Building Carbon Inventories in China

A report by:

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Dear Readers,

There couldn't be a more important time to write this report. First, recent studies on the impact of business-as-usual scenarios on climate change reveal a future far more in peril than anyone ever thought. The effects are both more serious and more imminent and will have disastrous consequences for everything from the basic safety of the world's poorest populations to the security of energy and food resources to the stability of the global economy. In the last year, we have seen that even the most conservative predictions for climate change paint a picture far more grim and devastating to the world's vital systems -- and all within a shorter timeframe -- than even the most extreme predictions of just a few years ago.

But with the seriousness of this prediction there are also great opportunities. In the lead up to and now in the wake of the Beijing Olympics Games China has made great strides in identifying its environmental problems. And China has also committed itself to formidable carbon reduction targets, in some cases these targets amount to the single most carbon-reducing plans in place in the world. In December 2007 at the Bali round of UN climate talks the Chinese delegation for the very first time pledged reduce energy use and improve energy efficiency. At the same time, with a new administration in Washington, a new political landscape has emerged that may allow for fresh thinking on these important issues.

All of this highlights the need to bring new policy tools and innovative solutions to carbon reduction in particular and climate change more generally in to the global conversation, especially in the lead-up to the 15th Conference of the Parties to the United Nations Framework Convention on Climate Change in Copenhagen in December 2009. *i*CET's Energy and Climate Registry (ECR) project in China is exactly this: It is a registry to quantify carbon emissions in a measurable, consistent, and verifiable way is the necessary first solid step to build the base for the formidable task of GHG emission reduction and begin to work effectively toward meeting a goal of halving global GHG emissions by 2050.

With contributions from The Climate Registry and Business for Social Responsibility, this Background Report sets the stage and establishes the context for the Energy and Climate Registry, a first step in supporting China's pledge to measure, report and verify GHG emissions. This background report will find that Guangdong province is an ideal location to develop a pilot registry because of its heavy manufacturing base of mostly carbon-intensive industries and because of the previously stated goals by both provincial and central government in China to improve energy-efficiency there. Moreover, this report will find that establishing an energy-efficiency and carbon registry in Guangdong province will provide the necessary transparency and tools for accountability that will lead to measurable and verifiable reductions in carbon emissions.

In this report, we look at the carbon-intensity of Guangdong province, environmental regulations that are already in place in China, the business case for a carbon registry, international climate policies and accounting and reporting efforts and finally we give recommendations for better carbon management designed for policymakers, government officials and companies – both international and domestic – doing business in China. We hope that this important tool will facilitate China's goal to reduce carbon emissions at home, as well as support opportunities for bilateral cooperation between the US and China and work toward international agreements on climate change. Working together, we believe we can create innovative solutions to a global problem!

Sincerely,
The iCET Team

INNOVATION CENTER FOR ENERGY AND TRANSPORTATION
能源与交通创新中心

List of Acronyms:

UNFCCC – United National Framework Convention on Climate Change
IPCC – International Panel on Climate Change
*i*CET – Innovation Center for Energy and Transportation
ECR – Energy and Climate Registry
BSR – Business for Social Responsibility
GHG – Greenhouse Gas
CCAR – California Climate Action Registry
FYP – Five Year Plan
WCI – Western Climate Initiative
RGGI – Regional Greenhouse Gas Initiative
EU ETS – European Union Emission Trading System
MGGRA – Midwest Greenhouse Gas Reduction Accord
SEZ – Special Economic Zone
GDP – Gross Domestic Product
ISO – International Organization for Standardization

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Executive Summary

Climate change is becoming an increasingly serious issue with an urgent need for innovative solutions. The first chapter of this report summarizes international climate policies and efforts to report emissions including the experience of the California Climate Action Registry and The Climate Registry based in the United States. The second chapter gives an overview of the considerations made when choosing Guangdong province as a site for the pilot development of an energy and climate registry. Chapter three introduces the Energy and Climate Registry project and provides detail on the project plans, timeline and partners. Chapter four gives the case for an energy and climate registry from the business perspective while chapter five explains the challenges and steps made in developing the methodology. Chapter six gives recommendations to policymakers and business leaders.

The government in China has set ambitious goals for reductions in greenhouse gas emissions and energy use and innovative tools will be needed to ensure the implementation of these goals. The Energy and Climate Registry promises to be this type of informative and useful tool. China in particular and the word in general are economically and politically poised to begin this large-scale project of building a carbon and energy-efficiency registry. Guangdong is a good place to begin a pilot phase of this project, which will eventually expand to a national scale. The Innovation Center for Energy and Transportation has developed the Energy and Climate Registry – a public, online carbon and energy-efficiency reporting system that is supported by the government in China and will help enterprises doing business in China promote a green image, increase transparency and set up internal systems to measure and monitor energy use, in some cases reduce energy costs, and get a head start on reducing carbon emissions.

Chapter 1: International Climate Policies & Accountability Reporting Efforts*

**written by The Climate Registry*

Since the 1990s, there has been a growing interest in identifying emissions of greenhouse gases (GHGs) to understand their impact on the global atmosphere. From this point in time, efforts have begun to better understand the origin and impacts of different greenhouse gases. Emissions today are determined through a variety of methods including macro-level models, direct measurement, calculations and estimations. Our understanding of the accuracy, value and applicability of each of these is increasing with experience and time.

How to best measure emissions may depend on the reasons for asking. For instance, national governments may use top-down assessments of emissions, based on economy-wide, macro assumptions to inform national climate policies. Regional trading systems rely on precise calculation and measurement of discrete activities associated with specific emission reduction projects at a relatively small geographic location. Regulators want comparable data to evaluate performance of like facilities – comparing one cement plant to another and to understand reductions over time. Companies may want to understand the footprint – including any associated liability or risk – from the full scope of their operations to be good corporate citizens.

Some of these efforts require tremendous precision – either because there are financial or regulatory obligations associated with any change in emissions, such as in a mandatory reporting or an emissions trading scheme. Even in voluntary programs – either intended to encourage reductions in parts of the world where nations have not made reduction commitments or to encourage action beyond minimums required by mandatory programs, there is a tremendous need to have consistent measurements to help understand human contribution to a changing climate. This chapter provides an overview of the most significant frameworks for mandatory and voluntary policies and reporting efforts.

