

SECTOR IN-DEPTH

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Environmental Risks – China

Path to net-zero emissions points to bumpy transition for fossil fuel-driven sectors

Summary

Global momentum and domestic initiatives behind reducing carbon dioxide (CO₂) emissions to net zero by midcentury will have credit implications for Chinese entities across sectors. The energy and emissions targets in [China's](#) (A1 stable) 14th Five-Year Plan align with the country's goal of reaching peak emissions by 2030, implying that key sectors of the economy will be subject to even more aggressive policy adjustment beyond 2030 for China to achieve carbon neutrality by 2060. Other policy challenges include reduced access to foreign capital, differing capacities to achieve carbon transition across provinces, and ongoing policy developments in the [EU](#) (Aaa stable) and the [US](#) (Aaa stable) that may create regulatory risks for Chinese exporters.

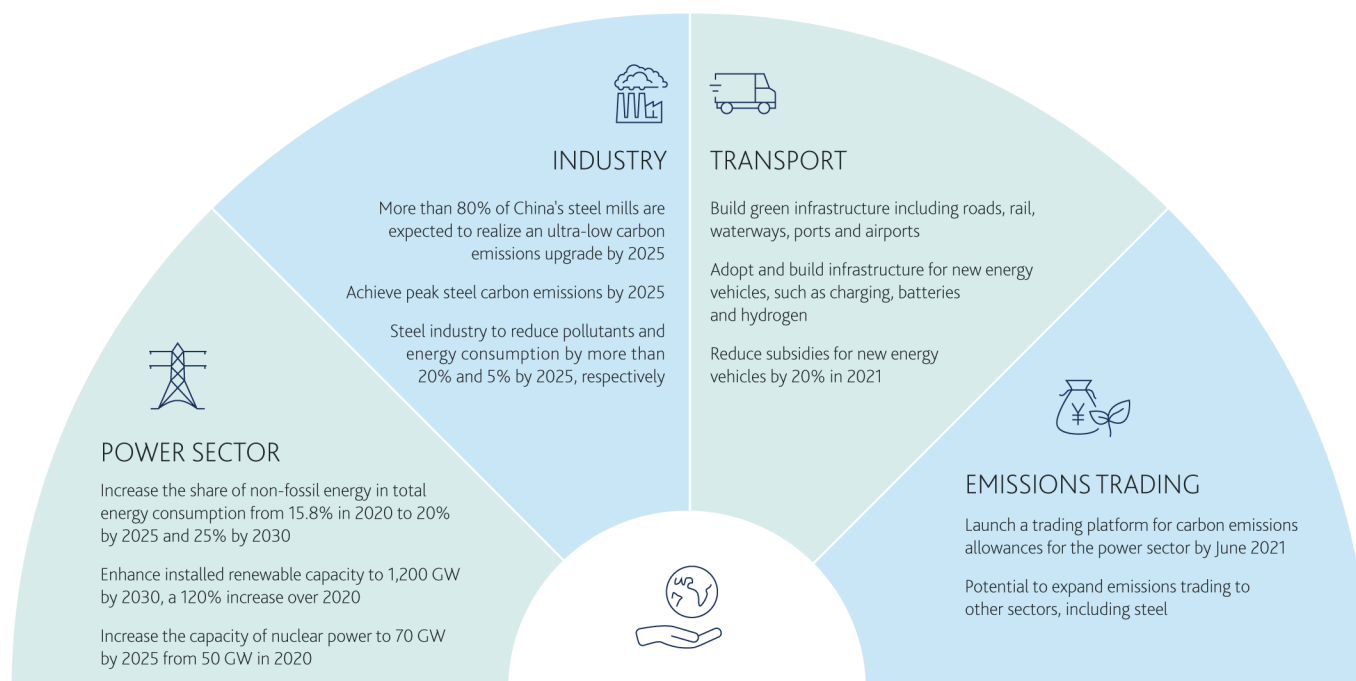
- » **Five-Year Plan targets imply a more aggressive transition to achieve net-zero emissions by 2060.** China's emissions over 2020-30 will determine the viability of its 2060 net-zero CO₂ emissions target. While targets for the next decade put CO₂ emissions on course to peak by 2030, this indicates that more aggressive and potentially disruptive emissions reductions will occur to achieve carbon neutrality by 2060.
- » **Credit impact for fossil fuel-based sectors will crystallise this decade, with largest companies better positioned.** The biggest carbon-emitting sectors in China are among the most exposed to carbon transition risk. Credit effects for the utilities, fuel commodities, steel, cement and financial sectors will begin to take shape over the next decade. Companies involved in renewable energy, batteries, construction and electric vehicles will benefit, while financial institutions will be compelled to adapt to rapid shifts in the technological and regulatory environment and to changes in borrower behaviour.
- » **Differentiated transition policies will emerge across China's provinces.** We expect a multispeed transition, with large industrial provinces and major coal-producing regions likely to find the process most difficult. Regional and local governments (RLGs) that are still adding fossil-fuel capacity are likely to face higher long-term debt and contingent liability burdens as these investments become redundant.
- » **Convergence of net-zero plans outside China will amplify credit pressures.** Growing global momentum¹ and investor pressure behind national net-zero targets, and carbon taxation measures in jurisdictions including the EU will increase pressure on Chinese producers to conform to global standards and accelerate emissions reductions, although these measures will only develop over time.²

Five-Year Plan targets imply a more aggressive transition to achieve net-zero emissions by 2060

The Chinese government's draft 14th Five-Year Plan³ for 2021-25 targets a reduction in CO₂ emissions per unit of GDP by a cumulative 18% from 2020 levels, among other key environmental goals launched in recent months (see Exhibit 1). The plan also envisages a reduction in energy consumption per unit of GDP by around 14% from 2020 and an increase in the share of non-fossil energy in primary energy consumption to 25% by 2030, up from the current level of 15%. Meanwhile, President Xi Jinping announced that China's coal usage will peak by 2025, before declining in the second half of the decade.

