditional industries.
2. The US government will largely maintain export controls on Huawei, but pressure from the US semiconductor industry and allies will prevent a major expansion of those controls that would block chip exports to tech giants such as Alibaba or Tencent.
3. There will not be major exogenous shocks to the technology landscape (e.g. game-changing breakthroughs in quantum computing or synthetic biology) that would fundamentally alter the global balance of technological capabilities.

LEADING INDICATORS:

1. Rollout of standalone 5G networks across the entire Jing-Jin-Ji Capital Economic Zone, the Yangtze River Delta region, and the Pearl River Delta Economic Zone.
2. China's cloud computing market surpasses \$30 billion in 2022, doubling its 2020 total.
3. Commercial production of advanced 7-nanometer (nm) chips by the leading Chinese chip fab, Semiconductor Manufacturing Industry Corporation (SMIC).

Base Case (60%)

In our base case, China's technology ecosystem over the next five years will have matured and will be largely successful in executing a transition from the consumer internet to the industrial internet. Specifically, the Chinese Communist Party (CCP) and private industry will try to use powerful emerging technologies like artificial intelligence (AI) and 5G to revamp and upgrade Chinese cities and traditional industries, such as manufacturing, agriculture, energy, and transportation.

This focus will mark a notable shift from the last decade of consumer technologies centered on apps like WeChat, Alipay, and TikTok. Instead, the Chinese tech landscape will likely enter a more capital-intensive phase as it targets industrial applications such as smart grids, dark factories, and autonomous vehicles (AVs).

“China’s technology ecosystem will be largely successful in executing a transition from the consumer internet to the industrial internet.”

By 2025, China will likely be a world leader in industrial technology applications, but that leadership will continue to depend on access to advanced semiconductors manufactured outside of mainland China.

Our base case is predicated on three factors:

1. The rollout of “new infrastructure” in key industrial and urban regions;
2. The rise of a new generation of Chinese industrial tech startups;
3. Progress by China in the design of semiconductors, but enduring weakness in the manufacturing of the most advanced semiconductors.

ANALYSIS:

1. New Infrastructure Paves the Way

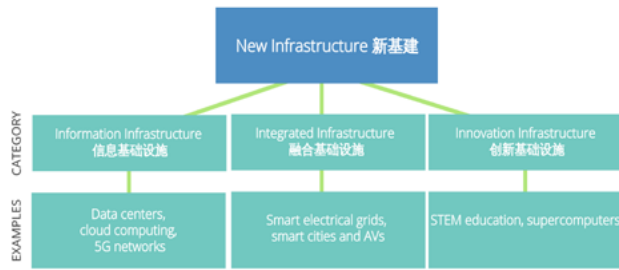
The term “new infrastructure” first surfaced in Chinese government language in 2018, but it picked up [major steam](#) in policy circles during the first half of 2020. Over the next five years, the push to build this digital infrastructure and use it to upgrade traditional industries will be central to China's technological development.

The National Development and Reform Commission has outlined three categories of new infrastructure: “information infrastructure” (data centers, cloud computing, 5G networks), “integrated infrastructure” (smart cities, smart energy), and “innovation infrastructure” (STEM education, supercomputers) (see Figure 1).

In this triumvirate, “information infrastructure” is the physical foundation that can accommodate the industrial-scale flow and processing of data. The second pillar of “integrated infrastructure” consists of the productive applications, often large-scale, that are built atop that

foundation. Finally, “innovation infrastructure” refers to the tools for cultivating and empowering human capital (Chinese researchers, engineers, and students) who can push the frontiers of indigenous technology.

Figure 1. The Structure of the New Infrastructure Initiative



Source: MacroPolo

By stitching these segments together, Chinese policy-makers aspire to create cities in which traffic flows and electricity grids are constantly optimized by AI algorithms. They aim to build airtight surveillance networks that allow automated monitoring of all public spaces nationwide, approximating the comprehensiveness of these networks in Xinjiang but without the mass internment of local citizens.

They envision 5G networks enabling fully automated “dark factories” and the deployment of AVs. And they hope to create universities where researchers have access to abundant computing resources and cutting-edge instruments. This techno utopian and dystopian vision remains a ways off from messier realities, but it serves as a guiding light for policymakers.

Making progress toward that goal depends on the active involvement of private technology companies. In our base case, those companies will actively embrace the new infrastructure push due to political-commercial alignment domestically, as well as major constraints internationally.