1.1 United Nations Framework Convention on Climate Change

While the greenhouse gas effect was first noted in 1824, it is only in relatively recent years that there has been recognition of the potential for harm of human activity in changing our climate. The first scientific group formed to study this was the Intergovernmental Panel on Climate Change (IPCC) created in 1988. Study and consensus on the state of knowledge by this body of scientists from around the world has informed most of international climate policy development on this topic. The IPCC published a first report in 1990, which led to the call for a global earth summit.

In June 1992 in Rio de Janeiro, Brazil, the UN Conference on Environment and Development, commonly known as the Earth Summit, was convened to discuss sustainable development, how to combine economic development with environmental protection. It was the largest summit of world leaders to date, with representatives from 172 countries in attendance. Important achievements of the conference include:

- Adoption of the Rio Declaration: 27 non-binding principles of environment and development
- Agenda 21: recommendations that led to the establishment of the United Nations Commission on Sustainable Development
- A Statement of Forest Principles for the sustainable management of forests
- The United Nations Framework Convention on Climate Change (UNFCCC) was drafted during parallel negotiations and discussions

Almost two years later, the UNFCCC entered into force on March 21, 1994. This treaty intends "to achieve stabilization of GHG concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system." To measure progress towards this goal, it creates a national GHG inventory reporting system. Following guidelines developed by the IPCC, parties to the treaty report their national emissions to the UNFCCC each year using top-down analytic models. Most significantly, the treaty asked all parties to set voluntary emission reduction targets.

Five years following the Rio Earth Summit, countries reconvened in Kyoto, Japan in December 1997. Parties recognized that voluntary reduction commitments were not achieving progress at the rate that the science determined necessary. Thus, countries met, and in the Kyoto Protocol, established binding GHG emission reduction targets for developed countries, namely 37 industrialized countries and the European Union. Together, parties to the treaty committed to reduce combined GHG emissions over the 5-year period of 2008-2012 by 5% against the 1990 baseline level with specified individual country reduction targets. For example, the US would have been required to reduce them by 7% (the US did not ratify the treaty), the European Union by 8%, and Japan by 6%.

Significantly, the Kyoto Protocol differentiated responsibility between industrialized countries (Annex I countries) and mostly developing countries (non-Annex I countries). It also included a trio of flexibility mechanisms, intended to help lower the overall costs of complying with the treaty's reduction goals. First, it allows for GHG emissions trading. Second, it creates a Clean Development Mechanism (CDM) that allows Annex I countries to purchase emission reductions in developing countries that will count against its cap. Third, it creates Joint Implementation (JI), that allows for trading between Annex I countries and countries of the former Soviet Union.

On February 16, 2005 the protocol entered into force after the two major conditions of the treaty were met, namely 1) ratification by at least 55 parties (when Iceland ratified) and 2) ratification by parties representing at least 55% of total member CO_2 emissions (when Russia ratified) known as the 55/55 target. An astounding 184 Parties of the Convention have ratified the Kyoto Protocol to date. The Kyoto Protocol is the first step in monitoring and reducing global GHG emissions. A new international framework will have to be negotiated and ratified before the compliance period ends in 2012. This framework is expected to be negotiated in Copenhagen in December 2009.

1.2 Corporate Accounting: WRI/WBCSD GHG Protocol

In an effort to understand their own contribution and risk for liabilities from the effects of climate change, companies in the late 1990s sought to understand their own emissions of greenhouse gases by developing a corporate-wide accounting of their footprint. BP, the energy company, was one of the earliest companies to attempt this. Through their relationships with both organizations, they brought together two leading international non-governmental organizations (NGOs) that were separately working to develop corporate accounting standards for greenhouse gases. These NGOs are the World Resources Institute (WRI), based in Washington, DC and the World Business Council for Sustainable Development (WBCSD), based in Geneva, Switzerland. Together, these groups created *The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard* (GHG Protocol)[1].

This document provides program neutral, high-level accounting standards that widely considered international best practice, and could be considered to be the Generally Accepted Accounting Principles (GAAP) for greenhouse gases. It was developed in a first effort to harmonize international accounting and reporting of GHGs and specifically:

- "To help companies prepare a GHG inventory that represents a true and fair account of their emissions, through the use of standardized approaches and principles.
- To simplify and reduce the costs of compiling a GHG inventory
- To provide business with information that can be used to build an effective strategy to manage and reduce GHG emissions
- To increase consistency and transparency in GHG accounting and reporting among various companies and GHG programs"[2]

Different from the traditional pollution control approach of tracking emissions on a unit or facility basis, the GHG Protocol takes precedent from financial accounting standards and assigns responsibility for emissions activities to a corporation, according to

[1] World Resources Institute and World Business Council for Sustainable Development. November 2005. The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard. Revised version.
[2] The Greenhouse Gas Protocol Initiative. Web. May 20, 2009.

ownership of different sources or facilities. Given the global nature of GHGs, this approach acknowledges that each company's footprint may result from a wide number of activities that it can directly or indirectly control.

The GHG Protocol establishes a language of greenhouse gas accounting, including setting reporting boundaries around a corporation or "entity" and defining what is to be reported or not based on the entity's operational or financial control or sources and/or its equity share in each source. Perhaps most significantly, the GHG Protocol defines scopes for counting purposes. When considering an entity's footprint, there may be:

- **Scope 1** – Direct emissions, or emissions that are within the control of the entity, defined as from stationary combustion, mobile combustion, chemical or manufacturing processes, or fugitive sources (unintentional releases).
- **Scope 2** – Indirect emissions, or emissions of which the consumption is controlled by the entity, but the generation is not – from purchases of electricity, steam, heating or cooling.
- **Scope 3** – Indirect emissions from everything else – emissions associated with the use of products that you manufacture, employees commuting to work or performing business travel, etc.

By breaking emissions responsibility into scopes, an organization can build its entire footprint. For broader analytical reasons, policymakers can add "like" scopes. In other words, every Scope 2 emission from electricity consumed by an end-user may also be counted as a Scope 1 emission by the electricity generator. Breaking emissions into scopes helps assure that emissions are not double-counted on a broad scale.

Scope 1 – Direct Emissions (emissions that are within the control of the entity, i.e. stationary combustion, mobile combustion, chemical or manufacturing processes, or fugitive sources.

Scope 2 – Indirect Emissions (emissions from purchases of electricity, steam, heating or cooling).