Exhibit 1

Climate targets are leading to new regulatory initiatives, which will drive credit risks and opportunities over the next decade



Sources: Xinhua News Agency, Ministry of Ecology and Environment, National Development and Reform Commission, People's Bank of China and Moody's Investors Service

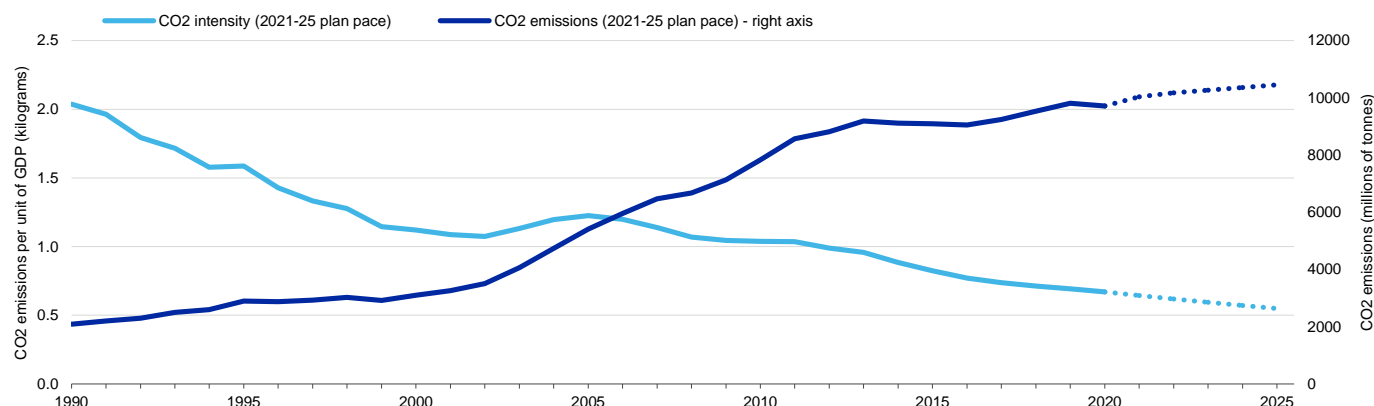
The interim environmental targets will set the stage for China's goal of reaching peak CO₂ emissions by 2030 and net-zero CO₂ emissions by 2060, as pledged by Xi at the United Nations in October 2020 and at the US Leaders' Summit on Climate in April 2021 (see Exhibit 2). China is the largest emitter of CO₂ on an absolute basis; therefore, its efforts to achieve net-zero emissions will be fundamental in reducing international emissions to limit the global temperature increase to below 2.0 degrees Celsius by 2100, per the Paris Agreement.

Plans for implementing the climate policies remain vague. However, sector-specific targets and policy measures are likely to be detailed in ministry-level plans over the course of 2021. An emissions-trading scheme for the power sector will also officially launch in June, setting a market price for carbon.

The scale of ambition and the potential credit impact of China's carbon transition are considerable in terms of the industrial reconfiguration and technological advancement that they will involve, given the likelihood that the authorities will seek to support economic growth over this period sufficient to sustain employment.

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Exhibit 2

China's emissions intensity target will bring CO2 emissions close to 2030 peak emissions goal

Emissions trajectory through 2025 assumes our forecasts of real GDP growth in China of 8.5% in 2021, 5.5% in 2022, and 5.0% thereafter.

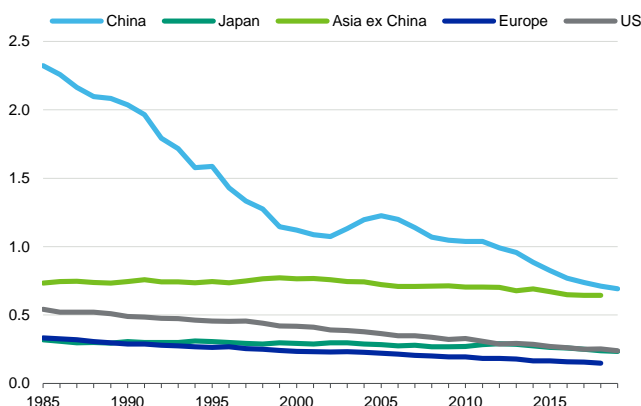
Sources: International Energy Agency and Moody's Investors Service

Under our assumption that China will maintain average real, inflation-adjusted GDP growth of around 4.5% through 2030, moving toward peak CO2 emissions will involve a reduction in the economy's emissions intensity to 0.5 kilogram of CO2 per unit of real output in the next five years – a level that would nevertheless remain above current intensity levels in other industry-heavy countries such as [Japan](#) (A1 stable) and [Korea](#) (Aa2 stable), and above the rest of Asia (see Exhibit 3). While China's per capita emissions are below most of the other top global emitters, it is also embarking on emissions cuts while at a lower level of per capita income and with a higher manufacturing share of GDP, introducing a unique set of economic and political risks (see Exhibit 4).

Exhibit 3

Emissions intensity of the economy underscores transition challenge ...

Kilograms of CO2 emitted per unit of real dollar GDP

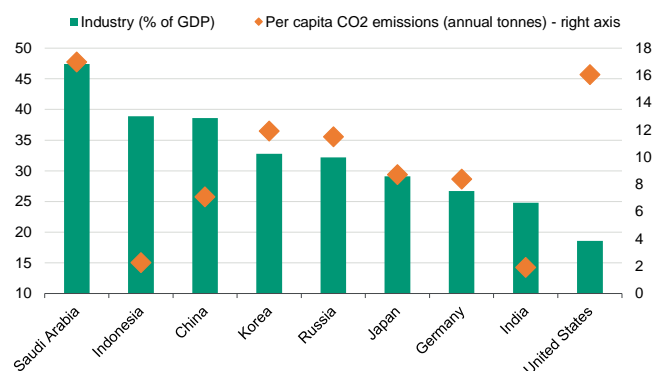


Sources: International Energy Agency and Moody's Investors Service

Exhibit 4

... represented by China's mining and industrial heft relative to other large emitters