Domestically, both private Chinese technology companies and the Chinese government have mutual interest in the success of the new infrastructure initiative. Leading firms such as Alibaba, Tencent, and Baidu see enormous

commercial opportunities in “information infrastructure” (e.g. cloud computing) and “integrated infrastructure” (e.g. AVs and smart cities). From the CCP’s perspective, the social media apps of the past decade were often seen as a threat to its control over information, but industrial internet applications fit well with the Party’s view of technology as a tool for advancing its economic and political agenda.

Internationally, Chinese tech companies see their opportunities narrowing, particularly in Western markets. While these tech companies still have meaningful footholds overseas, especially in developing countries, international expansion no longer looks like a reliable source of growth in the medium term. This will force the companies to double down on domestic sources of growth, expanding beyond consumer-facing apps into enterprise services and products.

China’s new infrastructure rollout will face constraints on both local government access to financing and on the supply of semiconductors, particularly for Huawei (see below for more detail). In our base case, however, China will largely overcome these constraints in the medium term by initially focusing resources on pilot programs in key regions.

“China’s new infrastructure rollout will face constraints on access to financing and on the supply of semiconductors.”

On financing, the central government will want to avoid another investment binge that could saddle regions with debilitating debt and litter the country with “ghost data centers.” Both [local governments](#) and [tech juggernauts](#) have pledged some eye-catching sums for new infrastructure development, but a large portion of these expenditures were likely already baked in and have simply been

rebranded as “new infrastructure” investments. On semiconductors, Huawei’s dwindling stockpiles of advanced chips mean that China will initially have to pick its spots with the deployment of standalone 5G.

Given those constraints, the central government will choose to initially concentrate new infrastructure spending in key industrial and urban regions with the greatest immediate economic upside: the Jing-Jin-Ji Capital Economic Zone around Beijing, the Yangtze River Delta region surrounding Shanghai, and Guangdong’s Pearl River Delta.

“A new batch of emerging Chinese startups will reap the greatest rewards from the diverse products built atop that infrastructure.”

These regions have the necessary fiscal resources and human capital to make new infrastructure investments work, with major projects already underway in smart manufacturing and AVs. The addition of standalone 5G networks will enable more experimentation in areas such as smart cities, energy, and agriculture. Other regions with a specific industry cluster (Guizhou province’s cloud computing cluster or the massive surveillance architecture in Xinjiang) will also see new infrastructure investment, but the focus will initially be on key coastal hubs.

Forty years ago, these coastal regions acted as laboratories for China’s experiment with global trade and foreign investment. In the next decade, they will again become test beds for a major experiment in applying emerging technology to industrial and urban problems.

China will be largely successful at building new infrastructure in these regions, leading to real economic dividends around 2022. Those experiments will then be expanded to other regions, and the gains will become more nationally distributed toward the end of the 2022-2025 period.

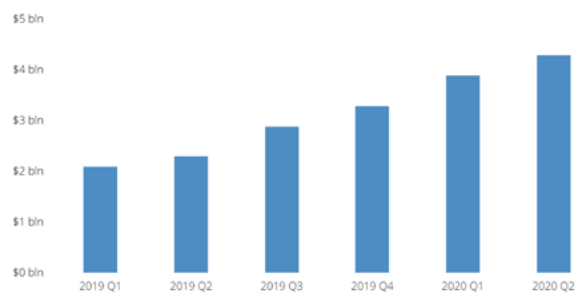
2. New Startups Take the Lead for the Industrial Internet

The benefits from the growth of China’s industrial internet will not be distributed equally across its technology companies. In our base case, China’s incumbent technology giants will take the lead in building out much of the physical “information infrastructure,” but a new batch of emerging Chinese startups will reap the greatest rewards from the diverse products built atop that infrastructure. Of the incumbent juggernauts, Alibaba is likely best positioned to capitalize on the new infrastructure initiative.

The reason for this lies in the incentives and business models of large platform companies like Tencent, ByteDance, and Baidu. These companies all succeeded by building software platforms used by hundreds of millions of Chinese consumers, with most revenue derived from advertising or fees attached to standardized services.

That platform model is relatively transferrable to information infrastructure like cloud computing. China’s tech giants saw what the growth of the cloud market did for [their US peers](#), and they have poured resources into recreating that success at home. China’s cloud market clocked in at [67% annual growth](#) in the last quarter before Covid-19 hit, with Alibaba, Baidu, and Tencent all pledging [major investments](#) in cloud over the next five years (see Figure 2).

