The Reality of Updating China's Nationally-Determined Contributions:
Effects of Long-Term Economic Growth and Global Carbon Emissions Budget

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In June 2015, prior to the COP21 talks in Paris, China committed to peak its carbon emissions around 2030. For many, China's commitment was an aggressive move to combat climate change, demonstrating its leadership in the global climate engagement. Yet, more critical voices questioned whether China's commitment adequately considered global average temperature increase target of 2 degrees Celsius within this century. As the upcoming COP24 talks in Katowice, Poland draw closer, participating countries delegations may focus on the main negotiation objective, an implementation plan of the Paris Agreement. However, in this conference there will be plenty of discussion on how big economies, like China, set Nationally Determined Contributions (NDCs) targets, not only according to their own economic and technological capacities but also based on the precondition of meeting the global carbon emission goal suggested by the Paris Agreement.

The following piece will investigate economic factors behind China's predicted carbon emissions (including GDP, urbanization, and energy consumption), as well as global predicated carbon emissions in 2030 and 2050 to discuss whether China can promise to peak much earlier and begin decreasing its total carbon emissions around 2025.

The Reality of Long-term Economic Growth: Peaking Early, A Lower Peak

In 2015, China based its 2030 carbon emissions peak target on optimistic economic growth forecasts. Specifically, China predicted that between 2015 and 2030, the country would be able to maintain its relatively rapid economic growth and energy consumption trends. However, since 2015, the Chinese economy has not performed as well as predicted, and recent short-term forecasts are similarly less optimistic. As a result, China's carbon emissions may be on track to peak earlier than expected. Moreover, the quantity at which emissions peak may also be lower than expected.

Between 2000 and 2015, China's breakneck pace industrialization, urbanization, and infrastructure construction drove the country's economic growth. According to World Bank data, however, China's rate of economic growth has declined from a 10.6% increase in GDP in 2010

to 6.9% in 2017.[1] Similarly, population growth decreased from 0.80% in 2000 to 0.53% in 2010. The new family planning policy, which was enacted in late 2015 and allows a family to have two children, has not curbed the extremely low population growth trend, and the population growth remained at 0.51 percent in 2017.[2]

Such a marked decrease in population growth has significant consequences for economic growth. Current rates of population growth cannot support optimistic economic forecasts. On the other hand, levels of urbanization are still low compared to those of high-income countries, like members of The Organization for Economic Co-operation and Development (OECD) . While people will continue to immigrate to cities in the future, urbanization pace may slow. Between 2000 and 2017, the proportion of Chinese people residing in urban areas increased from 36 percent to 58 percent.[3] During the next 20-30 years, urbanization will continue to grow, just at a slower pace.

In the 40 years since China's economic liberalization, particularly in the past 20 years, the high-speed development of China's infrastructure, including highways, railways, airports, and civil architecture has supported GDP growth and increases in carbon emissions. Since 2015, there are signs that China's transition from an investment- and trade-based economy to one driven by services and consumption has decreased the economy's energy consumption and carbon emissions. It will be difficult for levels of infrastructure building to return to their prior pace, and both urbanization and population growth are slowing down. Consequently, China's GDP growth will likely fail to meet prior expectations. In other words, China's estimates for its GDP between 2016 and 2030 were more than overly optimistic.

The above view is gaining popularity among economists. In July 2017, the International Monetary Fund's (IMF) World Economic Outlook predicted that China's GDP annual growth rate would be 6.6% and 6.4% in 2018 and 2019, respectively.[4] Entering 2020-2025, it predicted that growth would reach below 6% and continue to decrease going from 2025-2030.[5] Nonetheless, experts remain optimistic about China's ability to combat climate change. China's National Development and Reform Commission's Energy Research Institute (ERI), one of the nation's most influential climate and energy policy think tanks, released a report discussing the possibility of China meeting its national goal for 1.5 degrees Celsius temperature growth in this century. In the report, their GDP forecasts were as follows: 7.9 percent growth from 2015 to 2020, 6.7 percent growth from 2020 to 2025, and 6.3 percent from 2025 to 2030.[6]