Industry share of GDP and per capita emissions, top global CO2 emitters

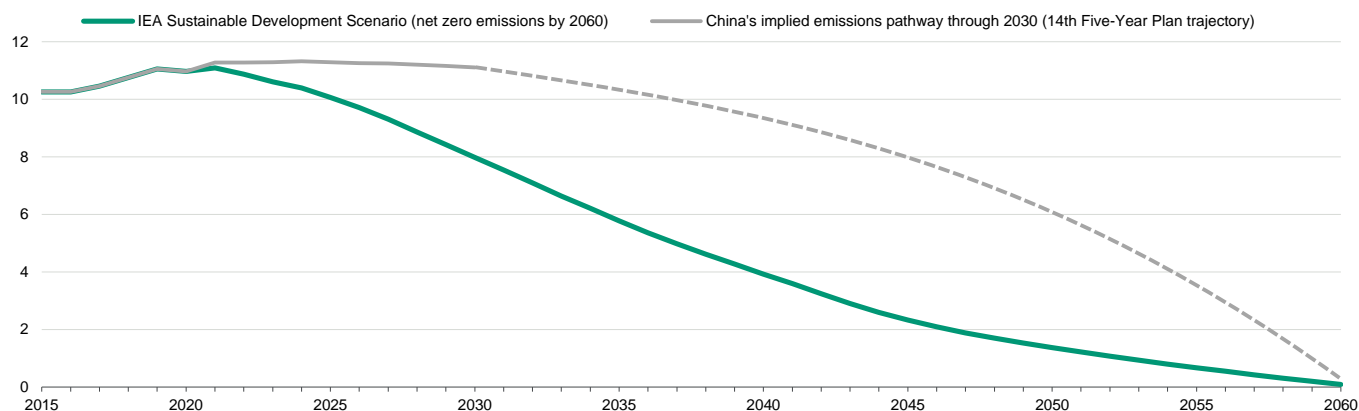


Sources: World Bank, International Energy Agency and Our World in Data

The Five-Year Plan trajectory indeed puts China on the path to peak carbon emissions by 2030. However, the plan signals a more aggressive and potentially disruptive path beyond 2030 if China is still to achieve its target of carbon neutrality by 2060, a pathway that would largely align with the Paris Agreement's goal (see Exhibit 5).

In an alternative scenario, China may outperform its targets through 2030, driven by (1) faster-than-expected technological innovation, or (2) more aggressive policies that more closely align with the International Energy Agency's (IEA) Sustainable Development Scenario, a more stringent emissions trajectory that reaches net-zero emissions in 2060 and incorporates policies that support the UN's Sustainable Development Goals.⁴

Exhibit 5

China's baseline emissions trajectory delays more aggressive transition to the futureNet CO₂ emissions, millions of tonnes

Dotted line represents one notional pathway to net-zero emissions in 2060, assuming peak emissions in 2030. In practice, there will be a number of potential pathways to net-zero emissions.

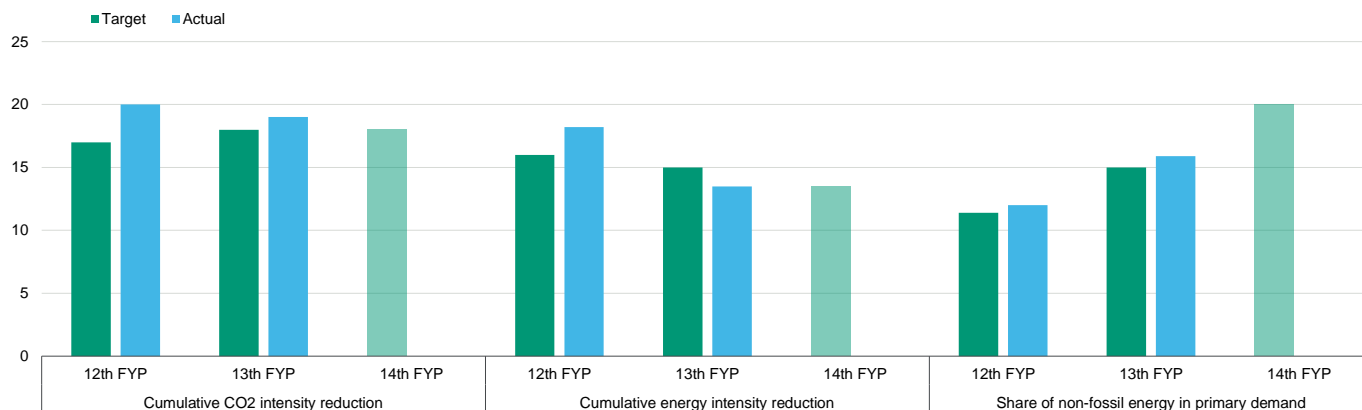
Sources: International Energy Agency, Our World in Data and Moody's Investors Service

Under either scenario, the speed of the transition would be unprecedented and its impact untested. Technological advancements, such as the rapid deployment of and cost reductions for solar power, have allowed for faster transition over the past 20 years, but the planned pace of transition is unprecedented. China has historically achieved emissions intensity targets in previous Five-Year Plans, although further reductions will become more difficult to achieve because of diminishing returns (see Exhibit 6). Political economy considerations associated with reconfiguring China's industrial base toward cleaner energy and electrification will also complicate emissions reduction, particularly given the effect on employment in higher-polluting industries.

Exhibit 6

China has hit most of its past environmental targets, but forthcoming targets are increasingly challenging

% change during the five-year period



FYP = Five-Year Plan

Source: Bloomberg New Energy Finance

Although achieving net-zero emissions will play out over the longer term, we expect credit pressures for the sectors most exposed to carbon transition to emerge sooner than implied by the path of CO₂ emissions, as policy announcements come due and global investors and policymakers scrutinise China's demonstration of its Paris Agreement commitments. Investor concern likely will grow if the pace of near-term transition underperforms targets, potentially triggering more forceful policy responses by the central government.

Credit impact for fossil fuel-based sectors will crystallise this decade, with largest companies better positioned

China's energy-intensive industrial structure and high dependence on coal-fired power underscore the challenges of achieving the net-zero emissions target and the large role of governments and sectors in reducing CO₂ emissions. The largest carbon-emitting sectors in China are among the most exposed to the negative credit effects of carbon transition risk, and also account for a significant share of China's industrial value-added. These companies also face funding pressure from banks and, to a lesser extent, insurers that are accelerating reduction of exposure to carbon-intensive industries.

Meanwhile, the transition also presents credit-positive opportunities for companies in industries developing new technologies, including in renewable energy, batteries, carbon capture and sequestration, and electric vehicles.

