

HOW CHINA CAN HELP LEAD A GLOBAL TRANSITION TO CLEAN ENERGY

Alvin Lin, Luan Dong
 and Yang Fuqiang

Key Points

- China's coal consumption in 2014 fell by 2.9 percent, the first such drop this century, in large part as a result of its policies to address its severe air pollution, develop renewable and alternative energy, and transition its economy away from heavy industry. China should take advantage of its current circumstances to adopt an aggressive national coal consumption cap target and policy to peak its coal consumption as soon as possible, no later than its next Five Year Plan (2016–2020), so that it can then peak its CO₂ emissions by 2025.
- China can achieve this target by building upon its existing achievements in developing clean energy such as wind and solar power, where it leads the world in manufacturing and installation, and focusing on improving integration of renewable energy and scaling technologies such as energy storage, electric vehicles and smart grids. China should also prioritize renewable energy development over coal in its western expansion in order to avoid making large investments in stranded assets, and should price carbon high enough to direct investment toward clean energy. By doing so, China can help lead a transition to clean energy that will contribute greatly to global efforts to keep warming to no more than 2°C, and can serve as a model for other developing countries.
- Building upon domestic actions, China should work with other key players, including the Group of Twenty (G20), to advance the international climate agenda. It should push for agreements to phase down fossil fuel subsidies and consumption of super-greenhouse gas (GHG) hydrofluorocarbons (HFCs) used in refrigeration, air conditioning and industry. China should phase down its own fossil fuel subsidies, including by increasing the pricing of coal to reflect its true environmental costs, and support a phasedown of HFCs domestically, in conjunction with the Montreal Protocol's Multilateral Fund.
- China should also ensure that the newly formed Asian Infrastructure Investment Bank (AIIB) prioritizes clean energy development for developing countries and does not fund coal mining or coal power projects, so that other countries can leapfrog the environmental pollution that China is now seeking to remedy.

Introduction

On the last day of June 2015, in Paris, China's Premier Li Keqiang announced China's commitment (or intended nationally determined contribution, in climate negotiations parlance) for the post-2020 climate regime to be agreed upon in Paris this December (Department of Climate Change [China] 2015). Adding to the two goals announced previously in November 2014, under the joint climate announcement with the United States, that China would peak its CO₂ emissions by 2030 — with the intention to try to peak earlier — and also increase its non-fossil energy (renewables and nuclear) to approximately 20 percent of its primary energy consumption by 2030, Premier Li added a 2030 carbon intensity reduction target of 60–65 percent below 2005 levels, and a goal to increase forest volume by 4.5 billion m³ compared to 2005 levels (The White House 2014). In doing so, China is not only taking a more proactive approach



About the Fixing Climate Governance Project

Project Leaders: **John Odell**, CIGI Senior Fellow and **David Runnalls**, CIGI Distinguished Fellow

Climate scientists agree that human activity has been changing our planet's climate over the long term. Without serious policy changes, scientists expect devastating consequences in many regions: inundation of coastal cities; greater risks to food production and, hence, malnutrition; unprecedented heat waves; greater risk of high-intensity cyclones; many climate refugees; and irreversible loss of biodiversity. Some international relations scholars expect increased risk of violent conflicts over scarce resources due to state breakdown.

Environmentalists have been campaigning for effective policy changes for more than two decades. The world's governments have been negotiating since 1995 as parties to the United Nations Framework Convention on Climate Change (UNFCCC). These talks have not yet produced agreements that are sufficiently effective in curbing greenhouse gas emissions or helping the world adapt to climate impacts. Some effort has shifted to partial measures by national governments, provinces, cities and private companies, which together, also fall far short of the need identified by science so far.

The Fixing Climate Governance project is designed to generate some fresh ideas. First, a public forum was held in November 2013. High-level workshops then developed a set of policy briefs and short papers written by experts. Several of these publications offer original concrete recommendations for making the UNFCCC more effective. Others make new proposals on such topics as how to reach agreements among smaller sets of countries, how to address the problems of delayed benefits from mitigation and concentrated political opposition, ways that China can exercise leadership in this arena and how world financial institutions can help mobilize climate finance from the private sector. These publications will all be published by CIGI in 2015.

to the climate negotiations, it is also acting in its own interests, promoting clean energy to help address its severe air pollution and other environmental problems caused by an overreliance on coal and oil, and seeking out a new economic development path based on the development and manufacture of clean energy technologies.

China's commitment comes at a crucial time in its own development and in the global effort to address climate change, one that has been a decade in the making and for which the next 10 to 15 years will be crucial. If China can find the political will to maintain and expand its drive to clean energy, the clean technologies and models it develops, builds and exports could be among the most important contributions to reducing global warming.

