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Prospects for Monitoring Carbon Emissions in China

by
Angel Hsu, PhD
Yale School of Forestry and Environmental Studies

Introduction

Few countries – save for the United States – have the ability to change the rules of global climate change in the way China can. To place into perspective China's demand for energy, in 2013, China consumed enough coal (4.05 billion tons) to fill 1.9 million Olympic-sized swimming pools (NBS, 2014).

What progress China has made so far on its past climate commitments is of major international concern. The estimation of what ambition is needed for the upcoming Paris deal is, in part, contingent upon China's achievements thus far and an estimation of what its ability to further mitigate is. In September 2014, China indicated that it is more than halfway to meeting its 2020 climate goals - completing 28.5 percent of a pledge to reduce carbon intensity 40 to 45 percent from 2005 levels (Zhang, 2014). But the country has not released any carbon emissions data since its Second National Communication on Climate Change to the UN Framework Convention on Climate Change (UNFCCC), which only includes data from 2005, making it challenging to corroborate these high-level claims (NDRC, 2012). The lack of publicly available, transparent data in support of China's climate progress surprisingly did not arouse suspicions or elicit media headlines. Many countries, including the United States, expressed concern in earlier negotiations over China's lack of data transparency, but no national leaders raised alarms this time.

Carbon emissions data have been an especially sensitive topic for China. Despite reports in 2007 suggesting China's carbon emissions were highest in the world, the Chinese government did not officially recognize its status as the top global emitter until three years later, prior to the December 2010 climate negotiations in Cancun. This delay illustrates the sensitivity of China's carbon emissions data, which the government is careful to not include in reports regarding energy statistics, and the opacity of data considered "state secrets" (Hsu et al., 2012).

Therefore, what can be said of prospects for monitoring greenhouse gas emissions in China, at both the national and local scales and across sectors, is limited to the consideration of how the country reports other statistics, including energy and environmental pollution, and policy signals that indicate future plans for monitoring systems that are accurate and robust.

Lessons from Monitoring Energy

China has only officially produced two national inventories of its greenhouse gas emissions for its National Communications to the UN Framework Convention on Climate Change (UNFCCC) Secretariat in 2004 and most recently in November 2012. The first GHG inventory referred to its 1994 emissions, which was completed with assistance from the U.S. government and the Global Environment Facility (GEF) during the 1990s. This first inventory was limited to just three gases (carbon dioxide, methane, and nitrous oxide); while the Second Communication included data for all six greenhouse gases for 2005. Estimations of China's emissions from the energy, industrial processes, waste, agriculture, land-use change and forestry were developed in the first national communication using all three tiers of IPCC methodologies (IPCC, 2006).

Apart from the two national communications, there are no greenhouse gas emissions data officially reported in China. The inventories developed for the national communications, in particular the first submission, were not created for internal management purposes or to be used to regularly track emissions. Instead, they were one-off exercises and it was not until the State Council established targets for energy intensity reduction targets in the 11th Five-Year Plan did the government recognize the need to develop a system to track progress. Further, because China's Copenhagen commitments made in 2009 are energy-based carbon goals, it is reasonable for the government to base its estimation of progress towards its 16 to 17 percent reduction in carbon intensity using energy and activity data and its own set of emission factors (YCELP et al., 2011). Therefore, to understand China's capacity to track greenhouse gas emissions, a consideration of its system to track energy consumption, production, and transfer (e.g., transmission and distribution) can provide a foundation for future monitoring.

In 2007 the National Development and Reform Commission (NDRC), China's main policy implementing body charged with managing energy and climate change, established a Statistics Indicators, Monitoring and Evaluation System (SME) with three primary goals: to implement a statistical monitoring, verification, and indicators system to assess energy intensity (CPI, 2012). Programs such as the Top 1,000 Enterprises Program (later expanded to include 10,000 companies), which aim to implement energy efficiency measures within the largest energy-consuming companies in China, required a system by which to measure and evaluate contributions to provincial and national energy intensity reduction targets. These companies, along with those with revenue greater than 5 million RMB (~$800,000 USD), are required to report data on energy production and consumption for all fuel types. For those that fall below this threshold or statistical scale, various methods are used to survey energy production for a few fuel types and energy consumption from a representative sample (CPI, 2012).

