China's System for Measuring, Monitoring, and Reporting

Energy and Climate Data

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To the Congressional-Executive Commission on China

April 1, 2010

Thank you for the opportunity to contribute to the deliberations of this Commission. My name is Deborah Seligsohn, and I am Senior Advisor to the China Climate and Energy Program at the World Resources Institute. The World Resources Institute is a non-profit, non-partisan environmental think tank that goes beyond research to provide practical solutions to the world's most urgent environment and development challenges. We work in partnership with scientists, businesses, governments, and non-governmental organizations in more than seventy countries to provide information, tools and analysis to address problems like climate change, the degradation of ecosystems and their capacity to provide for human well-being.

I am delighted to speak with you today about China's systems for measuring, monitoring, and reporting energy and climate data, how these systems have been implemented and the opportunities for continuing to build capacity and improve these systems.

Measurement and reporting systems provide information for a number of different purposes. It is important to distinguish the functions we expect the system to provide -- both in the development of the system itself, and in the evaluation of the system's effectiveness and utility. Energy and climate data can be collected or disseminated for three purposes:

1. Measuring overall progress through national-level data. This is the essential level for evaluating any country's commitments to any international climate regime. It is the level at which we compare country commitments. It is also essential for the country's own purposes in considering energy and climate policy in the context of overall macro-economic policy.
2. Measuring the impact of specific programs or players – in other words the data needed for energy and climate policymakers to track progress toward specific policy goals. This includes measuring at the sub-national level since China allocates provincial and local quotas. It would include sectoral or company-level reporting to enforcement bodies (to the extent that enforcement is at those levels). Finally, it includes programmatic data -- metrics collected to assess the progress of specific energy or climate programs.

3. Providing data that civil society can access (public transparency). The transparency function can occur at all levels from national to the local.

It is important to distinguish these three functions and the types of data needed to meet each goal, as well as the separate history of each type of data collection and dissemination in the international sphere.

1. National Level Data

In contrast to traditional environmental pollutants, where in the developed world there is now a 40-year history of collection and dissemination of all three types of data listed above, in the energy area until very recently data collection has focused mainly on the first area – the development of national-level, aggregated data sets. China's history with collecting and producing energy data for an international as well as domestic audience is much lengthier than its focus on environmental issues. If one goes to the website of the National Bureau of Statistics (NBS) of China, one can find production data from 1952 and consumption data, starting in 1957. Over the years this data becomes substantially more sophisticated. Energy data in this regard is collected as part of overall national accounts data collection, an area that China has focused on during the past thirty years.

National-level energy data is relatively easy to collect – there are relatively few major suppliers and some very large demand centers – and production (from the major energy suppliers, coal and oil companies) and consumption data (power plants, major industry, transportation information) can be cross-checked. The consensus of scholars we have interviewed as part of our ChinaFAQs program both in the United States and China is that (1) it is unlikely that energy data will depart from reality for long before the gap between supply and demand numbers, which are collected through separate networks, becomes very clear and requires a correction, and (2) the best way to track Chinese data is to observe the trend rather than focus on an specific short-term result. The most recent data may well need to be corrected in the normal cycle (as is true in other countries, as well), and especially in China there are some rapid fluctuations (such as the precipitous rate at which electricity demand dropped immediately after the 2007 Financial Crisis) that really need more time and context to analyze.

Both of these points are illustrated in the most commonly raised concern about the quality of China's national energy data, a period between 1998 and 2001, where the Chinese National Bureau of Statistics (NBS) substantially underreported Chinese energy data, primarily because of an underreporting of coal production and use. By 2002 data collection had improved sufficiently so that what had previously looked like a trend toward rapidly improving energy intensity instead looked like a peculiar dip followed by a rapid rise in consumption. NBS recognized the aberration, and published a correction, along with a revision to national accounts data in 2005. This incident shows the need to look at long-term trends and not rely on single year data, to recognize the ability of the Chinese system to self-correct, and the formal systems enabling such self-corrections to occur predictably. In 2005, NBS initiated a new program of 5-year economic censuses, specifically to assess and revise economic data.