China's Development over the Past Decade, Both Dirty and Clean

During the past decade of rapid economic growth, China paradoxically became both the world's largest carbon emitter,¹ consuming half of the world's annual coal consumption in recent years, and the largest contributor to reducing global carbon emissions, through its implementation of the world's largest energy efficiency and renewable energy programs.

Coal has powered much of China's growth over the past decade and more, as the country built up its infrastructure, cities and heavy industry and became an export powerhouse. China's total energy consumption in 2013 reached 4.17 billion tonnes of coal equivalent (TCE), with coal accounting for about 2.90 billion TCE (69 percent), equivalent to 4.05 billion tonnes of raw coal (calculations based on National Bureau of Statistics 2015). In the same year, coal accounted for only 29.9 percent of the world's energy consumption, and only about 20 percent in Organisation for Economic Co-operation and Development countries. China has used coal both for power and heating, and as a raw material for its coal chemicals industry, including ammonia. And in recent years, Chinese companies have sought to expand the use of coal by investing in highly carbon- and water-intensive coal-to-gas, coal-to-liquids and coal-to-chemicals projects.

At the same time, beginning with its Eleventh Five Year Plan (2006–2010), China set out to address the rapid increase in its energy consumption by setting mandatory energy intensity targets and, later, carbon intensity targets for provinces and industry, developing programs such as the Top 1,000 Enterprises program (now expanded to cover the top 10,000 enterprises), and passing a renewable energy law and feed-in tariff program. China now boasts the largest installed wind power capacity in the world and the second-largest solar photovoltaics (PV) installed capacity (behind Germany), at 96 gigawatts (GW)

¹ In 2013, China emitted around 10 billion tonnes of CO₂, with a per capita emission level higher than that of the European Union (Friedlingstein et al. 2014).

and 28 GW respectively at the end of 2014 (National Energy Administration 2014; Reuters 2015; Downing 2015). (For comparison, according to the Global Wind Energy Council [2014] and the Solar Energy Industries Association [2014], the United States had 65.9 GW of wind power and 18.3 GW of solar PV installed at the end of 2014.) China has also been shutting down smaller coal-fired power plants in favour of larger, more efficient coal power plants, improving the overall efficiency of its coal power fleet even as it greatly expanded net capacity.

2014: A Tipping Point in the Transition to Clean Energy?

China's ever-increasing consumption of coal showed signs of a reversal in 2014, as its coal consumption last year fell by 2.9 percent, the first time this has happened in more than a decade of expansion. This contributed to a stalling in the growth rate of global CO₂ emissions from energy in 2014, according to the International Energy Agency (2015), the first such halt in 40 years that was not tied to an economic downturn.

This reversal can be explained in large part by China's efforts to address its severe air pollution and rebalance its energy structure away from coal. Under the Air Pollution Action Plan of September 2013, China set regional coal consumption caps for the key air pollution regions around Beijing, Shanghai and southern Guangdong that require absolute reductions in coal consumption by 2017 compared to 2012, in order to help achieve mandatory targets for these regions to reduce their average annual fine particulate matter concentration levels (i.e., the most damaging air pollutants smaller than 2.5 micrometres in size) by 25, 20 and 15 percent respectively during this time period. China set a further national coal consumption cap target of 4.2 billion tonnes of coal for 2020 in its 2014–2020 Energy Development Strategy Action Plan, released in November 2014, and a goal to reduce the share of coal in primary energy to 62 percent. The plan also seeks to double the share of natural gas to 10 percent of primary energy, and further expand low-carbon generation sources, with hydropower growing to 350 GW, wind power to 200 GW, solar PV to 100 GW and nuclear to 58 GW by 2020.

China's efforts to shift to a cleaner energy path by focusing on energy efficiency and developing non-fossil energy appear to be having an effect, with new electricity demand increasingly being met by renewables and nuclear rather than coal-fired power generation. In 2014, China's average coal power plant utilization hours fell, leading electricity generation from thermal power (mainly coal, with a small share of natural gas and oil) to fall by 29.4 terawatt-hours (TWh), while generation from hydropower increased by 175.5 TWh, wind by 17 TWh, nuclear by 14.7 TWh and solar PV by 1.0 TWh (China Electricity Council 2014). In other words, the increase in generation from non-fossil electricity generation sources in 2014 was more than enough to make up for the decrease in generation from coal-fired power plants.