Figure 2. China’s Cloud Market Sees Rapid Growth



Source: *Canalys*

But building the more targeted industrial applications made possible by new infrastructure requires a different

business model, one centered on highly customizable enterprise technology products. For example, a robotic inventory sorting system needs to be tailored to each customer's needs. Each new contract will likely require new engineering work and after-sales service. Tech juggernauts often lack the incentive structures to compete effectively in these verticals, except in the case of extremely lucrative contracts for large products such as smart city systems.

Instead, a new generation of Chinese technology startups will grow to fill these markets. Their niche products will leverage new infrastructure for industrial upgrading: smart agriculture systems, autonomous delivery drones, and enterprise software managing all of the above. These startups may not grow into the sprawling behemoths that their predecessors did, but they don't necessarily have to. They can build a useful and profitable business around a few concrete use cases and a few large customers.

Large companies will continue to lead in some applications of new infrastructure, particularly high-profile projects that involve working closely with municipal or provincial officials. Alibaba has already built out a number of ["City Brain" systems](#), and Baidu is piloting its [fully autonomous "robotaxi" fleet](#) in Changsha, Hunan. Among the incumbent juggernauts, Alibaba will likely see the largest upside from new infrastructure because it already [controls 40%](#) of the Chinese cloud market and has had some early success with smart cities.

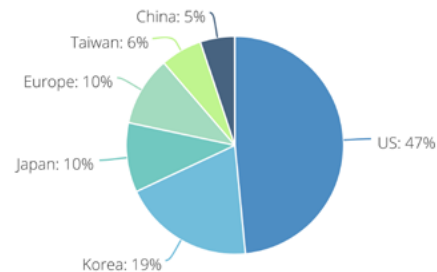
But for the hundreds of more niche products that will make new infrastructure valuable across so many industries, it will be this new batch of startups leading the way.

3. A Mixed Bag of Chips

Access to cutting-edge semiconductors remains a potentially serious obstacle to China's medium-term technology trajectory. Here China faces two external challenges: 1) restrictions on the export of advanced chips to certain Chinese companies such as Huawei; and 2) restrictions on the export of semiconductor manufacturing equipment (SME)—the crucial tools needed to manufacture chips domestically.

Our base case holds that through 2025, export controls on chips will have a modest impact on China's ability to execute on its digital infrastructure initiative. During this period, export controls targeting Huawei will substantially slow the nationwide rollout of standalone 5G networks, but it will not have a debilitating impact on most other new infrastructure applications. However, during this period China will struggle to gain ground in the fabrication of advanced semiconductors due to controls on SME exports. That lack of access to SME means China will continue to be dependent on foreign suppliers for advanced chips, and thus remain vulnerable to supply disruptions (see Figure 3).

Figure 3. Global Market Share of Semiconductor Sales, 2019



Source: Semiconductor Industry Association

In the short term (2020-2022), the greatest impact of US export controls on chips will be hampering Huawei's deployment of 5G networks in many parts of China. The company may have stockpiled enough inventory to install standalone 5G in a few key regions, but it has already [slowed down the construction](#) of new 5G base stations.

Our base case holds that, in response, China will seek to reconstitute its 5G industry around companies that are not subject to US export controls. Huawei—in consultation with the Chinese government—will likely license its large library of [standards-essential 5G patents](#) to domestic and foreign competitors, such as ZTE, China Information and Communication Technologies, and Sweden's Ericsson. In addition, Huawei's large workforce of radio frequency engineers experienced in 5G deployment will likely migrate to these companies, transferring their experience across a broad range of companies that attempt to continue building 5G in China.

This disruption and the messy process of re-bidding existing contracts will delay the national rollout of standalone 5G networks until 2022 or 2023. But these delays are unlikely to fundamentally affect other economically productive parts of China's new infrastructure. Many early experiments will first be conducted in coastal regions where standalone 5G networks can be prioritized for early deployment. In the meantime, the rest of the country can begin harvesting other low-hanging fruit from the many non-5G applications of new infrastructure technology.

While export controls on advanced semiconductors will likely have a modest effect over the next five years, our base case holds that restrictions on the export of SME will put a ceiling on China's ability to domestically fabricate advanced chips in the medium term.