Although systems put in place to assess enterprise, local and provincial energy data still suffer from some structural issues that inhibit regular, consistent monitoring. For example, in the SME described above, different enterprises, depending on size and sector, report data in various intervals to disparate agencies at the sub-national scales. For example, the 5,000 enterprises above the statistical scale report energy data directly to the NBS, while those below report to local bureaus of statistics. Power companies below the statistical scale report electricity usage to China's Electricity Council; whereas coal or oil companies may report to local statistical bureaus. Programs aimed to promote energy intensity or renewable energy may also collect their own data and statistics. Seligsohn (2010) notes that making a comprehensive list of the number of energy savings and climate or low-carbon related programs in China is nearly impossible. These multiple reporting levels and overlaps between programs results in similar challenges of institutional coordination, resulting data gaps, and persistent data mismatches described in air and water pollution data in China, which environmental protection bureaus manage (Hsu, 2013). Such challenges will need to be ironed out if China is to develop accurate systems for measuring and managing its carbon emissions.

Latest Updates on Carbon Monitoring

The 12th Five-Year Plan, including targets for carbon intensity reductions based on China's 2009 Copenhagen commitment, required the creation of statistical monitoring systems for greenhouse gas emissions (State Council, 2010). China's pledge to the Copenhagen Accord further committed the government to producing a national inventory every two years (Schmidt, 2010). However, since the announcement of these requirements as well as two other public announcements to establish a national GHG monitoring and reporting database, there has not been any evidence any such system has been created. China has also not since officially released any national GHG inventories outside of its Second National Communication.

The NBS has been working over the last half-decade to develop carbon dioxide reporting requirements for China, although they still have not been released. From all indications (e.g., conference presentations and interactions with colleagues), the agencies charged with developing the reporting requirements have closely studied international practice, including the U.S. EPA's reporting guidelines and the European system. As the U.S. EPA requires continuous emissions monitoring (CEMs) for coal-fired power plants, it is possible that China will adopt a similar approach. For coal-fired power plants, China already requires CEMs monitoring for sulfur dioxide (SO_2) and is adding NOx monitoring since the addition of nitrogen emission reduction targets in the 12th Five-Year Plan. In 2010 the MEP reported that 7,988 state-controlled enterprises had installed CEMs, although some studies suggest that there currently are over 10,000 CEMs that measure emissions from air and other parameters, at power plants alone throughout the country (Zhu et al., 2010). To include continuous carbon emissions monitoring to existing CEMs systems, particularly for the power sector, would seem an obvious move to upgrade China's ability to effectively monitor carbon emissions. Technical assistance, for example from the U.S. EPA, would help in the implementation and calibration of such systems, which many environmental protection bureau officials, at least with respect to continuous monitoring of air pollutants, are still relatively unstable in China (Hsu, 2013). The U.S. EPA and the China's Ministry of Environmental Protection (MEP) have had more than a

decades' long cooperation on building capacity on air pollution monitoring, through initiatives like the Regional Air Quality Management program.

Another policy development that should foster the creation of improved systems for monitoring carbon emissions is the NDRC's plan to establish a nationwide carbon emission trading program by 2016. Already, seven carbon emissions trading pilots are currently underway and 31 million tons of carbon dioxide emissions have been traded. Shenzhen, Shanghai, Beijing, Tianjin and Guangdong were the first five sub-national trading pilots to begin in 2013, with Chongqing and Hubei joining later in 2014. It will be a big leap for China to expand from the pilots, which currently only cover 1,115 metric tons of CO2 equivalent (MtCO2e)—a fraction of China's overall emissions (around 8,300 MtCO2e annually). Still, these pilots are providing critical testing grounds to help local and national leaders identify gaps in data and capacity to lay a successful foundation for the eventual national program. In addition to establishing rules for the means of capping emissions within the pilots (e.g., sectors or method of capping, whether using absolute or intensity-based caps) (Wu, 2011), the pilots are also charged with determining legal frameworks and processes for monitoring, reporting and verification (MRV).

Although details of the individual experience so far of the pilots is fairly limited, China's past experience with SO_2 trading based on the U.S. EPA's successful program and other local pollution trading systems emphasize the need for better data and measurement as the foundational requirement to future successful schemes (Yang and Schreifels, 2003; Chang and Wang, 2010). China still suffers from a relatively weak system of legal enforcement and a lack of entities able to conduct third-party verification for effective MRV systems to be put in place. The recent revisions to its Environmental Protection Law and harsher enforcement and penalties of violating enterprises should help both the establishment of MRV systems domestically but also drive improved data transparency on the part of enterprises. Already, third-party watchdogs like Ma Jun's Institute for Public and Environmental Affairs are providing real-time apps that disclose enterprise air and water pollution data in real-time to help pressure compliance.