These trends are continuing in 2015. In the first quarter of 2015, thermal power generation fell by 3.7 percent year on year (continuing a trend of negative growth in thermal power generation since July 2014), while hydropower generation increased by 17 percent, nuclear generation increased 29.7 percent, wind power generation increased 24.6 percent and solar power generation increased 58.4 percent (China Electricity Council 2015).

This drop in coal consumption and coal-fired power generation represents a potentially transformational shift in China's economic growth model, from one dependent on investment, heavy industry and coal, to one driven more by services, high technology and clean energy. Beijing now has a choice of whether it will take advantage of this opportunity to decisively shift its economic growth to one based on clean energy or invest further in an energy structure based on coal and fossil fuels.

By establishing a mandatory national coal consumption cap in its next Five Year Plan, China can ensure that its coal consumption peaks as soon as possible, and certainly by 2020. In the next five years, China must make important decisions about how it will develop its western provinces, and how it will price carbon, that will greatly influence its future coal consumption and emissions. If it makes the right decisions, China's coal consumption in 2013 — 4.05 billion tonnes — can become the peak, or the start of a gradual plateauing, of its coal consumption. While China's coal consumption over the next few years may fluctuate up or down slightly, a mandatory national coal cap policy and the ever-growing alternatives to coal — natural gas, hydropower, wind, solar and nuclear — can combine to ensure that its coal consumption begins a steady and sure decline. By first capping its coal consumption, China can peak its CO₂ emissions from energy at approximately 10 billion tonnes by 2025.

The Need to Green China's Future Western Expansion

To peak its CO₂ emissions, China must first peak its coal consumption as early as possible and continue to build the low-carbon energy resources and infrastructure to ensure that the peak is locked in and coal's share of energy production continues to fall. Much of China's best wind and solar resources, and its largest coal reserves, are located in the north in Inner Mongolia and in the west in Shanxi, Shaanxi, Xinjiang, Gansu and Ningxia provinces. China is simultaneously building wind and solar power bases in these provinces even as it is developing coal mining, coal power and coal chemicals bases in these areas as well. And it is building ultra-high-voltage transmission lines to bring the power — both renewable electricity and dirty coal — from these western provinces to the eastern and central cities whose air it is trying to clean.

In order to ensure that clean energy is prioritized, China will need to establish the rules, policies and market environment to prioritize renewables integration and to ensure that the

environmental benefits of clean energy are realized. The electricity system reform under discussion should include rules prioritizing the dispatch of wind, solar and other renewables, and their full integration into the grid; it should also prioritize the development of energy efficiency as a resource. Coal-fired power should provide a supporting role to renewable power in the future system, given the air quality, water and climate change advantages of renewables, and be used only to help balance the greater integration of renewables into the grid.

The expansion of the grid, as well as the increased use of energy storage, including electric vehicles, and demand response measures, can all help to balance the grid as greater shares of variable wind and solar energy sources are integrated. Cities in both the west and east should also focus on developing distributed solar PV, including on rooftops and nearby open land, in order to provide more localized renewable resources. China's focus over the next five to 15 years should be building the know-how and systems for scaling up this clean energy structure, similar to the steps that Germany is taking with its energy transition.

If China is to realize its goal of peaking CO₂ emissions as early as possible, it should avoid developing excess coal-fired power capacity as well as developing a new coal chemicals industry in the western provinces. Doing so runs the risk of investing in stranded assets and repeating the “pollute first, clean up later” development pattern of China's eastern provinces.

China's Actions to Price Carbon

In addition to continuing to expand energy efficiency and renewables, China is also seeking to develop market mechanisms that will direct investment toward low-carbon energy. It has announced plans to scale up the seven existing carbon-trading pilots to a national carbon cap-and-trade system in the next Five Year Plan (2016–2020). China should learn from the experiences of the carbon markets in the European Union and the United States, and focus on building a solid legal foundation and rules for the system, a robust emissions monitoring and reporting platform, and a combination of credibility and punishment measures to ensure compliance. Importantly, in order to ensure that a national carbon trading system actually directs investment toward clean energy, China should ensure that all key coal-consuming enterprises are covered, and that a minimum price for carbon is set high enough to influence future investment decisions. The minimum carbon price could be integrated with a possible carbon tax, setting a carbon price floor, as the United Kingdom has done (Neslen 2015). Revenues from auctioning emissions permits should be reinvested in energy efficiency and renewables programs. China should also seek to remove government subsidies and relax price controls for fossil fuels and electricity to rationalize energy markets and promote greater efficiency and competition.