In China, each of the top sources of greenhouse gas emissions has "very high" or "high" exposure to risks from carbon transition, according to our environmental risk heat map.⁵ In the heat map, we identified 16 sectors with \$4.5 trillion in debt globally with exposure to carbon transition risk, including power utilities, coal mining, and energy-intensive industries and products such as steel, chemicals and transportation (see Exhibit 7).

As in many economies, the power and industrial sectors account for the bulk of CO₂ emissions in China. However, the share of coal-fired power generation in China's overall emissions is much higher than that of other industrial powerhouses, such as Japan and Korea, which have also announced targets to achieve net-zero emissions by midcentury (see Exhibit 8). The effects of transition on these sectors are likely to begin crystallising between now and 2030 regardless of the pace of emissions reductions, as policy direction drives a shift in investment flows away from the sectors and entities that are most exposed to transition.

Exhibit 7

China's energy-intensive economic structure drives emissions CO₂ emissions by source, millions of tonnes

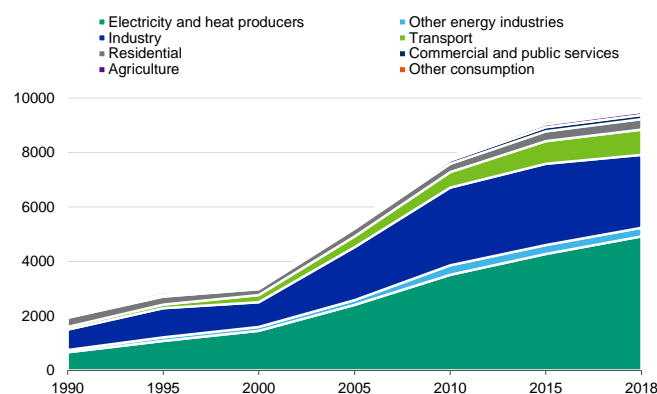
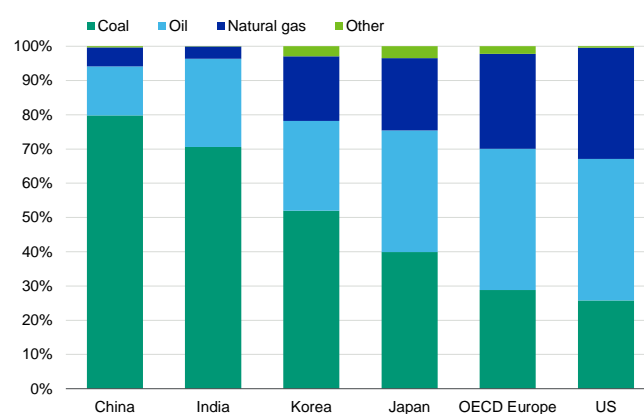


Exhibit 8

Coal dominance in China contrasts sharply with Europe, US CO₂ emissions by energy source, %, 2018

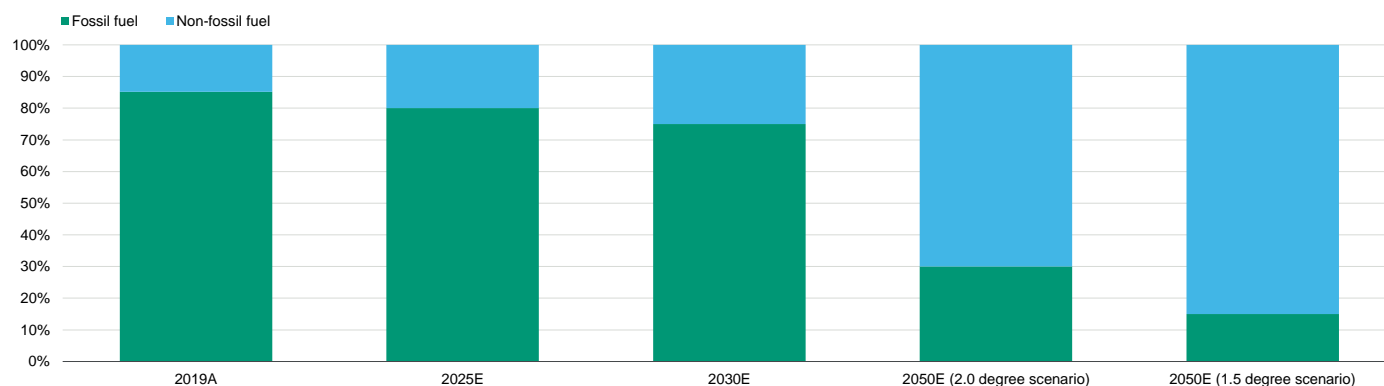


Utilities sector: Net-zero target credit negative for the coal power sector, but renewable and city gas sectors will benefit

For the power sector, the government's plan to lower unit CO₂ emissions will lead to a shift in fuel mix from coal-fired power toward clean and renewable energy. Specifically, the government plans to increase the nation's share of non-fossil energy in primary energy consumption from about 15% in 2019 to 20% in 2025 and 25% in 2030. Tsinghua University further projects that non-fossil fuel's contribution will increase to about 70%-85% by 2050 (see Exhibit 9).⁶ We believe renewable energies, hydropower and nuclear power will be key contributors to the non-fossil fuel mix.

Such developments will be credit negative for the coal power generation sector over time. Coal power generators will face (1) lower utilization, or even risks of stranded assets for their less-efficient generation units, and (2) higher carbon emissions costs as the government tightens emissions standards in the future. They will also have to incur more capital spending on renewable capacity expansion under the government's latest policy directives, which will pressure their leverage positions.

Exhibit 9

China's non-fossil fuel contribution could increase to about 70%-85% by 2050

Sources: National Energy Administration, State Council and Tsinghua University

That said, we believe the impact on the coal power sector will likely be gradual. Specifically, we expect that coal power output growth in China in 2020-30 will be maintained at zero to low single digits while the non-fossil fuel power sources will grow by about 5%-10% per year over the same period. These projections are based on our assumptions of (1) an average inflation-adjusted GDP growth of about 4.5% during the projection period, and (2) the government's 2030 target contribution from non-fossil fuels to the overall energy mix. These projections should still support the sector's coal power utilization hours and reduce the risk of significant capacity shutdown during this period. However, any material expansion in coal power capacity will be credit negative for the sector.