Scope 3 – Indirect Emissions (emissions associated with the use of products that you manufacture, employees commuting to work or performing business travel, etc.)

Last, the GHG Protocol also defines key accounting principles:

- "***Relevance*** - Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.
- ***Completeness*** - Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.
- ***Consistency*** - Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
- ***Transparency*** - Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.
- ***Accuracy*** - Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information."[3]

Many programs, including the California Climate Action Registry and The Climate Registry, build on the framework of the GHG Protocol to develop step-by-step guidance to inform consistent calculation of GHGs. For example, the GHG Protocol defines Scopes and activities that fall within them. A program protocol may specify the calculation methodologies including detailing an emission factor, units of conversion, and guidance for how this should be reported and verified. Because the GHG Protocol is a voluntary standard, programs that require public disclosure and third-party verification of their implementation are considered best practice.

The GHG Protocol team continues its work, beyond corporate accounting, and has developed a similar framework document for accounting for emission reduction projects. Current efforts are attempting to tackle the complicated issues around accounting for many Scope 3 emission activities.

[3] The Greenhouse Gas Protocol Initiative. Web. May 20, 2009.

1.3 Lessons from the United States and Europe

While the US pioneered the world's first environmental markets, without its participation in the Kyoto Protocol it has been the European Union (EU) that has led the way to develop the world's largest emissions cap & trade scheme. The EU has also developed a suite of policies & measures to reduce the emissions from non-capped sources including efficiency standards, technology tax incentives and much, much more.

Effective Climate Registries

A valuable tool providing building blocks for climate policymakers is development of a GHG registry. A registry can serve many of the roles already described in this paper, including preparing companies for regulation, providing baseline protection, investor disclosure, and/or validating carbon neutrality claims.

In 2000, a coalition of CEOs sought a place to document their early actions, prior to regulation, to reduce GHG emissions. Working with the California state legislature, a bill was passed creating a quasi-governmental organization set up and overseen by the State of California, but operating as an independent non-profit or 501(c)(3). The mission assigned to this organization was to develop GHG accounting standards and work with companies to establish a GHG emissions baseline to drive reductions and increase energy efficiency. In exchange, the State of California promised in legislation to consider the data reported at the time of regulation. The California Climate Action Registry (CCAR) opened for business in October 2002 with 23 charter members, and today has grown to over 350 including some of the US' largest emitters. Building on the framework of the GHG Protocol, CCAR provides a user manual with detailed calculations, reporting resources and technical assistance. CCAR has evolved into a full service organization also providing education on climate policy, science, economics and business practices to its reporters.

By joining CCAR, an organization commits to:

1. Report its GHG emissions inventory each year to CCAR
2. Work with an accredited third-party verifier to independently assess its data each year.
3. Once verified, publicly disclose its annual report through the CCAR website at www.climateregistry.org.

With the strong support of the State of California, CCAR has collected over 500 individual years of emissions inventories, including over 835 million metric tons of emissions, which total emissions are greater than California's annual inventory of about 500 million metric tons each year. Because of broad participation in California's electric power generation, waste, and petroleum refining sectors, the State of California today has a very accurate understanding of emissions from these large-emitting sectors as they prepare to make emission allocations for their own emissions cap.

This model was found to be so helpful, that in 2006 other states were interested in replicating the program. In an effort to provide consistency and ease the burden on reporters with operations in multiple states, many states, provinces and Native Sovereign Nations worked together with CCAR to create The Climate Registry (www.theclimateregistry.org). Today, The Climate Registry uses the CCAR model to provide support for voluntary, pre-compliance reporting of organizations, as CCAR is phasing out its operations. Significantly, The Climate Registry is also supporting mandatory reporting programs of interested states.

Together these models provide an accurate, transparent, consistent and comparable data set for policymakers. By establishing a baseline, policymakers have an accurate picture of real emissions. Thus, at the point of allocation, there will not be a correction such as that experienced in the European Union Emissions Trading System (EU ETS) in 2006. Also, organizations that publicly disclose their data are highly motivated to be as efficient as possible. Organizations typically do not manage what is not measured.

Present and impending cap-and-trade markets

A "cap-and-trade" program limits or "caps" greenhouse gas emissions and provides flexibility in achieving reductions. A capped source can either make reductions at their own location or can purchase or "trade" the right to emit with another source that has also been capped. Through this market, capped sources can comply with their obligation at the lowest price – if they can reduce below their own obligation they can sell the excess tons into the market. Or, if they find it more cost-effective, they can continue their current activities and purchase reductions from a source able to make them

at a lower cost. Many complex policy designs must be addressed before creating such a program, but once in place, a cap-and-trade market is relatively easy to implement, can achieve emissions reductions goals in a cost-effective manner, and drives innovation.[4]

The world's largest GHG emissions market to date is the EU ETS, which is currently over $1.25 billion in size. Launched in 2005, the EU ETS has capped about 12,000 facilities across the European Union, or an estimated 45% of EU-wide emissions. Emissions can be traded within the scheme, and up to 49% of reduction obligations may be met by purchasing reductions certified under the Clean Development Mechanism (CDM) and/or Joint Implementation (JI).

The EU rolled out its ETS in two phases: Phase 1 from 2005-2007 was intended to be a "learning-by-doing" phase. Initial allocations were negotiated by each country with their respective industries relative to their respective sources, and the entire scheme covers approximately 45% of the EU's total emissions. (Transportation is not part of the EU ETS). Starting at the end of 2005, and every year thereafter, every source with allowances must have its emissions verified by a third party before it can register the number of allowances it has used/retired. This process is helping to narrow the gap between the initial negotiated number of allowances for each source, and that source's real emissions.

Key lessons learned from the first phase were a need for transparency. The EU experienced a sharp market correction almost overnight during its first year of operation. In the first year of the EU ETS, allocations were made on a top down basis. As the end of the first reconciliation period neared, market participants guessed that the market would generally be short on allowances. Therefore, the market price was bid up in anticipation. In fact, the EU announced that compliance was generally better than the market had foreseen. The spread between what the market assumed would be the allowances needed and the actual allowances needed was about 8%. This caused a correction, and the price of allowances dropped from 28 Euros to 15 Euros within a few days. The market soon stabilized at 17 – 20 Euros. To increase market transparency, and prevent a reoccurrence of this type of market swing, the EU now releases quarterly, rather than annual, updates on compliance.