It is worth noting that since the early 2000s there has not been a similar period of apparent drift in Chinese energy statistics and the variability in energy intensity improvements have been much more easily explained in terms of current policy or global economic conditions than was the case in the late 1990s. Moreover, the last period when Chinese energy and indeed GDP statistics were questioned by international analysts – directly after the global financial crisis in 2007 – it turned out that China's statistics reflected the unusual way the crisis played out in China, with a rapid drop in heavy industrial demand that led to a short-term and dramatic drop in electricity generation, followed by a much more rapid and robust overall GDP rebound than in any other country.

These statistics can thus act as a reasonably reliable guide to national energy accounts and conditions, ones that can be used both by the Chinese national government in making policy decisions and by other countries looking to see how China is implementing its energy efficiency and renewable energy programs.

There is no doubt data could be improved. While NBS has become much more willing to revise its data sets – a practice standard in other countries, as well, (for example, US GDP figures have a cycle with three revisions) – Chinese revisions of recent-year data do not always include revisions of prior-year data, making time series analysis difficult.

In contrast to energy data, China has substantially less experience collecting and reporting greenhouse gas emissions data. China produced one Greenhouse Gas Inventory of its 1994 emissions, which it submitted in its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in 2004. This work was done with assistance from the U.S. government during the 1990s. China is currently in the process of preparing its Second National Communication, including a new inventory. During President Obama's visit to Beijing in October 2009, the United States Environmental Protection Agency (EPA) signed a Memorandum of Cooperation (MOC) with the Chinese National Development and Reform Commission (NDRC) for capacity building in preparing this inventory. Our understanding of the capacity building needs as perceived by both sides is that it is not in the area of data collection *per se*, but rather in data analysis, and in creating a replicable and updatable system, so that China can update and submit an inventory every two years as provided by the Copenhagen Accord.

One of the issues with national inventories not just in China, but in most developing countries, is that the first versions, conducted with project support from organizations like the Global Environmental Facility (GEF), were conducted as one-off exercises, rather than conducted with systems creation in mind.[i] As a result few developing countries that conducted these first inventories in the 1990s found them easy to repeat. Needless to say, there are other issues involved, including negotiating issues about who pays for inventories, but as a practical matter the first inventory exercises did not leave in place easily replicable systems.

Since China has not conducted regular inventories since 1994, its own GHG emissions figures that it uses for internal policy purposes are based on estimates. Since China's current national policy as reported to the Copenhagen Accord relates only to energy-related CO2 emissions, it can make reasonably good estimates based on its energy data. From interviews with Chinese energy researchers, we understand that the Chinese government has a complete set of local emissions factors (the amount of CO2 emitted per unit energy, differentiated by type of energy and type of technology used to consume it) with which they use internally to make these estimates.[ii] Its next inventory, currently underway, should enable it to assess the accuracy of overall GHG emissions estimates. It is not clear whether China will be publishing a new inventory in 2010 or 2011, but in the Copenhagen Accord it agreed to every two years.

2. Tracking Sub-National governments, Companies and Programs

China can assess overall progress toward meeting its energy intensity, renewable energy and carbon intensity goals by looking at national-level data; however, to manage targets and influence the behavior of sub-national governments and firms, the Chinese government requires more detailed data. Over the last several years, the Chinese government has developed its energy information systems to track this data in a more detailed manner than was previously the case. Changes include more frequent reporting -- up to twice a year for China's largest companies -- as well as detailed auditing procedures.

