POLICY BRIEF

Coal Consumption in China:
Understanding Recent & Future Trends

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After a decade of breakneck growth, coal consumption in China has been relatively flat since 2011 (see below figure). Fuel switching to non-fossil fuel energy sources (renewable and nuclear energy) and natural gas have been important drivers of lower coal consumption growth. But the flattening of coal consumption also reflects changes in the Chinese economy that are important for understanding whether and how this trend might continue.

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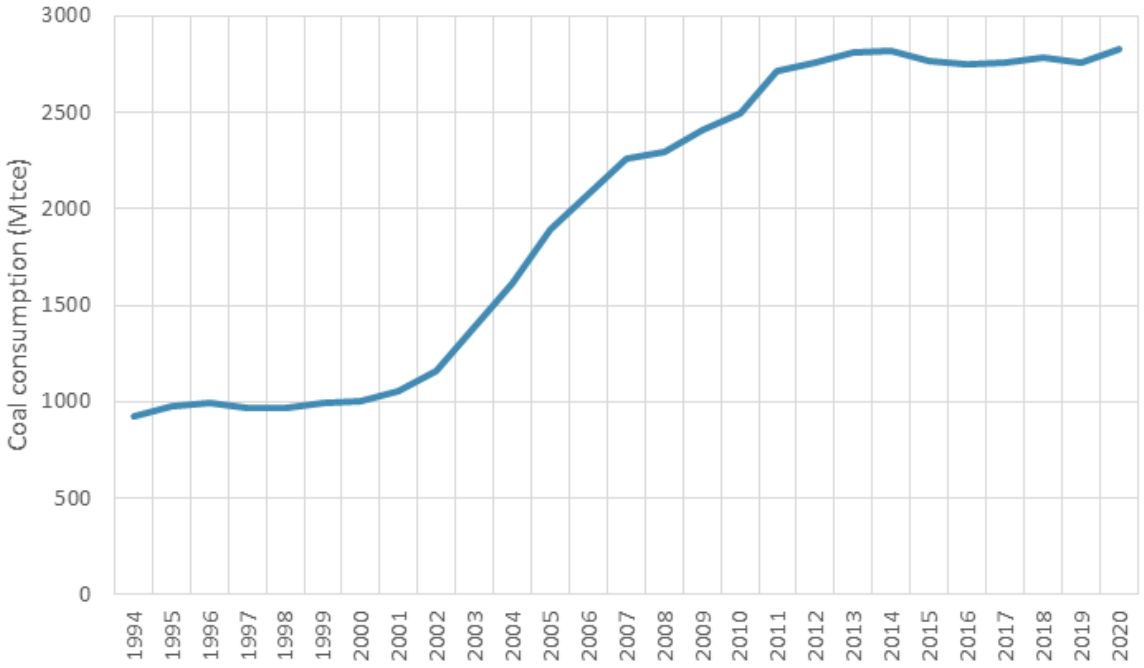
Coal consumption in China, 1994-2020