[4] Pew Center on Global Climate Change. Cap and Trade. Web. May 20, 2009.

The EU is now in its second phase, from 2008-2012, which parallels its first compliance period under the Kyoto Protocol, and has announced plans to continue the ETS beyond that time. While not without flaws, generally the EU ETS has been determined to be a success. It provides flexibility, and has been found to be a valuable way of reducing the overall compliance costs of the Kyoto Protocol targets.

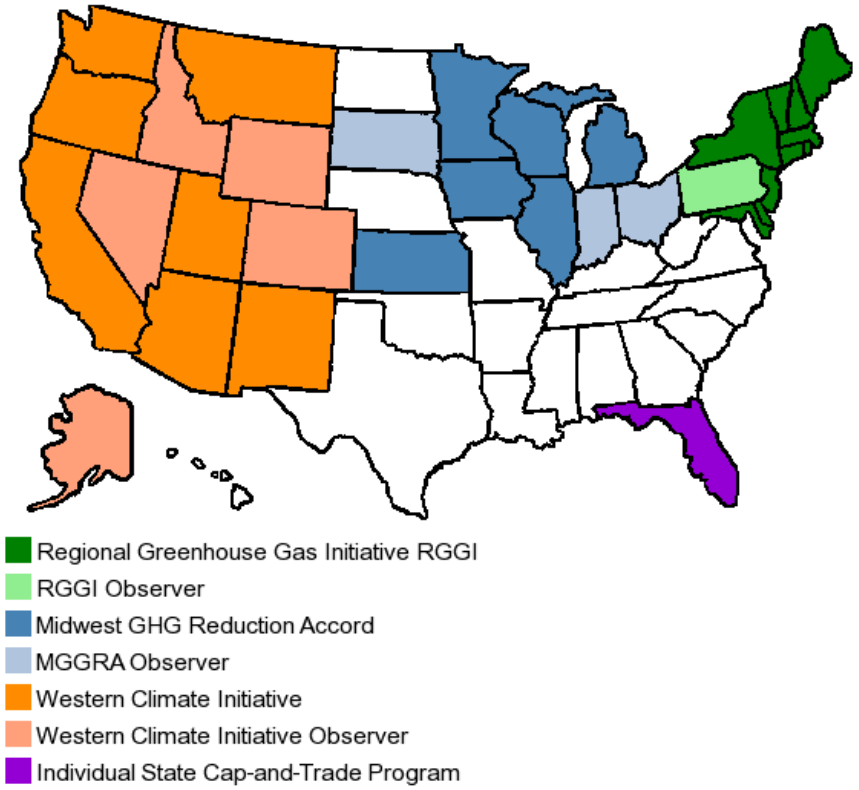
Non-European countries with Kyoto targets, such as Australia and Japan, are also moving to put cap-and-trade systems in place. The Canadian province of Alberta also has a trading program. Very recently, in the US, which represents potentially one of the world's largest markets, there are evolving regional cap-and-trade programs.

RGGI, the Regional Greenhouse Gas Initiative, is the US' first cap & trade program. In December 2005, seven Northeastern governors adopted RGGI, setting a cap of CO_2 emissions from electric power generation. With a goal of reducing emissions 10% from 2009 levels by 2018, RGGI held its first auctions in late 2008. RGGI has subsequently been adopted by an additional 3 states. The policies and thought process that have been created by RGGI serve as a starting point for other US regional cap-and-trade efforts.

The largest of the US regional initiatives is the Western Climate Initiative (WCI), an effort of seven U.S. states and four Canadian provinces to identify, evaluate, and implement measures to reduce greenhouse gas emissions in participating jurisdictions. Together, WCI has an economy-wide target to reduce GHG emissions to 15% below 2005 levels by 2020. These reductions will be achieved in many ways, but expectations are that a cap-and-trade program, on track to begin operation on January 1, 2012, will play a key role in meeting these targets. Also, WCI's work is now serving as a model for the Midwest Greenhouse Gas Reduction Accord (MGGRA) created in November 2007 with similar goals, and may serve as a model for federal programs in the US and/or in Canada.

States participating in these various programs are indicated in the map on the following page (Figure 1).

Figure 1: US States Participating in Cap-and-Trade Programs



Source: www.pewclimate.org

With the change in US government in January 2009, there is renewed engagement in US federal policy. The US Environmental Protection Agency is accepting comments on draft rules for mandatory reporting of GHGs, viewed as a preparatory step for a federal cap. US President Barrack Obama's first budget was released in Spring 2009 with projections showing that the federal government plans to have revenue from auctioning the right to emit GHGs. Also, legislation sponsored by Congressmen Henry Waxman (D-CA) and Edward Markey (D-MA) outlining a federal cap-and-trade system is moving through the US House of Representatives. At the time of writing, it is possible this bill will pass the House sometime in the summer of 2009 and perhaps be considered in the Senate, although expectations are that it is most likely that such legislation will pass in 2010.

Voluntary carbon markets

As previously discussed, many organizations, particularly in Europe and the United States, are increasingly interested in showing sound climate citizenship and following a GHG management plan. Companies are working to reduce emissions from their core activities, and/or looking to offset the impact of other activities that they may have limited ability to reduce or control such as business travel, product shipping, waste disposal, etc. Also, with a number of compliance programs looming on the horizon, others – ranging from speculators, risk-averse companies to environmental groups – are looking to purchase emission offsets as a hedge against future regulation while prices are low – if a company does not receive sufficient emission allowances to cover its emission liabilities, it can retire offsets instead.

These factors have resulted in a voluntary market that has seen exponential growth each year, more than doubling from 2006 to 2007 to over $330 million. While the global financial crisis has slowed growth in this market in 2008 and 2009, there is still tremendous activity. Compared to the European market when tons that can be used for compliance have traded as high as $32/ton, the average price of carbon sold in the voluntary market is about $6/ton.[5]

Projects most often originate in sectors that will not likely ever be capped (energy efficiency), and/or where technology choice can be influenced (methane destruction) and/or where an environmental good can be protected (forest conservation). As this is an evolving and unregulated sector, general opinion is that quality of offsets varies widely depending on their source or the standard to which they are reported. Prices seem to be higher for offset projects that are thought to be of regulatory quality, including through programs like the CDM and the US-based Climate Action Reserve.