China's programs for promoting energy intensity and the greater use of renewable energy are complex and to some extent overlap. For example, a program to improve industrial boiler efficiency will assist some companies in the 1000 Enterprise Program, but might also assist smaller companies outside the scope of that program, and both programs serve the overall energy intensity goal. At the level of the national targets these do not cause double-counting, but tracking individual programs is more complex. Table 1 below details some of the major programs that contribute to controlling carbon dioxide emissions. There are dozens of other programs. Some of the successful national programs have been replicated at the provincial level, and there are also separate provincially-initiated programs, making a comprehensive list almost impossible to compile.[iii]

Table 1: Major Climate-related programs and assessment mechanisms

NAMA	Scope	Metric	Reporting Mechanism	Assessment Mechanism	Time Frame
Five-Year Plan	National comprehensive planning document	Qualitative evaluation of policy implementation	Annual work report by Premier and by each Ministry	Monitored and assessed by standing committee of National People's Congress	New targets set every five years

Energy Intensity	National, with targets given to each province, local-ity and state-owned enterprise	Energy used (MTCE/ Unit GDP)	Calculated by NBS and published in a semi-annual statistics bulletin	Collected from multiple sources to ensure cross-checking	Five year goal. Many data are tabulated monthly. Provinces are required to report semi-annually
Renewable Energy	National, with targets given to provinces and power generation companies	Renewable energy portfolio standard (specified percentage of renewable in total output)	Energy Bureau aggregates data from NBS, various Ministries and industrial associations	Internal data quality assurance system within various Ministries and cross-checking	Goals to year 2010 and 2020, calculated annually
The Thousand Enterprise Program	National, targeted at 1000 largest enterprises	Energy Intensity per unit output	Enterprise to local DRC to NDRC	NDRC inspection teams	5 year program with annual targets; progress reports twice a year
Individual Industrial Sector Targets	Set by Sector	Energy Intensity per unit physical output	Industrial association to NBS/NDRC	Aggregated data from individual companies	Annual and 5 year reporting
Program to Close Small Enterprises	National, specified closures in electricity and other sectors	GW capacity for power, tons of production capacity in industry	Provincial government and related enterprises reporting to national NDRC	NDRC conducts onsite verification	5 year targets, annual progress reports

Much of the effort in the 11th Five Year Plan (2006-2010) was focused on the large programs that would yield the energy intensity improvements needed to meet the national targets, in particular the 1000 Enterprise Program, whose enterprises use one-third of China's primary energy, and the closure of small and inefficient enterprises. From our own work with local researchers and an upcoming assessment of the 11th Five Year Plan by the China Energy Group at Lawrence Berkeley National Laboratory, it is clear that the data from these programs is significantly better than that related to other programs. For these programs not only can specific program-related targets, such as setting up energy plans, or closing specific units be tracked, but they can also be related to a specific amount of energy savings. While for other programs, the specific program elements might be tracked (for example, number of compact fluorescent light bulbs distributed), they might not be linked back to the actual amount of energy saved. The challenge is that programs were established without necessarily being linked to the metrics collection needed to assess program outcomes in terms of energy use. The programs that have the best metrics used fairly labor-intensive evaluation techniques, in particular regular inspections. Table 2 below provides the evaluation metric used by inspectors to firms in

the 1000 Enterprise Program and shows the level of detail national officials could focus on for such large energy users. The State Statistical Bureau is focused on improving statistical approaches, which would be beneficial.

Table 2: Evaluation Score Sheet for 1000 Enterprise Program

Energy conservation target (40 points maximum)	100% of target achieved: 40 points; 90% achieved: 35; 80% achieved: 30; 70% achieved 25; 60% achieved: 20; 50% achieved: 0
Energy conservation measures (60 points maximum)	Energy conservation leading group: 3 points Energy conservation management department: 2
	Decomposition of target to unit and person 3 Assessment of energy conservation target 3 Reward and punishment system 4
	Energy efficiency performance in 1000 enterprises: 10 for top 10% and 5 for top 50%. Energy conservation R&D fund 4 Annual energy conservation plan 4 Closure of backward equipment 7 Retirement of outdated equipment
	Implementation of local regulation 2 Implementation of energy consumption norm 4 Norm management for energy consuming equipments 2 Implementation of energy conservation design 2
	Energy audit and monitoring system 2 Energy statistics manger and account 3 Energy monitoring appliance 3 Energy conservation training 2