The GDP growth has a direct impact on energy consumption and levels of carbon emissions. According to World Bank data, China's annual GDP increased by 88 percent between 2009 and 2013, and by 27 percent between 2013 and 2017.[7] At the same time, the annual national primary energy consumption grew by 25 percent between 2009 and 2013, and by eight percent between 2013 and2017; the annual energy-related carbon emissions increased by 20 percent from 2009 to 2013, and by 0.3 percent from 2013 to 2017, based on the statistics from 2018 BP Statistical Review of World Energy.[8] A comparison of past growth in GDP, primary energy use and carbon emission demonstrates that China's cooling-down economy has led to a significant low growth pace of carbon emission. Slower economic growth influences not just *when* emissions hit their peak, but also dictate the level at which emissions peak. The disparate projects of the IMF and ERI have drastically different implications for China's economy and naturally, China's carbon emissions 10-20 years in the future. Hypothetically, using China's 2018 GDP as a reference value, IMF and ERI projections put China's GDP at 1.96 and 2.19 times 2018 levels at 2030, respectively.[9] Assuming a consistent relationship between GDP and carbon emissions in these two models, environmental implications are clear: carbon emissions would be 11.7 percent higher following ERI's economic model compared to the one put forth by the IMF.

Based on the above, we can see that higher GDP estimates also correspond to higher carbon emission estimates. The tendency for researchers to overestimate GDP growth can be understood when we put it into the context of the national five-year plan for economic and social development. Every five years, the Chinese government creates a plan and strategy for social and economic development with each period using GDP growth as its target. Additionally, historically, China has used GDP growth as a guidepost for economic governance, sending off a signal to inspire optimism and confidence in China's economy among the population, including researchers themselves.

Lowering Coal Consumption: Governing Air Pollution and Pushing for Energy Transition

Advancing China's energy transition has several driving factors, including energy security, technological development, energy resource endowment, climate change policy, and other factors. However, in the author's point of view, since 2013, controlling air pollution has remained the most important factor behind reducing the consumption of coal.

Cutting the coal use is the most effective way to address air pollution. China's coal consumption has increased from 1.36 billion tons in 2000 to 4.24 billion tons in 2013. After that, the coal consumption has been declining gradually. According to the 2018 BP Statistical Review of World Energy, from 2013 to 2017, China's national coal consumption declined by 3.89 percent.[10] Some researchers believe that China's annual coal consumption has peaked because of slowing economic growth and subsequent reduced demand for energy.[11] Another important but often overlooked reason for coal's peak is that 2013 was the first year of China's Action Plan for the Prevention and Control of Air Pollution (2013-2017). Uniting the central, provincial, and local governments, particularly where pollution is most severe (Beijing, Tianjin, and Hebei province), the plan set out to aggressively reduce coal consumption while simultaneously equipping residents in these areas with controllable natural-gas-powered and electric heating.

Between 2013 and 2017, the government invested heavily in pollution control, employing command and control policies to accomplish its pollution reduction targets. Such an aggressive strategy had a profound influence on China's energy transition. In a short period of time, pollution reduction efforts had already exceeded goals put forth by the Renewable Energy Law passed in 2005.

Recent emphasis on environmental protection and advances in China's energy transition have a strong and direct influence on the country's carbon emissions. Between 2015 and 2030, we can expect China to continue substituting coal heating with natural gas-powered alternatives, causing China to meet its carbon emission reduction goals earlier than expected, much like how coal consumption peaked earlier than expected. Combined with the development of renewable energy, the intensity of carbon emission per unit of GDP will decrease dramatically, leading to a lower carbon emission peak than expected.

China's Determined Contribution Goals and the Paris Agreement Action Plan: The Elephant in the Room?

The Paris Agreement requires participating countries to submit Nationally Determined Contributions between 2015 and 2017. In December 2018, the COP24 talks in Poland is predicted to result in actionable plans to carry out goals originally set forth by the Paris Agreement. COP24 remains an urgent meeting, as projections indicate that global greenhouse gas emissions are to exceed levels required for 2 degrees

Celsius of temperature change by the end of the 21st century. In October 2018, the Intergovernmental Panel on Climate Change (IPCC) published a special report "Global Warming of 1.5°C," where it detailed the benefits of controlling global average temperature change below 1.5 against between 1.5 and 2 degrees Celsius on humans and ecosystems. The report's analysis revealed that achieving the 1.5 degrees Celsius mark requires urgent and comprehensive reform in land use, energy, industry, architecture, and transportation to the point where global carbon emissions in 2030 must be 45 percent of those in 2010 and totally neutral by 2050.[12] In 2010, carbon emissions amounted to 50.9 billion tons, making the 2030 goal 28 billion tons.[13] In 2016, the world's total carbon emission hit 36.2 billion tons and China emitted 10.2 billion tons.[14] It is obvious that the world carbon emission must enter a rapid declining pathway after 2020 if the 1.5 degrees Celsius scenario is a real serious goal. On top of this, the dominating carbon emitters of the world, China, U.S., and EU hold high expectation during the COP24 talks in Poland.