The voluntary market helps organizations prepare for compliance, and also provides opportunities for broad participation in a carbon market for countries, participants or worthy projects that would not otherwise be able to participate. A voluntary market also provides flexibility to test out new methodologies, technologies, and perhaps an opportunity for small-scale projects to participate in the market. It also

[5] Trends in the Market - Ecosystem Marketplace and New Carbon Finance State of the Voluntary Carbon Markets report available at www.ecosystemmarketplace.com and www.newcarbonfinance.com

serves as another potential channel for transfer of funds from developed to developing countries for instance, should an Annex I country purchase tonnes from a non-Annex I country.[6]

While total tonnes reduced through the voluntary market is not yet on the order of magnitude of any regulatory program, it represents a real and increasingly strong new carbon market.

Conclusion

Underpinning this growing momentum to reduce GHG emissions is a need for consistent, accurate and transparent data. Only with solid data will carbon markets have confidence to trade. Only with solid data will regulators be able to follow emissions performance. Only with solid data will corporate citizens understand the true impact on their business, and only with solid data will individuals be educated to reduce their own footprint. Given the global nature of the problem, we need to understand emissions across cultures and borders. For all of these reasons, now more than ever, data provides the building blocks to inform meaningful carbon policy and action.

[6] Anja Kollmuss (SEI-US), Helge Zink (Tricorona), Clifford Polycarp (SEI-US). WWF Germany. March 2008. Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards.

Chapter 2: Economy and Environment in Guangdong Province

Globalization has been taken to new heights with today's supply chains that make the markets, set the prices, and create the distribution of labor for their supply chains. Guangdong province in coastal southern China has established its position as "the world's factory," a manufacturing hub that provides billions of Chinese-made products for the rest of the world. Guangdong province is close to Hong Kong and Macao while far from Beijing. As a result, Shenzhen city in Guangdong province was selected as a Special Economic Zone (SEZs) in 1979. As a SEZ Shenzhen developed into an area that experimented with market reforms – "socialism with Chinese characteristics" – by allowing foreign direct investment and joint-ventures transforming the city into a vibrant economy and one of the busiest ports in China. Soon, the Pearl River Delta (PRD) economic zone became China's manufacturing hub, comprising of 9 cities all within Guangdong province – Guangzhou, Shenzhen, Zhuhai, Foshan, Jiangmen, Dongguan, Zhongshan, Huizhou city, and Zhaoqing city.

2.1 Spotlight on the Guangdong Economy and Carbon Emissions

In the 1980s and 90s the PRD became increasingly attractive to entrepreneurs – a free market with low corporate taxes, few environmental or urban planning regulations, and the free movement of capital and profits in and out of the region. The PRD's gross domestic product (GDP) jumped dramatically from $8 billion in 1980 to $113 billion in 2002. Today, Guangdong's economy has the largest GDP of all provinces, accounting for one-eighth of the national total, which makes it roughly the same size as Argentina's economy. In 2007 Guangdong had the largest share of exports (30.3%) and the largest retail sales value of consumer goods (11.9%) in the country.[7] Major industries in Guangdong province include electronics, toys, textiles, plastics, porcelain, petrochemicals, automobile manufacturing and machinery.

[7] Hong Kong Trade Development Council, Market Profiles on Chinese Cities and Provinces, Web January 2009 http://info.hktdc.com/mktprof/china/mpgud.htm

There are two main types of supply chain clusters within the province. First occurs when a giant manufacturer (usually large state-owned enterprises (SOEs) or their joint ventures) is surrounded by many suppliers in the region. The giant manufacturer is generally highly regulated and in a capital-intensive industry such as telecommunication, energy, utility and steel. The second and dominant type of supply cluster is the private, non-SOE sector comprised of countless small- and medium-sized enterprises. These companies have now become the driving force of the market economy, producing more than 50% of China's GDP.

China is a single country, but each of its provinces is larger than many European countries, both in geographic size and population. Due to the wide range of economic developments, wealth, and population growth between the provinces, aggregate national data does not fully address the effect of each province on energy consumption. Hence, because the supply chains and companies in Guangdong province comprise the manufacturing hub of China, analyzing their carbon emissions serves as a critical jump-off point.

While Guangdong province has not been immune to the global economic downturn of the last year, there is no evidence that the province's growth rate will change significantly anytime soon. From November 2008 to April 2009 Guangdong showed the biggest slowdown in 30 years. Foreign trade was reported to be down 31% in January 2009 and a number of export-oriented businesses closed with millions of workers being laid off. While this trend may have social implications, it won't likely have an important environmental impact. According to Guangdong's governor, Huang Huahua, economic growth in Guangdong is forecast to be around 8.5% in 2009[8] (down from 10.1% in 2008) – a change that will likely lower just slightly energy consumption and greenhouse gas emissions.

The general trend in Guangdong province is that alongside staggering economic growth there has been a steady rise in carbon dioxide emissions, which is far outpacing previous estimates. Guangdong's urbanization and industrialization has resulted in exponential rates of GHG emission rates. As the manufacturing hub of China, Guangdong takes on a disproportionate amount of carbon. China's carbon emissions in

[8] "Guangdong GDP Set to Grow by 8.5%," *China Daily*, 13 Feb. 2009.

total are very high. The Intergovernmental Panel on Climate Change estimated a 2.5% to 5% annual increase in carbon emissions from China between 2004 and 2010, but recent analysis by economists at the University of California in Berkeley and San Diego, puts the annual growth rate to be at least 11% for the same time period. The most conservative forecasts predict a 600 million ton increase in carbon emissions by 2010, which would surpass the 116 million tons of carbon reductions pledged by developed countries in the Kyoto Protocol.[9]

Although many outsiders are quick to blame Guangdong's rising standard of living (including higher meat consumption, larger houses, higher demand for imported good and increased travel) for its increased energy consumption and resulting surge in GHG emissions, the province's industrial and manufacturing sites bears the lion's share of the responsibility. Aluminum smelters use more electricity than the commercial sector in China. More energy is used in the chemical industry than all the cars in China combined. The steel industry produces more carbon dioxide than all the residential homes in China put together. The main industries in Guangdong – electronics, plastics, textiles, toys, porcelain, petrochemicals, automobile manufacturing and machinery – all consume high levels of energy. According to the national average 70% of energy use is generated from coal, which has a high carbon content.[10] According to a recent study, China's economy is four times as energy intensive as the United States and nine times less efficient than Japan.[11]

Another factor of the rising emission levels is Guangdong's rising population and urban sprawl. Urban sprawl simultaneously contributes to the demand on the energy grid and erodes wild and undeveloped parts of Guangdong such as forests and wetlands, which function as carbon sinks. According to an official government study, Guangdong is the most urbanized province in China with an urbanization rate of 60.68% in 2005.[12]

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[9] Barry Jagoda, "New UC Analysis Shows Alarming Increase in Expected Growth of China's Carbon Dioxide Emissions" UC San Diego News Center, Web, 10 Mar. 2008.
And
"New Analysis Concludes China CO2 Emissions Growing More Rapidly Than Expected," Green Car Congress, Web, 11 Mar. 2008.