Successive generations of semiconductors are classified by their "node" (also called "process"), with lower nodes representing more advanced chips. For much of the past 20 years, Chinese semiconductor fabrication plants ("fabs") have lagged 2-3 nodes behind the world's leading fabs. As of 2020, the world's most advanced semiconductor fab (TSMC in Taiwan) has begun producing chips at the 5 nm node. China's leading semiconductor manufacturer, SMIC, is currently three nodes behind, fabricating at the 14 nm node, though at low volume and with high manufacturing error rates. SMIC plans to begin limited production at the 7nm node in 2021.

Progressing to the next node is an immense challenge that often requires the purchase of new SME. Supply chains for SME are global, and the large majority of manufacturers use some US components in their production process. Limiting Chinese access to crucial SME gives the US government leverage, which it can exercise either by narrowly restricting direct US exports to Chinese fabs (using the Entity List) or through more expansive international controls that bar international SME companies that use US components from selling to China (using the Foreign Direct Product and *de minimis* rules).

If these expansive international controls were taken to the extreme, they could temporarily cripple Chinese fabs like SMIC by cutting them off from the supply or servicing of crucial SME components.

“While export controls on chips will have a modest effect, restrictions on SME exports will cap China’s domestic fabrication of advanced chips.”

In our base case, the United States will likely selectively limit Chinese access to SME, effectively preventing Chinese fabs from progressing past the 7 nm node. It will, however, avoid the "nuclear option" of entirely cutting off Chinese fabs from foreign SME exports (see more in the secondary scenario below). The goal of capping Chinese progress at 7 nm could be achieved by working with allies such as the Netherlands to formalize narrow controls on the export of the most advanced EUV photolithography machines, which are needed to make 5 nm or below chips.

These more targeted restrictions—blocking chip sales to Huawei and restricting but not entirely blocking SME exports to China—won't pose a grave threat to Chinese technology over the next five years. Most Chinese companies will still be able to source leading node chips from abroad, and China's leading fab will continue making incremental progress toward 7 nm fabrication.

But as leading global fabs like TSMC and Samsung progress from 5 nm to 3 nm and beyond, China's inability to advance past 7 nm will present a major vulnerability for its technology ecosystem. That vulnerability will give the United States, Europe, Japan, and South Korea enduring leverage in dealing with China's technological advancements.

Secondary Scenario (40%)

In the secondary scenario, China will struggle to deploy and leverage new infrastructure due to a combination of three factors: 1) debilitating frictions in applying new infrastructure applications to traditional industries; 2) long delays in restructuring China's 5G industry; and 3) major expansions of US export controls on semiconductors and SME. In this case, China's new infrastructure push turns into a boondoggle, and the country proves unable to leverage emerging technologies for upgrading traditional industries.

Frictions, missteps, and waste are usually part and parcel of a Chinese industrial plan on the scale of new infrastructure. But whether those frictions end up undermining the plan as a whole depends on their degree. In our secondary scenario, these difficulties in implementation prove costly enough that they undermine the real-world impact of new infrastructure.

Rather than private companies and startups, many of the most promising industries for new infrastructure upgrading are dominated by state-owned enterprises, companies not known for their nimbleness or innovation. These entities prove incapable of leveraging new infrastructure, and large expenditures turn into debt accumulation on the public ledger.

In addition, the rollout of standalone 5G networks proves far messier, setting back China's progress by up to four years. This may result from misguided government attempts to keep Huawei on corporate life support or the successive US blacklisting of any Chinese or foreign company working on 5G in China.

This leads into the third aspect of this scenario: a major expansion of US export controls on chips and SME to

China. In this secondary scenario, restrictions on chip sales are expanded to include some of China's leading cloud providers such as Alibaba. In addition, US restrictions on SME exports are unilaterally expanded to cover most global sales of SME to China that use significant US components, as well as the servicing of existing equipment, effectively crippling production lines at Chinese fabs for a time. In the short term, these actions would constitute an enormous blow to China's technology ambitions, one that would send the country's ecosystem reeling.

But over the medium and long term, they could also backfire on the United States if done unilaterally. Such a move would alienate key allies in Europe and Japan that produce SME, and incentivize all global SME companies to strip American components out of their own products to avoid US export controls. Replacing those US parts would be a slow process (experts estimate 5-10 years), but once completed it would effectively eliminate US influence over foreign SME suppliers and dramatically undercut the domestic US SME industry.

In essence, this is a card that can only be played once, and in this case Washington chooses to do so during 2020-2023, giving the United States a one-off bump in technological competitiveness by temporarily cutting off Chinese access to advanced semiconductors. In doing so, the United States sacrifices its long-term leverage over China and its credibility with allies, while also hampering the ability of US semiconductor companies to innovate and compete.