Summary

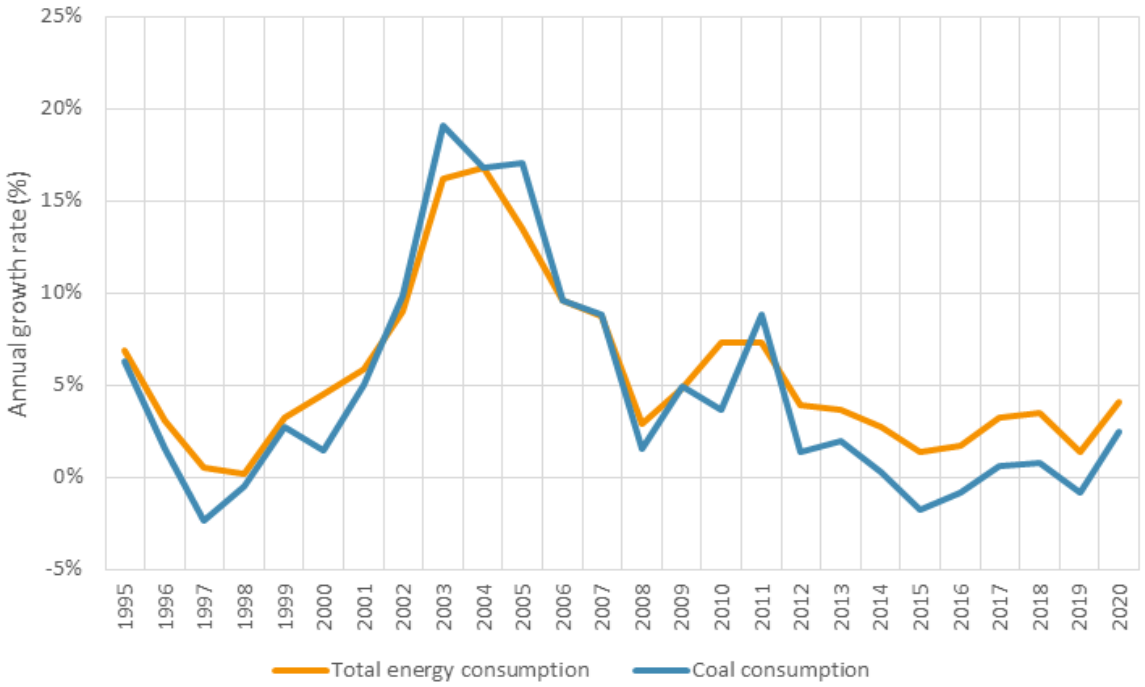
Although we often think of China's efforts to reduce coal consumption and greenhouse gas emissions through the narrow lens of energy policy, changes in its economy and society have had, and will continue to have, an important influence on coal consumption and carbon dioxide (CO_2) emissions. Over the past decade, macroeconomic policies targeting lower Gross Domestic Product (GDP) growth and aiming to reign in excessive debt led to a restructuring of China's economy and contributed to slower growth in coal consumption.

Over the next two decades, demographic change and related changes in economic policy will likely emerge as important drivers of coal consumption and emissions. China will be better able to manage these changes, aiding global efforts to limit global warming, if it is more closely integrated into the global financial system. This highlights the central role of international cooperation and the importance of changes in the geopolitical order in efforts to address climate change.

Macroeconomic policies and coal consumption in China from 2010-2020

Two entry points for exploring China's coal consumption trends over the past decade are changes in the country's total (primary) energy consumption and changes in coal consumption in specific sectors. Declines in coal consumption growth in China over the 2010s paralleled a slowing of the country's total energy consumption (see Figure 2 below).

Figure 2: Annual Growth in Total Energy Consumption and Coal Consumption in China, 1995-2020



Note: All data in the figures and text is from the National Bureau of Statistics' Statistical Yearbook series, unless otherwise noted