[10] International Energy Agency, 2009

[11] "Common Challenge, Collaborative Response: A Roadmap for US-China Cooperation on Energy and Climate Change," The Asia Society, Center on US-China Relations and the Pew Center on Climate Change, Jan. 2009.

[12] "Guangdong Most Urbanized Province, Report Says," *China Daily,* 12 May 2007.

2.2 The threat of Climate Change for Guangdong Province

Guangdong province, which is, on average, only 4 meters above sea level, is especially vulnerable to sea level rise. According to a report by the Guangdong provincial weather authority, sea levels may rise by at least 30 centimeters by 2050. This means that an area of 1,153 square kilometers of Guangdong province could be submerged under water. The cities of Guangzhou, Zhuhai and Foshan – home to many of the major manufacturers of toys, electronics and other commodities – are predicted to be the worst affected.[13] The climate expert who authored the report, Du Raodong said, "Climate change will negatively affect the economic development of Guangdong, which is currently of the biggest consumers of energy and producers of greenhouse gasses."

The International Panel on Climate Change's predictions for the Pearl River Delta are even more grim. According to the IPCC's Fourth Assessment Report, sea levels could rise as much as 40-60 centimeters, flooding an area of 5,500 square kilometers in the province.

Another reason why Guangdong is more vulnerable to climate change than other provinces in China and than other areas of the world is that agriculture – an industry that is highly susceptible to changes in weather – makes up a large percentage of its total economic activity. A report authored by Chinese and British scientists in October 2008 found that grain production in China could be seriously affected by climate change. Lin Erda, chief scientist and former director general of the Agro-Environment and Sustainable Development Institute at the Chinese Academy of Agricultural Sciences, who worked on the report, noted that because of this fact China could be even more vulnerable than other developing countries to the effects of climate change.[14]

[13] "Sea to 'Engulf Guangdong' by 2050," *China Daily,* 30 Aug. 2007.
[14] Ibid.

2.3 Voluntary Corporate Actions to Mitigate GHG Emissions

In general, many transnational companies have made attempts to be more sustainable either by using renewable or low-carbon energy. An increasing number of multinationals in China are publishing sustainability reports and making efforts to demonstrate strong environmental policies. Here are some prominent examples, although this list by no means exhausts the number of environmental business initiatives happening in China today:

- Some large Chinese corporations such as **Haier** and **Midea** have disclosed energy consumption data.

- By using new technology such as co-generation from using natural gas, and solar heating, **Proctor & Gamble** has reduced 9.5 million kg of CO_2 emissions and US$1.2 million in operating costs throughout five beauty plants in Asia (three in China).

- Car company **Geely's** logo reads: "Supplying the Safest, the Most Energy Efficient, the Most Environmentally Friendly Vehicles!" (Although it is not evident that this goal has been actualized, it is a good sign that it is at least a goal).

- **Wal-mart** has built its first environmentally friendly outlet that saves 23% of annual electricity consumption compared to business-as-usual.

- **China Southern Power Grid Company** reports saving 46 billion kwh in the last five years through their Green power transmission program.

- **176 Chinese Companies have** signed on to the UN Global Compact – a strategic policy for businesses developed by the United Nations Environmental Program.

- **Chery** Automobiles has been authorized to build a national engineering technology research center for energy saving and eco-friendly automotives, and recently signed a memorandum with American Structural Composites Industries to develop New Energy Vehicles including fuel-cell vehicles, hybrid-electric vehicles, and battery-electric vehicles.

- China's **Huaneng Power Company** and the Australian Commonwealth Scientific and Industrial Research Organization are involved in a post-combustion carbon capture project.[15]

This is not an extensive list of environmental improvements taking place in the business community in China, but it does show some of the prominent actions and demonstrates that there is a growing movement in the direction of achieving higher energy efficiency and minimizing carbon footprints. Although the corporations listed above operate both in Guangdong and all over China – the trend is clear. There is a growing precedent for business leadership in environmental improvement that is happening outside of a government mandate.

To conclude, it is clear the Guangdong province is an optimal place to initiate a pilot project of building a carbon inventory both because of the environmental problems that exist there and because of the high level of corporate manufacturing activity that occur there. We can also see that there have been great strides in the direction of increased transparency and environmentally friendly practices on which a carbon and energy inventory project could build.

[15] "Common Challenge, Collaborative Response: A Roadmap for US-China Cooperation on Energy and Climate Change," The Asia Society, Center on US-China Relations and the Pew Center on Climate Change, Jan. 2009. p30

Chapter 3: The Energy and Climate Registry - An Overview

While some argue that increasingly stringent environmental regulations threaten to inhibit growth, we believe the opposite is true. By taking a perspective that includes longer-term goals, it is clear that environmental regulations will spur innovation. By instituting environmental regulations in China before the rest of the world takes the equivalent action China will have a head start and be a leader in those innovations.