Strengthening China's Leadership on Climate Change Internationally

China's cooperation on climate change with key players can also help move the climate negotiations forward. The US-China Joint Announcement on Climate Change, a demonstration of cooperation and commitment by the two largest GHG-emitting countries, injected new momentum into talks of the United Nations Framework Convention on Climate Change (UNFCCC). China should work with other major emitters, such as India, the European Union and Japan, to find areas for mutual cooperation on climate change, including development of low-carbon energy and carbon trading markets and taxes.

China can also use the G20 forum to promote global actions on climate change, in particular the phasing out of subsidies for fossil fuels, which the G20 originally agreed to in 2009 but has stalled, with recent analysis estimating that G20 subsidies for fossil fuels exploration still amount to US\$88 billion per year (Bast et al. 2014). Taking actions domestically to reduce fossil fuel subsidies, including by relaxing price controls for electricity and natural gas, and pricing the external environmental and health costs of fossil fuels through environmental and carbon taxes, will help spur the use of clean energy and ensure that it can compete on an equal footing with coal and oil.

China should also help to push forward a global agreement on phasing down HFCs, the super GHGs used in refrigeration, air conditioning and other sectors that represent a rapidly growing source of GHG emissions. Proposals for such a phasedown are currently before the parties to the Montreal Protocol, since HFCs are replacements for the ozone-depleting chlorofluorocarbons and hydrochlorofluorocarbons. Chinese President Xi Jinping and US President Barack Obama agreed to work together on a global phasedown of HFCs under the Montreal Protocol in June 2013 and again at the G20 meeting in September 2013. India, which was previously against discussion of an amendment, came out with its own proposal at the last Montreal Protocol meeting in Bangkok in April 2015. A handful of countries — Saudi Arabia, Kuwait, Pakistan and Bahrain — are still opposed to opening discussions on an amendment to phase down HFCs. As the world's largest producer of HFCs, and with industries already moving toward finding climate-friendly replacement chemicals, China should seek to phase down the use of HFCs domestically and through an international phasedown agreement under the Montreal Protocol. Opening discussions on the phasedown amendment this year, and demonstrating progress on a global phasedown agreement before the Paris meeting of the UNFCCC in December 2015, would provide a big boost, showing that countries can work together to find solutions to climate change.

Finally, as the world's largest developing country, and one with increasing influence internationally, China should use its growing influence to promote green growth and clean energy,

rather than fossil fuel-based development. In setting the rules for the AIIB, which will be formally established by the end of this year, China should clearly prioritize investment in clean energy, including wind, solar, energy efficiency and energy storage, and low-carbon infrastructure such as high-speed rail and public transit. Like the World Bank, European Bank for Reconstruction and Development, European Investment Bank, and the United States, United Kingdom and Norway, which have all announced that they will not finance or invest in coal-fired power projects or companies except in “rare circumstances” (World Bank 2013; Choudury 2013; Carrington 2015), the AIIB should make clear that it will help to finance low-carbon, non-polluting infrastructure in Asia. Only by prioritizing green growth can China and the AIIB avoid creating the same pollution problems in other Asian countries that China is now seeking to remedy.

Recommendations

China has taken strong actions in the past decade to pursue a more climate-friendly development path based on energy efficiency and clean energy. Its goal to peak its CO₂ emissions by 2030 or earlier, coupled with its efforts to reduce its reliance on coal in order to improve its air quality and develop its clean energy industry, demonstrate a real and determined effort to develop a low-carbon economy. To provide further leadership in addressing global climate change, China should:

- Take advantage of the recent tipping point in transitioning from coal to clean energy, by seeking to peak the country’s coal consumption as soon as possible. This includes severely limiting future investments in coal-fired power and coal chemicals in its western regions, and focusing on greater integration of utility-scale and distributed renewable energy and energy efficiency. China should also set a price on carbon through carbon trading and/or tax mechanisms that set a carbon price high enough to direct investment toward clean energy.
- Internationally, China should work with other key players, including the United States, the European Union, India, Japan and the G20, to speed up adoption of clean energy, and also push forward an agreement on phasing down super-GHG HFCs. It should also ensure that the AIIB prioritizes clean energy development for developing countries and does not fund coal mining or coal power projects, so that other countries can leapfrog the environmental pollution that China is now seeking to correct.

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Acronyms

AIIB	Asian Infrastructure Investment Bank
G20	Group of Twenty
GHG	greenhouse gas
GW	gigawatt
HFC	hydrofluorocarbon
PV	photovoltaics
TCE	tonnes of coal equivalent
TWh	terawatt-hour
UNFCCC	United Nations Framework Convention on Climate Change

About the Authors

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Fixing Climate Governance Series



The Fixing Climate Governance project is designed to generate some fresh ideas. First, a public forum was held in November 2013. High-level workshops then developed a set of policy briefs and short papers written by experts. Several of these publications offer original concrete recommendations for making the UNFCCC more effective. Others make new proposals on such topics as how to reach agreements among smaller sets of countries, how to address the problems of delayed benefits from mitigation and concentrated political opposition, ways that China can exercise leadership in this arena and how world financial institutions can help mobilize climate finance from the private sector. These publications will all be published by CIGI in 2015.