Conclusion – Looking ahead towards Paris

China's ability to effectively monitor its carbon emissions has implications both internally and internationally. Internally – to meet its own carbon intensity reduction targets – and internationally – to comply with its reporting commitments, China requires a robust monitoring system that is bolstered with strong legal, regulatory mechanisms and streamlined reporting that ensures accurate monitoring. Although China agreed to a form of MRV internationally through the UNFCCC, a less stringent form referred to as "International Consultation and Analysis (ICA)," it is unclear what MRV-like requirements countries may negotiate for the upcoming Paris climate agreement. So far, the form of intended, nationally-determined contributions or INDCs has left wide latitude for countries to individually specify the content and specificity (or lack thereof) of pledges, potentially making consistent MRV and review challenging at the international level. Regardless, the internationally community is watching for the announcement of China's commitment, as well as a significant remaining number of countries that have yet to put forth details of their pledges. After which, analysts and the UN alike will all undertake evaluations to understand what the pledges amount to and whether they sufficiently "add up" to ensure a least-cost trajectory to contain global temperature rise.

References

Chang, Y.C., and N. Wang. 2010. "Environmental Regulations and Emissions Trading in China." Energy Policy 38 (7): 3356–3364.

Climate Policy Initiative, (2012). Tracking Emissions and Mitigation Actions: Current Practice in China, Germany, Italy, and the United States. Climate Policy Initiative Working Paper. Available at: http://climatepolicyinitiative.org/wp-content/uploads/2012/05/Tracking-Emissions-and-Mitigation-Actions.pdf.

Hsu, A., A. de Sherbinin, and H. Shi, (2012). Seeking truth from facts: the challenge of environmental indicator development in China. *Environmental Development.* 3:39-51.

Hsu, A. (2013). Environmental Reviews and Case Studies: Limitations and Challenges of Provincial Environmental Protection Bureaus in China's Environmental Data Monitoring, Reporting and Verification. *Environmental Practice*, *15*(03), 280-292.

IPCC, (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. *2013-04-28.* Available at: *http://www.ipcc-nggip.iges.or.jp/public/2006gl/,* https://www.ipcc.ch/meetings/session25/doc4a4b/doc4a.pdf.

National Bureau of Statistics of China, (2014). *China Statistical Yearbook 2014.* Available at: http://www.stats.gov.cn/tjsj/ndsj/2014/indexeh.htm.

National Development and Reform Commission, (2012). "Second National Communication on Climate Change: The People's Republic of China. Report to the UN Framework Convention on Climate Change," (8 November). Available at: http://unfccc.int/resource/docs/natc/chnnc2e.pdf.

Schmidt, J. (2010). China and India to Report their Global Warming Pollution Every 2 Years. NRDC: Switchboard, March 16. Available at: http://switchboard.nrdc.org/blogs/jschmidt/china_and_india_to_report_every_2_years.html.

Seligsohn, D., (2010). China's System for Measuring, Monitoring, and Reporting Energy and Climate Data. Written testimony to the U.S.-China Executive Congressional Commission. Available at: http://www.wri.org/publication/testimony-congressional-executive-commission-china.

Yale Center for Environmental Law and Policy **(**YCELP**)**, the Center for International Earth Science Information Network **(**CIESIN**)**, Chinese Academy for Environmental Planning, and City University of Hong Kong, (2011). Towards a China Environmental Performance Index. Available at: http://envirocenter.yale.edu/chinaepi.

Wu, Q, (2011). "Policy and Politics of a Carbon Market in China." In J. Peetermans, ed. Greenhouse Gas Market Report 2011: Asia and Beyond: the Roadmap to Global Carbon & Energy Markets. Geneva, Switzerland: International Emissions Trading Association. 22-25.

Yang, J., & Schreifels, J. (2003). Implementing SO2 emissions in China. OECD Global Forum on Sustainable Development: Emissions Trading.

Zhang Gaoli, (2014)."Build Consensus and Implement Actions For a Cooperative and Win-Win Global Climate Governance System" presented at UN Climate Summit, New York City, USA, 25 September 2014.

Zhu, F., H. Li, and S. Qiu, (2010). Development and application prospects of gas continuous emission monitoring systems. Environmental Monitoring Management and Technology 22**(**4**)**:10–14. in Chinese**.**