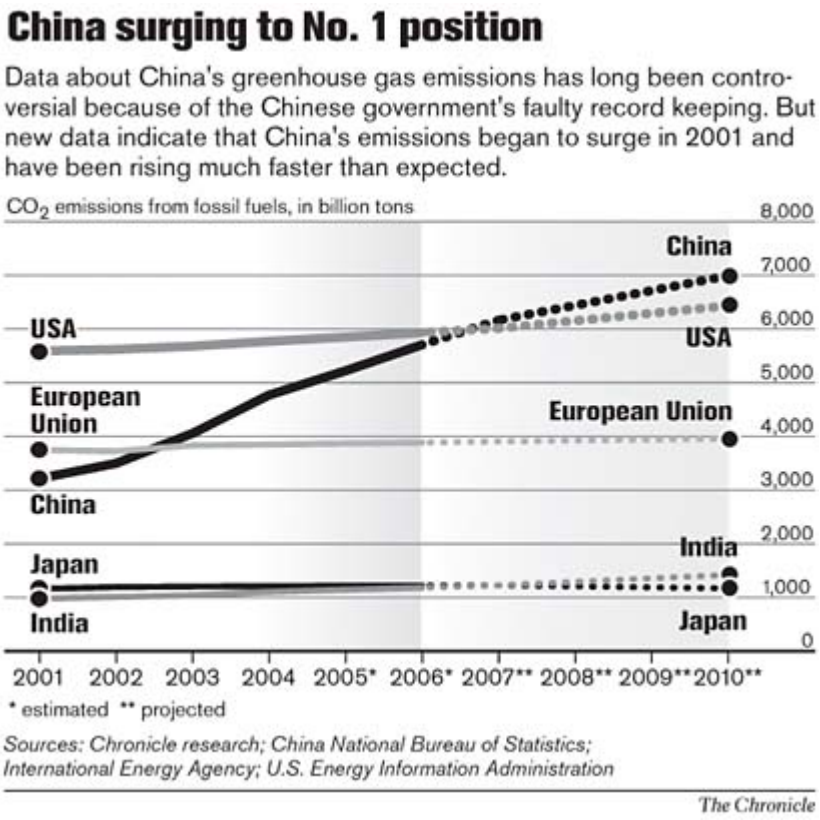
What is the reason for building a registry in China? Why is this an important tool? We can say in general terms that transparency and accurate carbon accounting methods are the first step toward any climate change solution. There are also three other more specific reasons:

First, as is seen in Figure 2, China currently is the number one emitter of greenhouse gases in the world and as a result this is an important place to develop infrastructure to be able to make precise measurements of carbon emissions. According to a Dutch study, China overcame the United States as the number one emitter of $C0_2$ sometime in 2006– about 12 years earlier than expected according to most experts' predictions to date.[16] Additionally, economists at the University of California, Davis and San Diego are predicting that CO_2 emissions in China will grow 11% annually in the next 2 years. In a worst-case or business-as-usual scenario in which the carbon intensity of China's economy remains constant and GDP growth hovers around 7% per year, CO_2 emissions would reach 8 gigatons a year by 2030 – equal to the level of CO_2 emissions of the entire world today.[17] Furthermore, over two-thirds of China's GHG emissions come from the industry sector. So this is definitely a problem that is serious and will increase in severity as we move forward.

[16] "China overtakes U.S. as top CO2 emitter: Dutch Agency," *Reuters*, 20 Jun. 2007. http://www.reuters.com/article/topNews/idUSL2080219120070620

17 Ning Zeng, Yihui Ding, Jiahua Pan, Huijun Wang, and Jay Gregg, "Climate Change--the Chinese Challenge," Science, 319, 730-731.

Figure 2: China and the World's CO_2 Emissions



Second, China's climate change policies could be the most progressive and have the capacity to result in the most dramatic reductions in CO_2 anywhere in the world. The 11th The Five-Year Plan (FYP), which was approved by the People's Congress in March 2006, stated that energy intensity (energy consumption per unit of GDP) would be reduced by 20% by 2010. This is equal to reducing China's greenhouse gas emissions by 10%, an estimated 1.5 billion tons of CO_2 reductions.[18] The 11th FYP also included a section on energy efficiency targets for select sectors, which showed ambitious targets (see Figure 3). However, even while there has been great progress, there is no evidence that these targets are being sufficiently met. This means that implementation is still a problem requiring new and innovative tools.

[18] "National Climate Change Program" report (NDRC, 2007)

Figure 3: Medium and Long Term Energy Conservation Plan

Indicator	Unit	2000	2005	2010	2020
Power generation (coal-fired)	Grams of coal equivalent/ kWh	392	370	355	320
Industrial boilers (coal fired, small & medium size)	Efficiency (%)	65	-	70-80	-
Generation units (design)	Efficiency (%)	87	-	90-92	-
Wind turbines (design)	Efficiency (%)	70-80	-	80-85	-
Pumps (design)	Efficiency (%)	75-80	-	83-87	-
Room air conditioners	Efficiency ratio	2.4	-	3.2-4.0	-
Refrigerators	Energy Efficiency index	80	-	62-50	-
Household gas water heaters	Efficiency (%)	80	-	90-95	-
Average automobile fuel	l/100km	9.5	-	8.2-6.7	-
Raw steel	Kilograms of Coal Equivalent/ ton	784	700	685	640
Cement	Kilograms of Coal Equivalent/ ton	181	159	148	129
Tiles	Kilograms of Coal Equivalent/ cubic meter	10.04	9.9	9.2	-
Aluminum	Tons of coal equivalent/ ton	9.92	9.60	9.47	9.22
Copper	Tons of coal equivalent/ ton	4.71	4.39	4.26	4
Oil refining	Factor	14	13	12	10
Ethylene	Kilograms of Coal Equivalent/ ton	848	700	640	600

Selected Energy Efficiency Targets in the 11th FYP.
Source: "China's Medium and Long Term Energy Conservation Plan", National Development and Reform Commission, NDRC, Beijing.

Third, recent studies show that climate change is in fact even more serious and urgent than predicted just a few years ago. But in that seriousness and urgency there are opportunities. The ECR builds on the momentum created around the Olympic Games in Beijing in which China began to identify and take seriously its environmental problems in general and more specifically about climate change and reduction in energy use.

3.1 Introduction to the ECR

The Energy and Climate Registry (ECR) will be the first ever, public, government-supported, online registry for carbon emissions and energy consumption reporting system in China. This is a new and innovative project but at the same time it is based on a tried and tested precedent –The Climate Registry in California (see Chapter One). The ECR is a voluntary reporting tool that discloses data to the public to view

without cost. The registry is not government mandated although it is government supported. This means that the ECR can act independently and also there is a certain level of flexibility regarding the development of the protocol. The registry is user-friendly and is, where possible, locally operated. This tool is designed to help China reduce the growth rate of carbon emissions and its own goals to do that at home, but also to be able to support opportunities for bi-lateral cooperation between the United States and China as well as international cooperation especially in the context of the lead-up to the Copenhagen conference in December 2009.