Figure 3: Real GDP Growth by Sector and Economy-Wide in China, 1993-2020

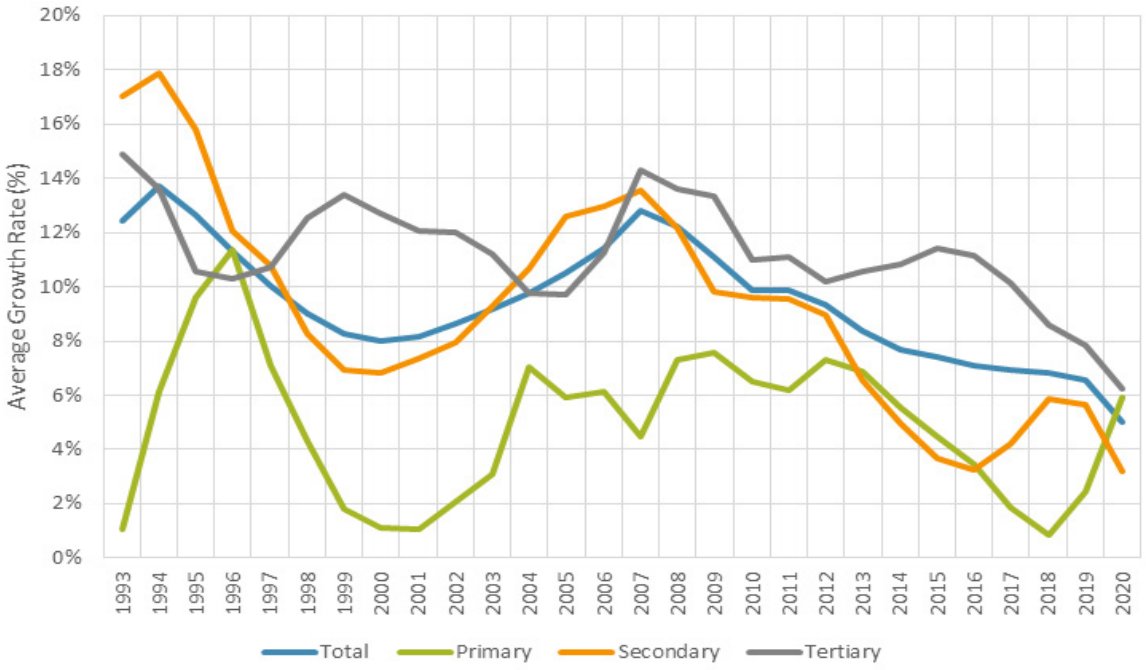
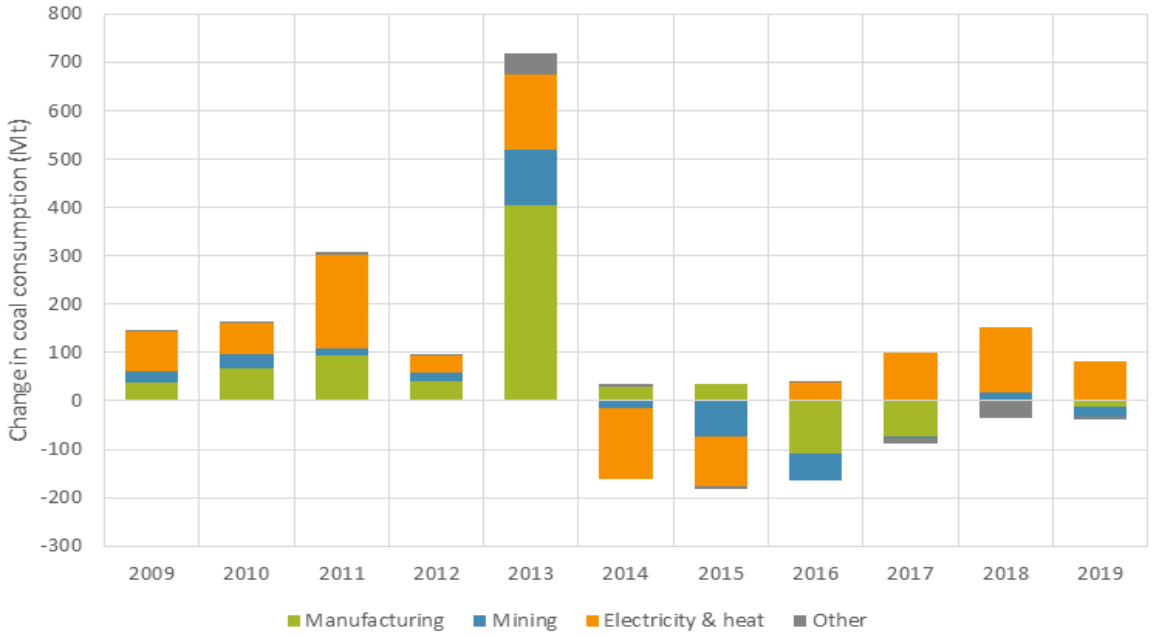


Figure note: Note the similarities and differences between what occurred after than 1997 Asian financial crisis and the 2007-2008 global financial crisis. After the former, secondary sector GDP fell and economic growth shifted to the services sector, but aggregate GDP growth remained relatively high. After the latter, economic growth again shifted to the services sector but the aggregate (and sectoral) GDP growth rate fell.