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China Energy 2025: Setting Course for Peak Emissions

Ilaria Mazzocco

OUR CALL:

- By 2025, China will be close to achieving peak emissions as a result of more ambitious actions to bolster renewables, pivot toward market mechanisms, and enhanced energy efficiency measures.
- Renewables will benefit from cost competitiveness relative to coal even in the absence of subsidies.
- Power sector reforms announced in 2015 will see meaningful progress to better support Beijing's decarbonization efforts.
- These factors will mean that non-fossil energy sources such as nuclear, wind, and solar will be the major beneficiaries relative to coal over the medium term.

KEY ASSUMPTIONS:

1. Energy consumption will continue to grow slowly and is likely to remain below GDP growth, facilitating the country's reduction in energy intensity and carbon emissions.
2. The costs of deploying renewable energy will continue to fall, enhancing the existing cost advantage of renewables over coal.
3. Political commitment to decarbonization will remain unchanged despite the presence of a strong pro-coal lobby.

LEADING INDICATORS:

1. Announcement of a midpoint non-fossil fuel target for 2025 in the 14th Five-Year Plan (FYP) or an updated Nationally Determined Contribution (NDC) of 18% or above.
2. Expansion of spot markets and inter-provincial trading beyond current pilot programs.
3. Measures to discourage coal power adopted in 2021-2022 through a combination of freezing new power plant approvals and restricting coal power capacity targets.

Base Case (65%)

China's energy policy over the past decade has been characterized by conflicting trends. The country continues to rely extensively on administrative measures to guide energy demand and supply despite repeated attempts to introduce more market-based measures, including price-setting mechanisms in the power sector and, most recently, the carbon emissions trading scheme (ETS). Meanwhile, renewables and coal vie for access to the grid, as rapid deployment of renewables has taken place alongside a coal industry that retains significant political support.

But those conflicts should be well on their way to being resolved by 2025. Our base case expects China to be close to achieving peak carbon emissions by then, fulfilling the goal set out by Xi Jinping to achieve peak emissions before 2030. This effectively marks the end of China's intense industrialization phase that will have spanned roughly 45 years. Reaching that goal has broad implications for China's energy landscape and will likely constrain coal's growth in the medium term.

To be sure, achieving peak emissions on an accelerated timeline won't be easy and will require stepped up efforts on several fronts. Dealing with coal will be key, which by implication means addressing bottlenecks and inefficiencies in the power sector, as it currently constitutes about half of coal consumption in China.

In 2020, China met its 13th FYP goal to raise [electricity](#) to 27% of total energy consumption, and the goal for 2025 will likely be even more ambitious as electrification of industry, buildings, and transportation continues apace. Given coal's longstanding privileged position in the power sector, constraining electricity generation from coal will

be thorny. For instance, the coal industry has long made the case that it is the most abundant and secure baseload energy source that can ensure energy security.

“Our base case expects China to be close to achieving peak carbon emissions by 2025.”

But two main factors militate against the expansion of coal, despite current trends. First, power sector reforms and measures to improve efficiency and flexibility in the power system are likely to see more progress. The outcomes of such reforms should make energy usage more efficient, reducing overall demand while facilitating the integration of more renewables into the grid. Second, the economics of renewables in China are such that wind and solar photovoltaic (PV) utility-scale installations are increasingly competitive with coal. Because the Chinese government is now less inclined to subsidize renewables, better market incentives and regulatory support will be needed, which bode well for reforms in the power sector.

Moreover, political support for decarbonization remains strong, exemplified by Xi's unexpected public pledge on carbon neutrality at the UN General Assembly. Skepticism is warranted given the magnitude of reforms needed to achieve that target. But on the other hand, Beijing did not have to publicly offer such a goal, vague as it is, and

doing so was an internal decision that likely reflects real high-level commitment to decarbonization.

To have any hope of reaching the 2060 goal, however, China will have to first demonstrate its credibility in the medium term. One indicator of credibility would be setting the non-fossil fuel in primary energy target for 2025 above the current 17.5% to 19% or even 20% (currently the target is 20% for 2030) as part of China’s Paris Agreement. To achieve that goal would require an estimated average of between 128 GW to [158 GW](#) of new solar and wind installations per year.