The IPCC special report provides a significant discussion background and policy rationale for the upcoming COP24 talks. For China, achieving its commitment of carbon emission peak by around 2030 is not sufficient to comply to emission goals underlined by the 2 degrees Celsius target in the Paris Agreement. This paper argues that due to the changing faces of China's economic, social, and environmental situation, as discussed above, China may have larger room to update the climate goals, from carbon peaking to carbon reducing in the near future. For China, acting according to the Paris Agreement's 2°C goal may not generate unaffordable impacts on economic growth as it is pursuing a technology and innovation driven model. In addition, the slowing down economy in the long term has allowed the government to take more measures to reign in the ever-growing carbon emission. In the global arena, the risk is extremely high; without China's increased and deeper actions, the international efforts towards fighting climate change under the Paris Agreement will fail. As the biggest carbon emitter in the world for over 10 years, China has the accountability to do more.

Conclusion: a New Leader?

Many expect that China will move towards a low carbon economy at a faster pace in the next decade. This scenario can bring Chinese people the greatest benefits such as a more resilient economy, clean air and water, and a livable environment. In this sense, lower economic growth rates,

higher energy expenses, and an aging population may not be bad things for China's transition to an advanced market economy. However, other researchers have serious concerns that the short-term political calculations from the country's leaders, such as the China-U.S. trade dispute, could play a role in China's climate change policy making. It's difficult to judge which direction China will go. Nevertheless, this paper argues that China could upgrade its climate commitment in the near future, but the new goal might be still far from what China is expected to do as there is a huge gap between China current emission scale and designated size suggested by the very limited global carbon emission budget. The turbulent outlook for China's economic growth means that China is unlikely to act as a real world leader in the climate change arena. China's weak economic outlook should become a significant factor in continual scenario-based carbon emission analysis and updating NDCs.

Notes

1 The World Bank, Development Indicator Data – China's GDP Growth (annual %) 2000-2017, https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=CN&start=2000.

2 The World Bank, Development Indicator Data - China's Population (total) 2000-2017, https://data.worldbank.org/indicator/SP.POP.TOTL?locations=CN.

3 Ibid.

4 International Monetary Fund, "World Economic Outlook Update July 2018: Less Even Expansion, Rising Trade Tensions," accessed October 25, 2018, https://www.imf.org/en/Publications/WEO/Issues/2018/07/02/world-economic-outlook-update-july-2018.

5 Katy Barnato, "China GDP growth to fall below 6% by 2020: IMF," *CNBC*, August 12, 2016, https://www.cnbc.com/2016/08/12/china-gdp-growth-to-fall-below-6-by-2020-imf.html.

6 China's Energy Related Emission Scenario Analysis: to Achieve 1.5 Degree Target. (WOGUOSHIXIANQUANQIU1.5SHESHIDUMUBIAOXIADENENGYUANPAIFANGQINGJINGYANJIU). Energy Research Institute of National Development and Reform Commission, 2018, http://coalcap.nrdc.cn/pdfviewer/web/?15306856261452779958.pdf.

7 The World Bank, Development Indicator Data – China's GDP Growth (annual %) 2000-2017, https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=CN&start=2000.

8 BP, Statistical Review of World Energy, 2018, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html.

9 It is assumed that in 2019-2029, ERI's GDP annual growth rate forecast is 7.9%

(2019-2020), 6.7% (2021-2025), and 6.3% (2026-2030). IMF's forecasts are 6.4% (2019-2020), 5.9% (2021-2015), and 5.5% (2026-2030).

10 BP, Statistical Review of World Energy, 2018. https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html.

11 Qi Ye and Jiaqi Lu, "The End of Coal-fired Growth in China," Brookings, March 2, 2018,https://www.brookings.edu/zh-cn/opinions/.

12 Intergovernmental Panel on Climate Change, "Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C Approved by Governments," IPCC Press Release 2018/24/PR, October 8, 2018, http://ipcc.ch/pdf/session48/pr_181008_P48_spm_en.pdf.

13 The World Bank, Development Indicator Data - Total Greenhouse Gas Emissions (kt of CO2 Equivalent), https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?view=chart.

14 Boden et al., UNFCCC, BP, and USGS, CO2 Emissions, Global Carbon Atlas, 2017, http://www.globalcarbonatlas.org/en/CO2-emissions.