Beyond 2030, we expect more coal-fired units to be shut down as part of the government's plan to achieve its 2060 carbon neutrality target. The scale of the shutdown will depend on (1) prevailing power demand growth, (2) technology development in resolving intermittent renewable supply issues and reducing carbon emissions for coal power units, and (3) level of tightening of emission standards. Also, we expect certain efficient and low-emission thermal generation units will be retained as backup capacity to ensure power supply security. In the case of developed markets, such units will receive capacity payment income.⁷

We further estimate that over 35% of the nation's installed coal power capacity as of 2020 will reach the end of their 25-year operating lives by 2030. This percentage will increase to over 80% by 2040 and 100% by 2045. This highlights the potential for a majority of the existing coal-power units in the nation to complete their service years in full well before the 2060 net-zero target. This is important to China coal power operators given uncertainty on potential compensation from the government in the event of mandatory shutdowns of their units to meet the carbon neutrality targets. We expect that coal-fired plants in China will strictly adhere to their timetables to shut down upon expiry of their operating lives going forward, given the government's commitment on emissions.

The government's emissions reduction plan will be credit positive for the renewables sector in the long term, as operators will benefit from priority in dispatch and potential upside from CO2 emissions credits.

In addition to non-fossil fuels, cleaner fossil fuels such as natural gas likely will complement other clean energies in China's emissions reduction plan and be an important lower-carbon "transition fuel," serving as a bridge between the current energy mix and the rise in the share of renewable energy. Specifically, China aims to increase natural gas consumption to 15% of its primary energy mix by 2030, compared with about 8% in 2019. This will support city gas distributors' sales volume growth over the next five to 10 years.

Coal: Net-zero target will raise credit risk for the industry

Coal remains China's largest energy source, accounting for more than half of its energy mix. China has already slowed the growth of coal production in recent years in response to environmental protection and carbon reduction initiatives. Annual growth in China's coal production fell to 1.4% in 2020 from 5% in 2018. While the coal industry aims to limit coal production to 4.1 billion tons per year by 2025, that level would still be too high for China to achieve the net-zero target. As such, the Chinese government is likely to implement more detailed interim emissions targets and more stringent industry policies to restrict the production and consumption of coal over the next decade. We expect China's coal production will peak in around 2025 and fall in the late 2020s.

Falling demand over the next five to 10 years will create credit challenges for the industry, especially for weaker companies with low-quality resources, outdated technologies and weak capital structures. Following a number of defaults of coal companies in 2020, we expect more defaults and the exit of weaker companies from the market. The credit impact for industry leaders likely will be mixed. On the one hand, those with competitive advantages in scale, natural resources, technology and capital bases are better positioned to benefit from reduced supply in the near term, which will help support coal prices and boost their revenue and earnings. On the other hand, we expect the reduced demand for coal to lower revenue and earnings over the long term, even for industry leaders. Business and financial risks likely will rise for coal companies during the transition, as these companies incur additional capital spending and investment to diversify into adjacent or non-coal businesses.

Oil and gas: Strategic importance to drive central role in emissions reduction

China's national oil companies (NOCs) can manage the carbon transition risk over the near to medium term because of their strong market positions and solid finances. However, as demand for oil will likely decline over the long run, the risk remains substantial if they do not fundamentally transform their businesses over the next decade.

NOCs will play an important role in achieving China's peak carbon and net-zero targets as they are among the country's key energy suppliers. Increasing natural gas in the primary energy mix has been a key step to achieve these targets as a transition fuel. A 2017 policy document shows that the Chinese government aimed to increase the weight of natural gas in the primary energy mix to 15% by 2030 from around 10% in 2020 and 7% in 2017. The government may increase the 2030 goal as a result of the net-zero pledge.

China's three NOCs have strategic plans to increase natural gas supply, which include expanding production, exploring unconventional gas (i.e., shale and coal bed gas), and securing overseas resources. [CNOOC Limited](#) (A1 stable), for example, recently announced it will increase the share of natural gas in total oil and gas production to 30% by 2025 from around 20% in 2020.

Besides increasing natural gas supply, the NOCs have included other measures in their carbon transition strategies. These include (1) reducing carbon emissions in their operations; (2) investing in clean or renewable energy, such as wind, geothermal, hydrogen and biofuel; and (3) exploring carbon capture technologies. For example, PetroChina Company Limited, the key operating subsidiary of [China National Petroleum Corporation](#) (CNPC, A1 stable), announced it will supply more zerocarbon green energy than the fossil fuels it uses in operations by 2035. CNOOC Limited also has announced that it will increase capital spending in renewable energies.

Additionally, the increasing penetration of electric vehicles in China will likely reduce oil consumption. But even as oil consumption declines, we expect the NOCs to maintain stable domestic production over the next five to 10 years because domestic supply will be instrumental in safeguarding national energy security by reducing reliance on oil imports, which currently account for more than 70% of China's total consumption. Other measures include directing investments into value-added petrochemical products and leveraging NOCs' massive gas retail network to support the development of electric or gas-powered vehicles. For example, [China Petrochemical Corporation](#) (Sinopec, A1 stable) recently signed agreements with some electric vehicle manufacturers to deploy battery charging facilities in around 5,000 gas stations.

Steel: Carbon reduction may reduce margins and raise debt in short term

The steel industry has set a 2025 target to reach peak CO₂ emissions, which is five years ahead of the government's target for the whole country. The Ministry of Industry and Information Technology's draft guidelines have called for 80% of China's steel capacity to complete ultralow carbon emission upgrades and for the expanded capacity of electronic arc furnaces (EAFs) by 2025. EAFs are more environmentally friendly than blast furnaces, which currently dominate China's steel production capacity at around 90%.

Investment in decarbonisation technology and upgrades will likely raise production costs and weigh on steel-makers' margins. Steel producers can partially pass on the increase in costs to end-users because steel has limited economically viable green alternatives. However, the producers are not completely immune to the increase and will still bear some of the burden. Also, additional investment in decarbonisation may increase steel-makers' debt and leverage as they spend more on carbon-reduction investments and research and development (R&D). In addition, because the steel industry is a heavy polluter, responsible for an estimated 15% of China's total carbon emissions, it will likely soon be included in China's CO₂ emissions trading program.