Further developing these program evaluation approaches might help China in addressing its future carbon mitigation targets and programs. As it moves from energy to carbon targets, there will be a need for integrated carbon accounting at the enterprise and possibly at the municipal and provincial level. The World Resources Institute has been working with Chinese partners on enterprise-level greenhouse gas accounting for four years. We have focused mainly in heavy industries, and our standards have been adapted for the cement and petroleum and petrochemicals sectors and are now being adapted for the power sector. These types of tools will enable Chinese enterprises and the Chinese government to better track their greenhouse gas emissions.

It is also likely that the Chinese government will assign carbon dioxide intensity targets to provincial and local governments. The current energy intensity target is distributed to each of the provinces. The challenge for provinces is tracking all the economic activity within their boundaries, a much more difficult task in all countries than tracking national

data, since provinces do not have enforced borders, control of a currency or customs agents. Current provincial energy data actually derives in part from bottom-up data from localities and local enterprises, but also top-down data from the central government, which receives data directly from many national-level companies.

This complexity will continue to exist with the move to carbon intensity. Calculating CO2 emissions at the sub-national level is more difficult that accounting at either the national or the firm level, because the "boundaries" of the organization are not so clear. A program like the European Union Emissions Trading System (EU ETS), for example, accounts at the national and the firm level. Because of the need in China, a number of international groups are working in this area. We at WRI are currently examining the existing tools available internationally, including the French Ministry of Environment's *Bilan Carbone* (Carbon Balance), and a tool produced by Local Governments for Sustainability (or ICLEI) to provide advise on how to best address this need.

NBS is actively developing its carbon dioxide reporting requirements for China. These are not yet public, but from presentations at various conferences it seems clear that they are carefully studying the European system as well as the EPA's GHG reporting rules. One area in which they seem to be looking closely at the EPA's rules is in monitoring CO2 from coal-fired power plants. The EU system is an estimation system, based on energy use and emissions factors. EPA requires continuous emissions monitoring on coal-fired power plants, because of difficulties in measuring coal input as well as variation in the coal itself. While we do not yet know what China will choose to do, we know that researchers have been considering the costs and complexity of adopting the U.S. approach. In the last two years China has required continuous emissions monitoring for SO2 from coal-fired power plants, and now a few provinces have introduced monitoring for NOx. The equipment that monitors NOx also measures CO2, but as yet it is limited to a few provinces. US EPA has provided some assistance to Chinese localities in areas such as calibrating SO2 monitors. If China were to rapidly deploy NOx/CO2 monitors, more technical assistance of this sort might help the program significantly.

What types of metrics China will need for domestic implementation, as opposed to overall national accounts described above, in the future will be determined in part by the types of mechanisms it chooses to use. In our current research with Tsinghua University we are looking at the different requirements needed if China were to choose at some point to use a cap and trade system, a carbon tax or additional emissions standards, in contrast or in addition to the current emphasis on quotas. While both cap and trade and carbon tax require regular monitoring and reporting, a carbon tax, for example, offers the choice of imposing it upstream or downstream in the energy production chain. These two would both require more facility-level verification – at whatever level the allotments or tax is being imposed. In contrast, standards will require separate systems for different types of standards verification, a seemingly more complex option, but one where China already has significant experience.

3. Providing Data to the Public (Transparency)

Traditionally energy data is treated quite differently from environmental data. Energy agencies like the U.S. Energy Information Administration aggregate data, and the public are unable to see specific firm-level or facility-level information. Firms have traditionally viewed this data as confidential business information, which they give to governments, but governments then protect. Aggregated data is widely available and used, and in the energy area this aggregation was never considered a barrier to transparency.