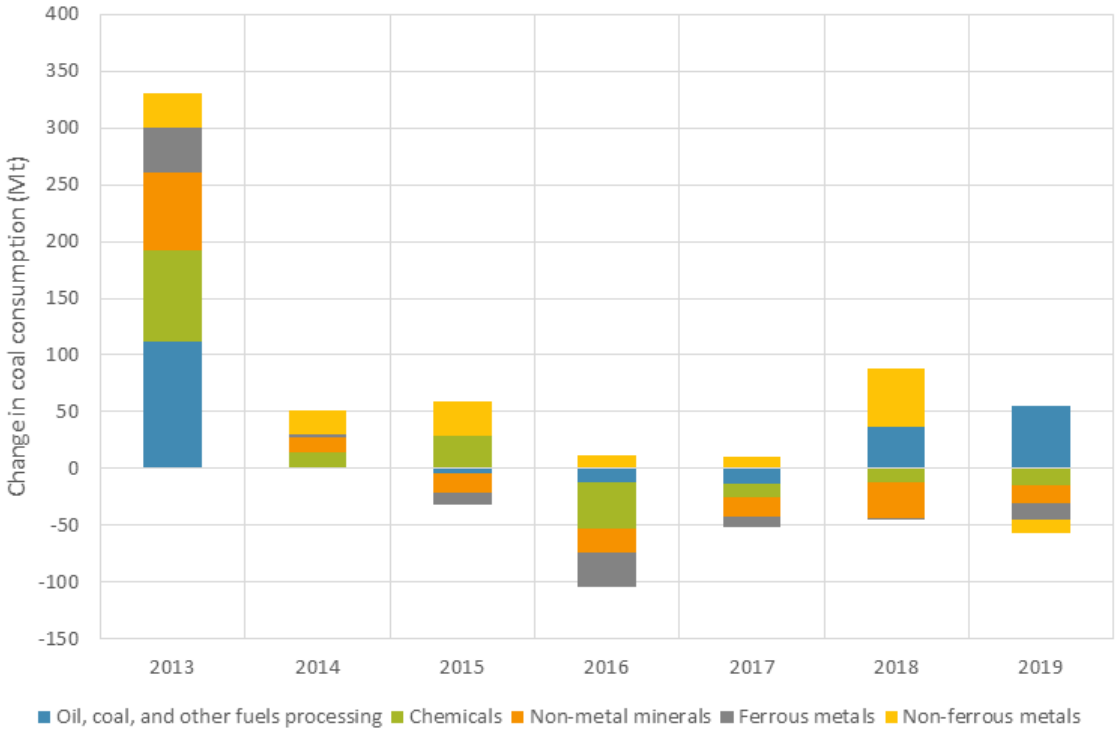
The slowdown in China's total energy consumption was partly driven by a decline in GDP growth, following the central government's move in the early 2010s toward lower GDP growth targets and attempts to reign in local government and state-owned enterprise (SOE) debt after the 2008-2009 fiscal stimulus. Credit tightening beginning in 2013 slowed growth in property and infrastructure development, which in turn contributed to a structural shift toward the services (tertiary) sector as the main driver of GDP growth (see Figure 3 above). Because the services sector is much less energy intensive than the industrial sector, this shift in GDP growth drivers also contributed to lower total energy and, by extension, coal consumption.

Figure 4: Annual Changes in Coal Consumption by Sector, 2009-2019



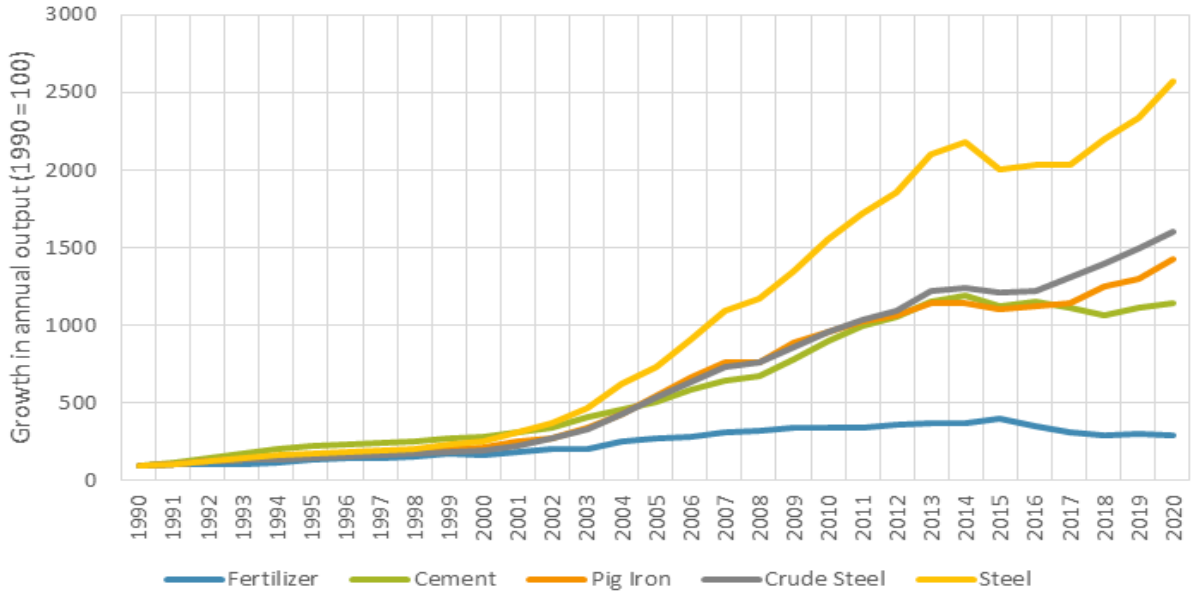
Changes in China's economy also translated into shifts in coal consumption at a sectoral level. Coal consumption in the manufacturing and mining sectors slowed during 2014-2015 and then declined from 2016-2019, while consumption in the electricity sector declined during 2014-2015 and then rebounded during 2017-2019 as electricity demand grew faster than energy demand. Increases in coal consumption for generating electricity may have been the result of local efforts to comply with air quality regulations after *China's Action Plan on Air Pollution Prevention and Control (2013-2017)*, which gathered steam during this time period.