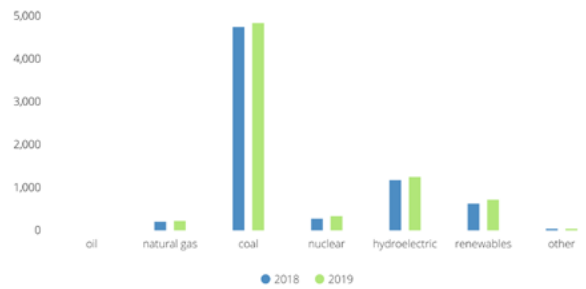
Within this context, there will be a limit to how much coal can meaningfully expand as there is now more political impetus to deploy renewables and achieve peak carbon in the medium term. Over the next five years, our base case is net bullish on renewables, predicated on three key factors: 1) progress on power sector reforms and continued electrification; 2) cost competitiveness of renewables relative to fossil fuels; 3) enhanced restrictions on coal expansion.

ANALYSIS:

1. Electricity, Efficiency, and Markets

Some have likened decarbonizing the energy system to a production mobilization effort tantamount to World War II. In China, however, the main challenge for renewables isn’t the supply side but the demand side. Renewables demand has been limited by the outsized role of coal in the power sector (65% in 2019) and the lack of a market-based electricity dispatch system as well as extensive direct combustion of coal—among other things (see Figure 1).

Figure 1. China’s Power Generation by Fuel in 2018 and 2019 (terawatt-hours)



Source: BP Statistical Review of World Energy 2020

Dethroning coal won’t happen overnight, but the confluence of three factors will likely enhance renewables at the expense of coal over the medium term: electrification, demand-side efficiency measures, and power sector reforms.

First, electrification of broad swathes of the economy will very likely continue to expand, bringing more energy consumption onto the grid. For instance, coal, particularly in rural areas, is used for coal boilers, coal stoves, and small private coal plants in industry. Electrification of this type of energy consumption, even if some of the electricity is from coal, is more efficient and less carbon intensive.

Second, to better accommodate power demand growth and prevent it from overwhelming the system, the government is likely to focus more on demand-side response measures to improve energy efficiency. Such actions can now be better facilitated by the ongoing digitalization effort that is central to the “new infrastructure” push (see technology base case). This is important because it reduces the gap that needs to be filled by non-fossil fuels and counters the argument that rising power demand requires more coal capacity to prevent blackouts or brownouts.

Expanding electricity’s share in overall energy use should also lead to a reduction in primary energy consumption because of efficiency gains and reduced demand from polluting extractive industries.

One study projects that on average countries [will see](#) over 40% of decline in energy consumption thanks to rapid electrification.

China already has in place some of the [most comprehensive](#) mandatory energy efficiency policies and regulation, and the recently launched national ETS could also help in the efficiency drive, especially on the producer side. It is possible that in coming years benchmarks and allocations will be adjusted to put more pressure on power plants, further supporting Beijing's efficiency and carbon intensity goals.

Third, power sector reforms will likely see significant progress. While electrification and efficiency measures can help limit energy demand growth, the system through which electricity production and delivery is managed will need to be updated to improve flexibility, efficiency, and facilitate the integration of renewables.

In China, electricity dispatch is still mainly determined administratively (also known as "fair dispatch") through quotas. In addition, selling and trading energy across provinces has been difficult, a barrier that has [led up to](#) an estimated 40% curtailment of renewable energy in recent years. In other words, China's power sector in general is not very responsive or flexible, a legacy of state planning and the continued dominance of [state monopolies](#).

“Power sector reforms will likely be dramatically expanded across the country over the next five years.”

Two major measures, the introduction of spot power markets and the expansion of inter-provincial power trade, are key to improving efficiency in the system and would largely solve problems with curtailment of renewables. For example, [the IEA estimates](#) that pursuing these

reforms, by 2035 carbon emissions would be lowered by 750 million tons per year and power system operational costs by 15% (mainly due to savings on fuel costs). The Rocky Mountain Institute, too, [has predicted](#) that implementing these measures could lower emissions in China overnight by 4.4% (0.4% of global annual emissions).

Beijing has in fact already launched a [reform program](#) in 2015 that included these measures. Progress seems particularly visible for spot markets, which have been tested in eight pilot provinces since 2019. Guangdong province, which has a larger population than Germany, [recently ran](#) spot markets for one month continuously for the first time. Other provinces like Jiangsu [have introduced](#) market reforms on their own even though they are not part of the national pilot program.