Market leaders are in a better position than smaller steel mills to withstand the challenges of carbon transition. They typically have technological advantages and larger operating scale over smaller steel-makers, as well as stronger financial resources to allow for

investment in carbon reduction. Market leaders can also draw more support from business partners such as funding for R&D related to carbon reduction. Additionally, investments in carbon reduction will help companies obtain policy support, such as tax benefits and lower-cost financing. Thus, industry leaders are more likely to emerge as winners. Smaller mills that are not able to meet carbon reduction targets will incur higher costs, operational suspension and potential elimination from the market. The elimination of smaller steel mills would further strengthen market leaders' position and likely drive up prices because of reduced capacity in the market while demand is still strong. The increase in prices would, in turn, increase the remaining steel-makers' margins.

Industry leaders have followed with their own timelines and initiatives. [China Baowu Steel Group Corporation Limited](#) (Baowu, A3 stable), for example, targets hitting peak emissions by 2023, reducing emissions by 30% from their peak by 2035, and reaching carbon neutrality by 2050. In addition to completing ultralow upgrades and expansion of EAF capacity, the company is also investing in greener technology such as hydrogen-based steel making. Even for industry leaders, however, the risks over the next decade will be substantial. These risks include margin erosion and high capital spending if technologies do not advance quickly enough for them to make a successful transition to greener production methods.

Cement: Industry leaders will pass higher transition-related costs to end users

Regulatory requirements for carbon reduction will tighten for cement manufacturers. Potential reduction methods include lowering capacity and production, upgrading facilities and improving production processes, using clean energy, and capturing and storing carbon. We expect cement producers to incur higher operating costs, increased R&D expenses to develop new technology or processes, and additional capital expenditure to upgrade operating facilities. To meet the carbon reduction targets, total cement production volume likely will be capped or reduced.

Industry leaders will be the best positioned to overcome the challenges of the transition because of their stronger financial and technical capabilities. In addition, there is currently no viable substitute for cement products in infrastructure and property projects. Therefore, continued demand coupled with reduced supply will lead to higher cement prices. We also expect cement producers to pass on the potential cost increases associated with carbon transition to their customers. Overall, we expect industry leaders to benefit as the sector further consolidates.

Financial institutions: Decarbonisation as a growing credit driver

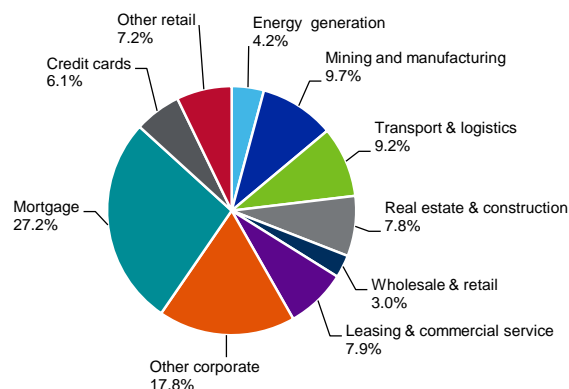
Policy implementation of the net-zero targets will make carbon transition one of the most relevant environmental risks for Chinese financial institutions, which will be compelled to adapt to rapid shifts in the technological and regulatory environment and in borrower behaviour. Faster carbon transition as envisaged under the net-zero targets raises asset impairment risks for rated financial institutions that have large exposure to carbon-intensive industries. While we expect most rated banks and insurance companies to manage their exposure to carbon-intensive industries because of their diversified lending and investment portfolios, the assets of some rated financial leasing companies are concentrated in aircraft and ship leasing, which makes them sensitive to carbon reduction measures in the transportation sector (see Exhibit 10).

China's carbon strategy will allow banks and insurers to reduce their financing for coal and coal-fired power industries at a gradual pace, which lowers the risk of credit disruption. Ping An Insurance (Group) Company of China Limited (life operating subsidiary [Ping An Life Insurance Company of China, Ltd.](#), rated A2 IFSR stable; property and casualty operating subsidiary [Ping An P&C Insurance Company of China, Ltd.](#), rated A2 IFSR stable) became the first Chinese insurer to release a Task Force on Climate-related Financial Disclosures report, which is the global standard in environmental risk disclosure, in 2020 after it made a commitment to reduce its coal-fired investments.

Exhibit 10

Chinese banks' diversified loan portfolio

Percent of total loans as of the end of 2020

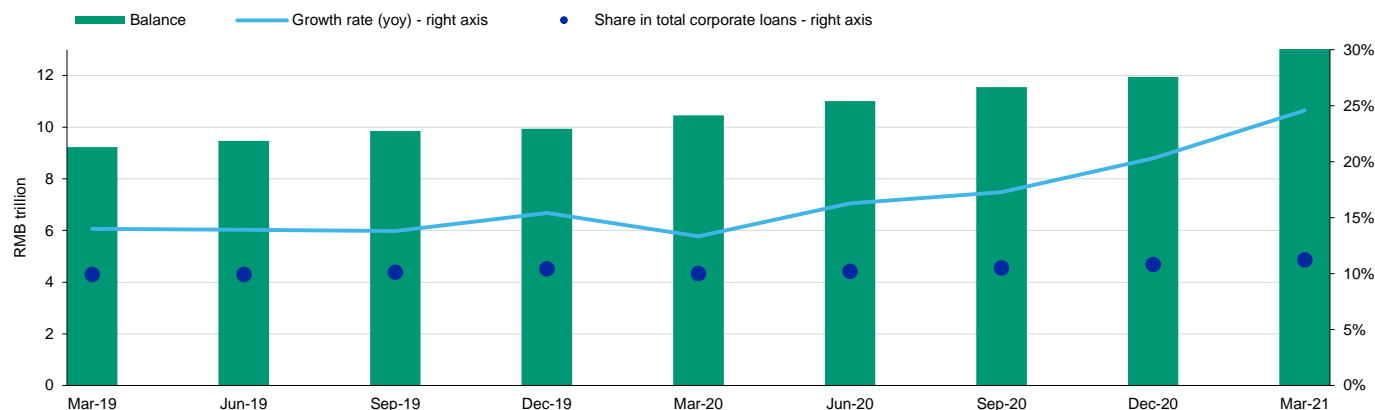


Sources: Bank reports and Moody's Investors Service

We expect financial institutions will do more lending and make more investments in green projects in areas such as renewable energy and electric vehicles (see Exhibit 11). Although a rapid expansion of financial institutions' low-carbon portfolios may increase their exposure to assets whose economic viability is unproven, we expect investments that are in line with the net-zero targets to entail lower credit risks because of government support. Regulators will likely balance the net-zero objectives and financial institutions' need to adapt gradually, avoiding systemic dislocations.