Figure 5: Annual Changes in Coal Consumption by Heavy Industrial Sector, 2013-2019



Within manufacturing, heavy industry — steel, cement, chemicals, and non-ferrous metals in particular — has historically been China's largest coal consumer, accounting for around 35% of coal consumption. With the exceptions of coke production (the main coal consumer in the "oil, coal, and other fuels processing" sector) and aluminum and other non-ferrous metals, coal consumption in all heavy industrial sectors declined every year after 2015.

Figure 6: Growth in Annual Output for Key Heavy Industrial Sectors, 1990-2020 (1990 = 100)



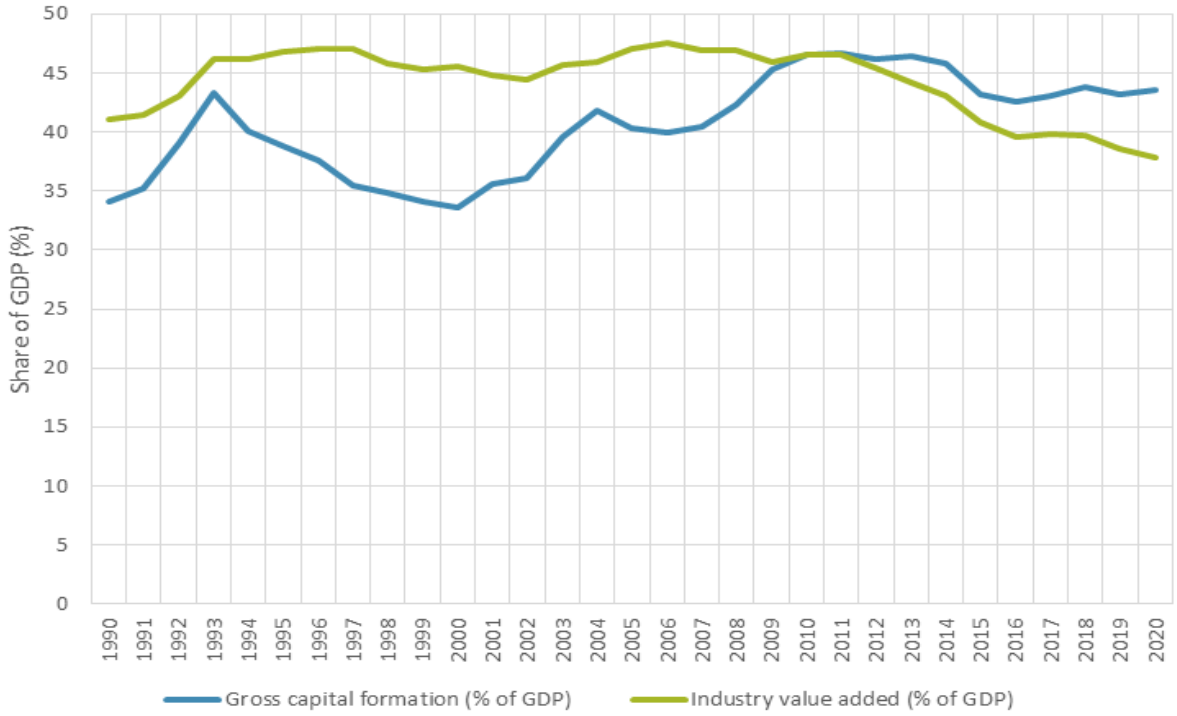
These changes had different drivers. For the cement and fertilizer sectors, lower coal consumption was largely driven by declines in annual output after 2013-2015 (see Figure 6). (Ammonia, used to make nitrogen fertilizers, is the largest coal consumer in China's chemical industry). For the steel sector, annual output of steel, crude steel, and pig iron flattened out or fell from 2014 to 2017 but grew sharply over 2017-2020; continued declines in the steel sector's coal consumption after 2016 may reflect improvements in energy efficiency, fuel switching to electricity and natural gas, and perhaps data anomalies.