Policy Options Could Increase Ambition in the 2015 Climate Agreement

Fixing Climate Governance Policy Brief No. 1
Henrik Jepsen

Economy-wide targets for emissions reductions will be an indispensable element of a 2015 agreement, but reaching agreement on ambitious targets is notoriously difficult. It needs to include a mechanism that can facilitate and incentivize increased ambition over time, and which focuses on high-potential policy options that contribute to the same general goal: climate change mitigation.

Conducting Global Climate Change Negotiations: Harnessing the Power of Process

Fixing Climate Governance Policy Brief No. 2
Kai Monheim

Process itself — over and above the issues at stake — is a key determinant of negotiation success across all levels of climate change negotiation groups in the United Nations Framework Convention on Climate Change. The author offers six axioms for chairs of negotiation groups that may lead to finding common ground and avoiding deadlocks: brokering compromise while remaining as transparent and inclusive as possible; enhancing influence by acting impartially and recognizing cultural differences; managing the agenda to create momentum while clustering, prioritizing and linking issues; focusing debate using the chair's information advantage; steering individual negotiation sessions in a time-efficient way; and building trust by creating sheltered negotiation spaces that allow for frank and constructive dialogue.

Six Ways to Make Climate Negotiations More Effective

Fixing Climate Governance Policy Brief No. 3
Pamela Chasek, Lynn Wagner and I. William Zartman

This policy brief proposes six changes that could improve the negotiating process and facilitate consensual outcomes. These include using a single negotiating text; discontinuing “on-screen” negotiations; eliminating the norm that “nothing is agreed until everything is agreed” and dividing the climate change problem into pieces that may be more readily acceptable; giving negotiating roles to ministries besides foreign affairs; establishing a group of states to play the “regime-builder” role; and employing the leadership skills necessary to make this all happen.

Focus Less on Collective Action, More on Delayed Benefits and Concentrated Opponents

Fixing Climate Governance Policy Brief No. 4
Edward A. (Ted) Parson

Controlling climate change has significant collective-action aspects, but the importance of these has been exaggerated and efforts misdirected as a result — particularly regarding the feasibility and impact of leading actions to pursue large emission cuts by individual nations or subgroups. Serious climate action must confront other challenges, most importantly, delayed benefits and concentrated opponents. This policy brief sketches several specific approaches to addressing these challenges, which can be pursued nationally or internationally.

Mainstreaming Climate Change into Financial Governance: Rationale and Entry Points

Fixing Climate Governance Policy Brief No. 5
Sáni Zou, Romain Morel, Thomas Spencer, Ian Cochran and Michel Colombier

The financial sector is exposed to the physical risks associated with climate change and the impact of climate policies. Securing global financial and economic stability and scaling up low-carbon, climate-resilient investments are not conflicting, but rather mutually reinforcing, objectives. Policies affecting and instruments matching the demand side and supply side of finance need to be aligned with climate objectives to efficiently shift investments toward a low-carbon, climate-resilient economy.

Central Banks Can and Should Do Their Part in Funding Sustainability

Fixing Climate Governance Paper No. 1
Andrew Sheng

Central banks, when purchasing financial assets, should consider selecting assets that will promote sustainability, including climate change mitigation and adaptation. Central banks not yet ready to factor social objectives into their decisions should at least incentivize bankers and asset managers to invest in climate mitigation activities and low-emission growth, as well as support a financial transaction tax to fund a new or established global fund for climate mitigation.

About CIGI

The Centre for International Governance Innovation is an independent, non-partisan think tank on international governance. Led by experienced practitioners and distinguished academics, CIGI supports research, forms networks, advances policy debate and generates ideas for multilateral governance improvements. Conducting an active agenda of research, events and publications, CIGI's interdisciplinary work includes collaboration with policy, business and academic communities around the world.

CIGI's current research programs focus on three themes: the global economy; global security & politics; and international law.

CIGI was founded in 2001 by Jim Balsillie, then co-CEO of Research In Motion (BlackBerry), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario.

Le CIGI a été fondé en 2001 par Jim Balsillie, qui était alors co-chef de la direction de Research In Motion (BlackBerry). Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario.

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