Exhibit 11

Chinese banks are quickening growth of green loans



Source: People's Bank of China

Differentiated transition policies will emerge across China's provinces

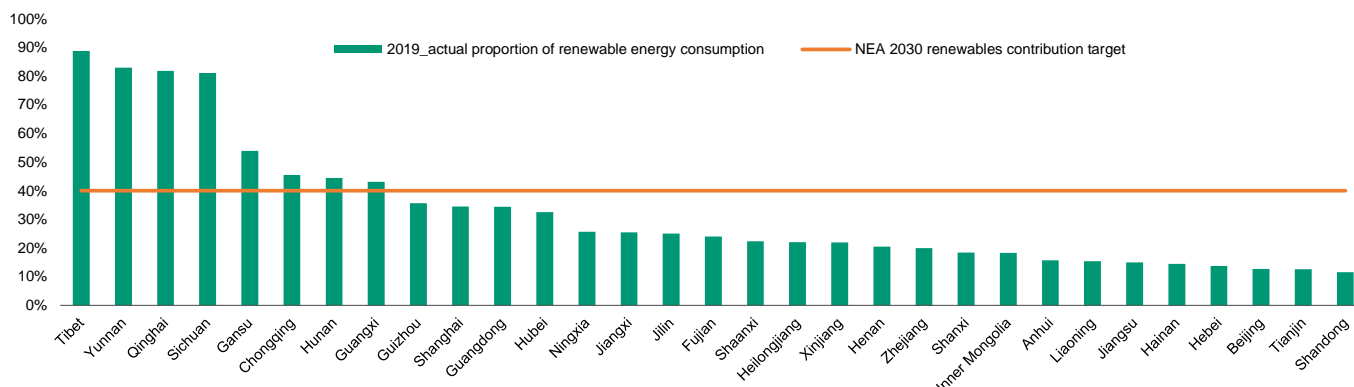
While most provincial RLGs have included carbon emissions reduction as part of their latest government work plans and five-year plans for 2021-25, most of these plans are in the early stages and do not specify clear targets. Only a small number of provinces have so far specified a date for reaching peak carbon emissions.

This is consistent with draft policies outlined by the National Energy Administration (NEA), which give some provinces more time to transition from nonrenewable energy sources. According to an NEA draft directive, all provinces apart from [Tibet](#) will receive annual targets for the renewable share of total power consumption through 2030. The draft plan asks all provinces to meet the target of 40% contribution of renewable energy to total energy usage by 2030, although at differing paces based on each region's current energy mix (see Exhibit 12). The large industrial and manufacturing provinces on the east coast ([Shandong](#), [Hebei](#), [Jiangsu](#) and [Liaoning](#)) and the major coal-producing provinces in the north ([Shanxi](#), [Inner Mongolia](#) and [Shaanxi](#)) will have the most difficulty meeting these targets.

Exhibit 12

Renewable energy contribution varies considerably across regions

Renewable energy as a percentage of total energy consumption, 2019



Source: National Energy Administration

Carbon transition at the regional level is complicated by the fact that there was a surge in coal plan approvals and construction at the provincial level in the aftermath of the coronavirus outbreak. China reportedly commissioned 38.4 gigawatts of new coal plants in 2020, comprising 76% of the global total.⁸ In addition to being widely viewed as the most reliable energy resource, coal is also politically important as a backbone of the state-owned sector and as a source of local employment. This is why RLGs continue to have an interest in the ongoing operation of local power generators and energy companies.

Provinces that are still constructing fossil fuel infrastructure are likely to find the eventual carbon transition process more difficult. The transition is also likely to add to RLGs' long-term debt and contingent liability burdens as investments in nonrenewable energy become redundant. Coal companies and other local state-owned enterprises that do not transition away from the fossil-fuel supply chain may see their funding positions come under increasing pressure as China shifts to cleaner sources of energy and will become more reliant on RLG support, which may be less forthcoming than in the past.

Carbon transition issues for some provinces could lessen as interprovincial trading of power further develops. This will involve both institutional reforms to better integrate provincial energy policies and the ongoing construction of ultra-high-voltage (UHV) direct-current connectors that can better match power generation to consumption demands while minimising transmission losses. UHV electricity transmission has the capacity to assist decarbonisation efforts by transferring renewable energy from the provinces in the west, that currently have a net surplus, to population centers in the east that have a net deficit and are reliant on coal, allowing older power plants to be retired.

Convergence of net-zero plans outside China amplifies credit pressures

Global momentum behind national net-zero emissions targets ahead of the 26th Conference of the Parties (COP26) climate conference in Glasgow, Scotland in November 2021 – coupled with the increasing focus on disclosure around the risks of climate change – will likely increase credit pressure on major emitters, including China.⁹

The EU and US have each announced specific emissions targets and associated environmental regulations that will have implications for China's exports to these markets. The plan with the biggest potential impact is the EU's forthcoming proposal (due July 2021) to impose a carbon border adjustment tax on goods imported into the customs union that do not incorporate an EU-equivalent carbon price. The market-implied future carbon price in the European carbon market surpassed €50 per metric tonne in May 2021.

The measure, intended to prevent European manufacturers from shifting production to jurisdictions with more lax carbon regulations, would have second-order competitive and cost implications for issuers dependent on the EU as an export market, including China. Approximately \$393 billion, or 15%, of China's exports in 2020 were to EU member states. A similar policy measure in the US would put an additional 17% of Chinese exports at risk of higher tariffs. Conversely, China could enact its own carbon price and impose similar border adjustments on its trading partners. It also remains uncertain how these measures will trigger trade disputes lodged with the World Trade Organization.