These power sector reforms will likely be dramatically expanded across the country over the next five years. Despite [several challenges](#) highlighted by Guangdong's experience, these reforms [could lower](#) electricity prices, incentivizing provinces concerned with industrial competitiveness to adopt such measures. That would align bottom-up and top-down incentives in pursuing such reforms.

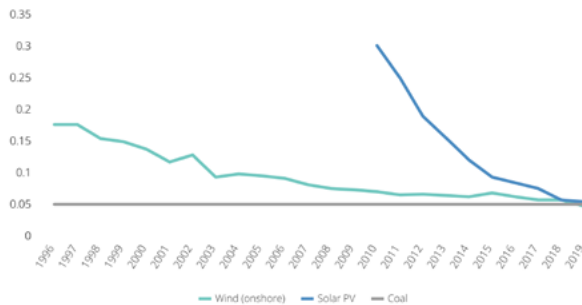
Even as meaningful progress on sectoral reforms takes place, China's power sector isn't likely to become fully marketized in the medium term. These reforms can be disruptive, as they could lead to bankruptcies and plant closures and may face resistance from the powerful State Grid. As such, power market liberalization will likely proceed unevenly across regions. Still, power sector reforms should significantly facilitate the integration of renewables and reduce overcapacity by incentivizing the exit of less efficient thermal power plants.

2. Renewables Now Cost Competitive with Coal

Current plans for coal capacity expansion will likely need to be revisited to ensure that wind and solar are not squeezed out. Existing laws already require grid companies to prioritize renewables, but guaranteed quotas for coal are a source of conflict. But this conflict may be

ameliorated as the economics are increasingly in renewables' favor, especially if reinforced by market reforms (see Figure 2).

Figure 2. Cost of Renewables Projects Is Approaching that of Coal, 2019



Source: IRENA

Note: The data shows the weighted average levelized cost of electricity (LCOE) of commissioned onshore wind projects and utility-scale solar projects in China (\$/KWh). Coal data is the lower bound LCOE estimate of mine-mouth coal fired power plants in 2019.

Indeed, a major change over the last few years is that the cost of new solar and onshore wind installations, even without subsidies, is [approaching that](#) of coal plants, putting significant competitive pressure on the legacy industry's future. As of 2020, the National Development and Reform Commission had approved 33 GW and 11.4 GW of unsubsidized grid-connected solar and wind projects, respectively.

This is also why the central government, having generously subsidized the renewables industry for at least a decade, is now [shifting from](#) a subsidies regime for new energy industries, including electric vehicles, to one that is more market driven. This changed attitude reflects perceptions that the renewables industry has arrived and can now stand on its own two feet.

The declining cost of renewables could well lead to a sea change over the next few years to significantly shape investor preferences on energy projects. For instance, investing in coal no longer seems as safe a bet, as the industry faces thin profit margins and falling utilization rates. According to [some metrics](#), 43% of coal plants in China are already uncompetitive, a portion that could increase

to 94% by 2025. What's more, 30% of coal companies were running at a loss in mid-2019, up nearly 7 percentage points from the start of the year. Meanwhile, the average utilization rate for coal power plants [had fallen](#) to as low as 50%.

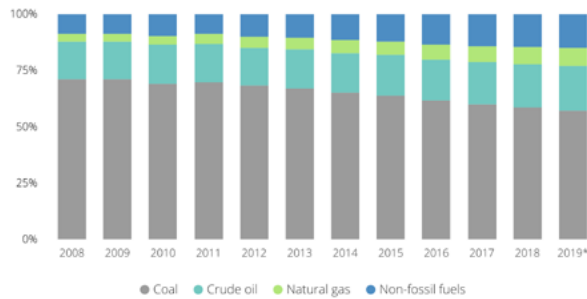
Although the economics are increasingly unfavorable for coal, the industry still retains political clout (see more details below). But more regulatory support for renewables, in place of subsidies, will likely tilt the balance over the next five years, particularly at the local level. There have been some positive signs in this regard with the introduction of provincial renewable electricity quotas and the prioritization of renewables in the draft energy law, among others. This will happen more quickly in some regions than others, as local governments are often directly invested in coal projects through local state firms.

“Concerns over recent coal capacity growth are legitimate, but not all approved projects will see the light of day.”

3. Restrictions on Coal

There's no doubt that coal's position in China's overall energy consumption remains dominant even as it continues to shrink in relative terms—it fell another 8 percentage points from 64% in 2015 to under 58% in 2019 (see Figure 3). The industry is a large employer, has been an important contributor to boosting local GDP, and is a source of tax revenue. For example, for [every million dollars](#) spent, the coal industry produces 68 direct jobs, compared to 31 in oil and gas and just under 30 for solar and wind.