In recent years there has been a movement for transparency in climate data, which WRI supports. Transparency is a principle of our Greenhouse Gas Protocol, which we began to develop with the World Business Council on Sustainable Development in 1998.[iv] The earliest public mandate to provide facility-level climate data is within the European Emissions Trading, a system only established in the past decade.[v] The U.S. EPA GHG reporting rule went into effect only in 2009. With an EPA requirement, this information is now public, but as you can see, this is very new.

Private groups have also promoted the idea of carbon transparency. In particular, the Carbon Disclosure Project (CDP) surveys companies listed in 29 stock indices around the world. 2009 marked its seventh annual report.[vi] Participation rates range from 8% in Central and Eastern Europe to 95% among the UK's FTSE 100.[vii] The China 100[viii] reported 10 firms or 10% reporting in 2009, double the number in 2008. While China's number was quite low, it reflected a broader trend, with Russia and India also both below 20%; even Japan had only a 37% reporting rate. The idea of GHG transparency in the Asian region is clearly just beginning.

The general argument for making pollution data available is so the public can know the risks they are exposed to. Since climate change has global impacts, global totals are the best indicator of the public's risks, and national-level data the best indicator of how each country is contributing to mitigating the risk. However, CDP's argument is that investors need to know a company's climate change risk (including both risks from dependence on GHG-generating energy and processes and from impacts) as part of the transparent information needed for a healthy market.

Transparency can also facilitate better analysis and can actually help promote innovation in GHG mitigation. As noted above China has an uneven record with program assessment. Freely available data sets that enabled academics and others to develop new approaches to assessing and evaluating data would assist national and local level policymakers. At present much of the information needed for companies to make independent assessments, such as access to the actual emissions factors the government uses, are also difficult to access.

Greater access to disaggregated data could thus facilitate investor and others' evaluations of specific companies, innovation in the use of the data and tools, and the companies' own efforts to manage their GHG emissions. This issue is not directly related to national-level accounting for inventory purposes, where national-level energy data can be used to

calculate energy-related CO2 emissions, but rather is related to program assessment and once sub-national targets are assigned to target enforcement.

In summary, there is a difference between calculating energy and emissions data at the national level to track how a country is doing overall and the country's own needs domestically for implementing, assessing and enforcing specific domestic programs and mandates.

China has a long history of national-level energy accounting, and the reliability of this data has increased significantly, especially in recent years, when new systems were put in place to implement the energy intensity target under the 11th Five Year Plan (2006-2010). GHG Emissions accounting is relatively newer, going back to 1994, but China is actively involved in improving its systems in this regard, and because its international commitments are for energy-related CO2 emissions, it will be able to fully use the data improvements in its energy information systems to support its GHG data collection and analysis.

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[i] Taryn Fransen, "Working Paper: Enhancing Today's MRV Framework to Meet Tomorrow's Needs: The Role of National Communications and Inventories," The World Resources Institute, June 2009.

[ii] From interviews with the Energy Research Institute we understand these emissions factors to be more technology specific and less aggregated than the type that would generally be released to assist companies in making their own accounting.

[iii] This information and the table are drawn from, Fei Teng, et al "Working Paper: Mitigation Actions in China: Measurement, Reporting and Verification," the World Resources Institute, June 2009.

[iv] See www.ghgprotocol.org for details on the program.

[v] Information on the EU ETS is available on the web at http://ec.europa.eu/environment/climat/emission/index_en.htm

[vi] Carbon Disclosure Project 2009: Global 500 Report. www.cdproject.net

[vii] The CEP is a voluntary report and the level of participation varies with many companies submitting full GDP accounting, while others provide only much more general information.

[viii] This appears to be CDP's own selection of 100 top companies. It is not one of the standard stock indices, in contrast to the others in CDP's compilation.