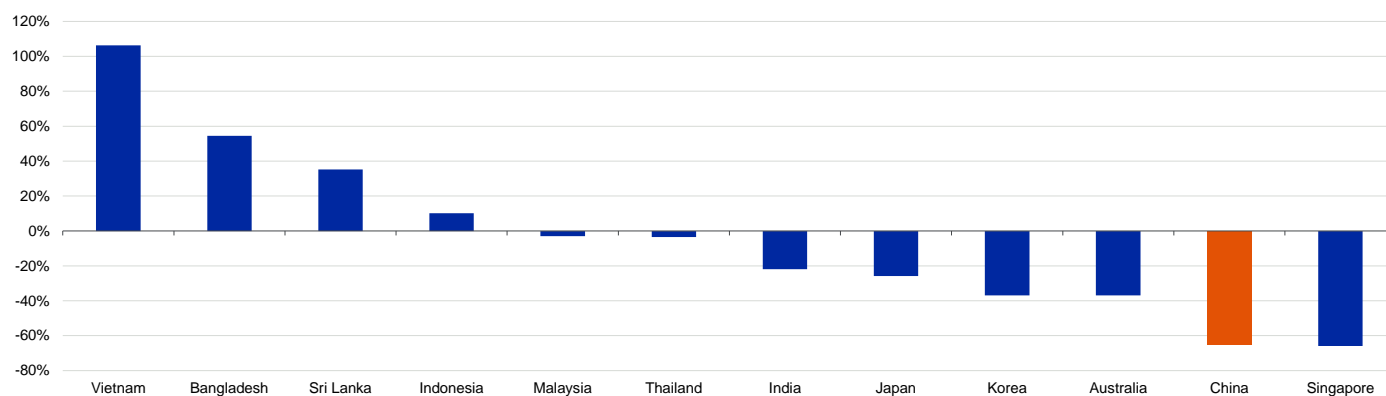
Investor alliances such as the Glasgow Financial Alliance for Net Zero (GFANZ), chaired by former Bank of England Governor Mark Carney, will also increase pressure on issuers to accelerate plans to reduce net emissions by 2050. GFANZ, for example, combines the market sway of 160 institutional investors with more than \$70 trillion in assets under management.¹⁰

Emerging economies in Asia-Pacific, Africa and Latin America may also complicate China's net-zero plan through their own net-zero emission efforts, limiting the ability of China and other major sources of CO₂ emissions to shift pollution-intensive industries outside their borders, or launch new investments in coal-fired power plants, including in commodity-intensive projects through the Belt and Road Initiative.¹¹ In Asia, for example, the emissions intensity of real output in countries such as [Bangladesh](#) (Ba3 stable), [Indonesia](#) (Baa2 stable) and [Vietnam](#) (Ba3 positive), which are potential recipients of relocated heavy industrial production, has risen since 1990 as use of coal-fired power has increased. These governments, however, have also shifted greater attention to the environmental impact of industry and may seek to limit the migration of "dirtier" production to their jurisdictions (see Exhibit 13).

Exhibit 13

Decline of carbon emissions intensity in Asia's wealthier and services-driven economies coincides with rising intensity in some emerging economies, as manufacturing bases shift

% change in CO₂ emissions per unit of GDP, 1990 - 2018



Sources: International Energy Agency and Moody's Investors Service

Moody's related publications

Sector research

- » [ESG – Europe: Green Deal poses risks for energy-intensive sectors and opportunities for companies best able to adapt](#), 12 May 2021
- » [Sovereigns – Global: Physical climate risk weighs on sovereigns; adaptation efforts yet to be widely tested](#), 5 May 2021
- » [CMBS – US: Groundbreaking NYC climate law spurs minor credit risk for CRE loans](#), 4 May 2021
- » [Cross-Sector – Global: Net-zero pledges increase credit pressure on major emitters](#), 27 April 2021
- » [Banking- Global: Climate change to force further business model transformation for banks](#), 20 April 2021
- » [Insurers – China: Environmental risks are growing credit driver](#), 15 April 2021
- » [Sovereign: Explanatory Comment: New scores depict varied and largely credit-negative impact of ESG factors](#), 18 January 2021
- » [ESG – Asia-Pacific: COVID-19 green recovery spending varies across the region, driving credit divergence](#), 13 January 2021
- » [ESG Heatmap: Heat map: Sectors with \\$3.4 trillion in debt face heightened environmental credit risk](#), 14 December 2020
- » [Credit Conditions – Emerging Markets: Post-pandemic credit stress points to leaner, greener future for Belt and Road](#), 23 November 2020
- » [ESG – Global: COVID effects likely to accelerate the energy transition](#), 18 June 2020
- » [ESG – Global: Climate scenarios vital to assess credit impact of carbon transition, physical risks](#), 10 March 2020
- » [Sovereigns – Global: Sea level rise poses long-term credit threat to a number of sovereigns](#), 16 January 2020
- » [Cross-Sector – Europe: EU decarbonisation strategy accelerating energy transition](#), 19 November 2019

Topic pages

- » [Policy Challenges](#)
- » [ESG Credit](#)

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Endnotes

- 1 See [Cross-Sector – Global: Net-zero pledges increase credit pressure on major emitters](#), April 2021
- 2 See [IEA: Net Zero by 2050 – A Roadmap for the Global Energy Sector](#), May 2021
- 3 See [Government Policy – China: Five-Year Plan highlights cautious balance between growth, risks and stability](#), March 2021
- 4 See [IEA Sustainable Development Scenario](#), October 2020
- 5 See [ESG – Global: Heat map: Sectors with \\$3.4 trillion in debt face heightened environmental credit risk](#), December 2020
- 6 See [Tsinghua University: Launch of the outcome of the research on China's long-term low-carbon development strategy and pathway](#), October 2020
- 7 Capacity payments are paid to a power plant to serve as backup capacity to ensure power supply security.
- 8 See Global Energy Monitor and others, [Boom and bust 2021: tracking the global coal plant pipeline](#), April 2021
- 9 See [Cross-Sector – Global: Net-zero pledges increase credit pressure on major emitters](#), April 2021
- 10 See [UNFCCC: New Financial Alliance for Net Zero Emissions Launches](#), April 2020
- 11 See [Credit Conditions – Emerging Markets: Post-pandemic credit stress points to leaner, greener future for Belt and Road](#), November 2020

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