Figure 3. China's Primary Energy Consumption by Fuel in 2019



Source: Statista; National Bureau of Statistics; author's calculations based on BP Statistical Review of World Energy 2020

Finally, provinces prefer [to rely](#) on local power generation rather than import it from other regions, providing yet another incentive for local investments in large coal power projects—which traditionally have been the most reliable energy source. Consequently, local governments have been [eager to approve](#) and support the construction of new power plants. After a temporary freeze in 2017 and 2018, new coal projects have been on the rise again since 2019 largely thanks to local state firm investment.

Currently 98 GW of new coal-fired power plant projects are [under construction](#), while another 153.7 GW are in the pipeline—combined that's more than India or the US' entire coal fleets. By comparison, 11.5 GW of solar [were installed](#) in the first half of 2020, bringing the total grid-connected solar capacity to 216 GW by the end of June. Total installed onshore and offshore [wind capacity](#), on the other hand, added up to about 217 GW by mid-2020.

Concerns over recent coal capacity growth are legitimate, but not all approved projects will necessarily see the light of day. Beyond the favorable economics of renewables and renewed push on power sector reforms, Beijing could well crack down harder on coal plants expansion for several reasons.

One, the coal industry already faces overcapacity and low utilization, which means more local investment in coal could turn into stranded assets, especially if the reforms discussed above mitigate energy demand growth. More-

over, coal will have to compete with the expected 130 GW of nuclear power coming online by 2030 and hundreds of GW of renewables over the next several years.

Given Beijing's newfound fiscal hawkishness, local financing going toward unproductive assets will be carefully scrutinized (see economy base case). In the meantime, the central government will continue to pursue its industry consolidation strategy to drive mergers and phase out older and inefficient coal power plants. For example, between 2010 and 2020, the Global Coal Plant Tracker [estimates that](#) 103 GW, or close to 10% of current installed capacity, were retired.

Two, the central government could well use the newly established national ETS, alongside other policies, to raise costs for coal plants and make them an even less desirable investment. While not particularly punitive for coal plants at the moment, the ETS system can be improved so that emissions benchmarks do put more pressure on coal. Among other things, the ETS is expected to increase the quality of emissions data, which can help improve planning and policymaking.

Three, Beijing will likely wring more compliance out of local governments in redirecting their investments toward projects that are more aligned with central mandates (see politics base case). In addition to administrative tools to freeze new coal power plant approvals in provinces (the so-called traffic light system), the 14th FYP will be the main occasion to gauge the central government's ambitions in curbing coal consumption. It is impossible to take a hatchet to the coal industry given its centrality in China's energy system, but Beijing also seems to realize that a scalpel approach won't be enough to meet its peak emissions goal.

Simply put, the pathway to a carbon neutral economy cannot allow enormous growth in coal use over the next five years. That growth will be managed, while Beijing will put pressure on local governments to redirect towards renewables.

Secondary Scenario (35%)

In this less likely scenario, the politics behind coal become difficult to overcome as major state entities call for expansion of coal, such as the [China Electricity Council](#), the State Grid Energy Research [Institute](#), and the China Electric Power Planning & Engineering [Institute](#). They collectively argue that potential energy shortages as a result of electrification could negatively impact the economy and social stability. It could also mean overreliance on energy imports that may present more risks in an uncertain global environment and instability with the United States.

As such, the 14th FYP will reflect a less ambitious and more modest transition from coal, making it much tougher to meet peak emissions before 2030. In this scenario, reforms to the power sector will be put on hold, making decarbonizing the grid harder to achieve. At the same time, the lack of regulatory support for renewables would mean that local governments will continue to pursue coal.

The favorable economics of renewables may still lead to coal's eventual phasing out, but timing matters. While Beijing will still remain committed to transitioning away from coal, a more timid approach will jeopardize Xi's pledge on reaching carbon neutrality by 2060 and will likely invite ever more skepticism of Beijing's credibility globally.

Finally, slow progress on reducing emissions could undermine Beijing's relationship with Brussels as climate is still viewed as an area of common interest between the European Union and China. It would be the first time that China would largely turn its back on climate commitments and forfeit an opportunity to overcome the bottlenecks

that have long existed in the energy sector. This is an outcome that Beijing would prefer to avoid, making it a less likely scenario.

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ABOUT

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