The impact of macroeconomic policies on industrial output, and their flow through to coal consumption, illustrates how these policies shaped coal consumption in China over the past decade, contributing to lower consumption growth.

Future Drivers of Coal Consumption

Over the last 30 years, China's energy-intensive economic growth model, with high levels of investment and a high share of industry in GDP, has been a major driver of its coal consumption and CO_2 emissions. The economic policies described in the previous section, which were partly in response to external forces (the global financial crisis) reduced the Chinese economy's reliance on investment and industry (see Figure 7). Over the next two decades, the drivers of structural change in China's economy, and the corresponding effects on coal consumption, may be increasingly driven by internal forces.

Figure 7: Gross capital formation and industry share of GDP in China, 1960-2020



Note: Gross capital formation refers to fixed asset investment plus net changes in inventories. Data are from the World Bank's World Development Indicators database, https://databank.worldbank.org/source/world-development-indicators.

Part of the reason why the Chinese economy maintained such high investment rates and a share of industry in GDP from 1990 to 2020 was due to capital controls, which limited the outflow of capital for households and some businesses. As the economy grew rapidly over the 2000s and 2010s and returns on domestic investments fell, limits on outbound capital flows encouraged speculative investment in real estate and low return public investments in infrastructure. China's central bank has been gradually loosening capital controls over the past two decades.

The pressures of an aging society would naturally lead to continued liberalization of China's capital account (financial inflows and outflows). Maintaining growth in per capita income while the country's labor force shrinks will likely require higher returns to capital. In addition to enabling the yuan to be a global reserve currency, liberalization of China's capital account would help to shift capital away from heavy industry and toward less energy-intensive and higher return sectors where China has a clearer comparative advantage..

China will also, however, continue to urbanize over the next three decades, requiring large investments in urban housing and infrastructure. Over the last 40 years, China's urban population grew by 660 million people, involving the largest urban migration in human history. The Chinese Academy of Social Sciences projects that China's urban population will grow by another 100 to 180 million people by 2050, a slower rate of urban population growth than previous decades but still very large in absolute terms.

The net effect of capital account liberalization and continued urbanization on investment, heavy industrial output, and coal consumption is unclear. But at the very least, capital account liberalization should increase the efficiency of investment in China, which would most likely continue to shift the economy away from heavy industry and toward light manufacturing and services. The energy and emissions implications of this transition are profound. A 25% reduction in industry's share of GDP, to around 30%, would alone reduce the Chinese economy's energy needs by more than 15% (assuming 2019 sector energy intensities), an amount (around 22 exajoules, or EJ) that is close to total primary energy demand in Latin America (28 EJ in 2018) and Africa (35 EJ). (Data are from the International Energy Agency's *World Energy Outlook.*)

This suggests that China's continued integration into the global financial system is an important strategy for reducing its CO_2 emissions, by continuing to shift the Chinese economy away from an energy-intensive growth model, lessening its reliance on heavy industry and in turn reducing coal consumption. More intentional integration of China into the global financial system would require deeper cooperation among China, the United States, Europe, Japan, the United Kingdom, and Canada (China and the G7) than has occurred over the past decade. International cooperation with such high stakes — that will essentially remake the geopolitical order — must be rooted in trust.

The socioeconomic dimensions to China's greenhouse gas emission trajectory over the coming decades, and their links to global geopolitics, provide another illustration that global warming is not a problem that can be solved without broad (covering multiple parties and multiple areas) and deep (leading to significant changes) international cooperation.