The registry is a compelling and useful tool for businesses in China, which are growth-oriented. The ECR can help enterprises reduce energy costs – as they inventory operations, enterprises can identify ways to reduce energy use. Business will further benefit from this tool because the ECR gives enterprises a chance to showcase good environmental performance. The tool creates an opportunity for early action on carbon reduction so businesses can improve their environmental performance and be rewarded for it without needing to wait for government action.

The goal of the project is to produce reliable, public and standardized information on energy consumption and carbon emissions. The three targets of the ECR are to have fifty members by the end of 2010, to draft and publish a protocol using Chinese emission factors by December 31, 2009 and to build awareness about greenhouse gas reporting among government, business and private communities for the duration of the project.

ECR Targets

50 reporting members by the end of 2010;

Protocol adapted to Chinese context with a reviewing process by end 2009;

Awareness building about GHG reporting.

Why would companies operating in China want to disclose their greenhouse gas emissions and energy use to the ECR? The three reasons why a business should sign up to this registry are as follows:

1. This registry allows corporations to promote and publicize a green image;

2. The registry provides opportunities for identifying and then reducing energy costs; and,

3. There is an opportunity for early action and for businesses to become leaders in sustainability.

Businesses that act now will have an advantage if and when legislation or regulations come to pass in China. Of course whether or not this type of legislation is in the pipeline is a big unknown. Corporations that decide to disclose their greenhouse gas emissions now will have an advantage in terms of having already developed the internal capacity to develop an accurate inventory. They may have even used the registry to reduce their energy consumption and will benefit from that if a carbon reduction target is put into place.

The project will begin in Guangdong province with the intention to eventually expand to a regional or national scale. Guangdong province was selected for the following reasons: First, because of its heavy manufacturing base. Although Guangdong is one of 30 provinces in China it has the largest GDP, which accounts for 12.5% of the nation's total (See Chapter Two). In 2007, Guangdong had the largest share of national exports at 30.3%. Second, Guangdong manufactures many high carbon-intensity of the products: i.e. toys, textiles, petrochemicals, plastics, machinery, electronics and automobiles. Third, there is a heavy reliance on coal for energy (this doesn't distinguish Guangdong from other provinces in China but is still an important factor in the province's total energy use). Fourth, Guangdong has a high population density and high rate of urbanization. Because it is only four meters above sea level, Guangdong province is more vulnerable to sea level rise than any other provinces in China and also more than other places in the world.

The question of methodology (See Chapter Five) is important to get right. The question is how to best develop and adapt the greenhouse gas protocols (and ISO standards on carbon accounting) to a Chinese context, effectively and also successfully.

We believe that it needs to be done diligently and as an experiment. There is a great need for transparency and accurate data – these are things that we will be focusing on as we continue to roll out the methodology.

The Energy and Climate Registry is a tool that requires voluntary, not mandatory reporting. With voluntary reporting environmentally-aware corporations can work outside of the context of government mandates to set and reach carbon reduction targets. Another benefit of voluntary reporting is that companies can get involved in the protocol development process early on. The protocol drafting process is designed to create opportunities for feedback from multiple stakeholders to deliver a tailored product.

Almost any entity can report. Eligible reporters to the registry include multinational corporations, state-owned enterprises, and private or non-state owned supply clusters as well as municipal governments and non-profit entities. The registry will be usable by all industries. We will begin with telecommunications, manufacturers, energy utilities and steel but then move outwards and include municipal areas, parks, university campuses, and NGOs.

Because it is a challenging task to establish an Energy and Climate Registry in China, *i*CET has developed a strategic implementation plan. To ensure gradual transition and maximum success of the project, *i*CET will target existing high-performing enterprises and then work outwards to recruit other companies. There are a lot of corporations that have already taken initiatives to improve their energy efficiency or even in some places to derive their corporate carbon footprint. As *i*CET continues to build partnerships with the business community, there is an opportunity not only to identify high-performing enterprises, but also to reward and acknowledge them in a public way. Another key task is to create a registry that is based on reliable, accurate and transparent data that are compatible with international standards. Finally *i*CET should facilitate the development of a strong, independent and accredited system of third party verification.

3.2 Membership

Almost any entity can report to the Energy and Climate Registry. Reporters can include multinational corporations, state-owned enterprises, private supply clusters,

residential and municipal areas as well as college campuses. Reporters can also come from all industries: telecommunication, energy, utility, steel, manufacturing etc. There are three different levels of membership:

Founding Member:
Business leaders who wish to get involved as part of the planning committee can join as a Founding Member and contribute to the protocol and website development by making comments on protocol drafts, and provide feedback on the reporting methods.

General Member:
Entities that wish to join the Energy and Climate Registry may sign a declaration of their intent to report their inventory and become a General Member.

Reporting Member:
Entities that have signed up to the registry and completed their first inventory and had their inventory verified by a third party are called Reporting Members.

3.3 Project Partners and Sponsors

The project is a collaborative effort. Although *i*CET will lead the direction and take ultimate responsibility for the project's successful implementation, many other non-governmental as well as governmental organizations are participating. Below is a list of the committees that oversee and direct the project's implementation.

Steering Committee
(oversees general direction of the project)
Members are from:

Innovation Center for Energy and Transportation
The Climate Registry
California Air Resources Board
Guangdong Development and Reform Commission
Standardization Administration of China
Guangdong Energy Conservation Commission
Energy Conservation Information Dissemination Center of NDRC

Technical Committee
(meets once a month by telephone to discuss project updates, challenges and action items)
Members are from:

Innovation Center for Energy and Transportation
The Climate Registry
Business for Social Responsibility
China National Institute for Standardization
Guangdong Development and Reform Commission
California Air Resources Board
EcoLinx Foundation
Energy Research Institute
CBCSD
Climate Change Center, Ministry of Environmental Protection

The ECR is funded by the **Rockefeller Brothers Fund** and the **Hewlett Foundation**.

Chapter 4: A Business Perspective*

**written by Business for Social Responsibility*

From the business perspective, there is a growing case for voluntarily tracking and sharing information about energy and carbon. At the same time, the lack of clear measurement and procedural standards creates a key barrier for doing so. An effective registry, therefore, would hold the potential to unlock significant untapped investment opportunities for environmental, social and business interests alike.

It may be straightforward that policymakers would want to promote more information being disseminated about companies' energy and carbon footprints, but why would business want this? Lawmaker's interest in climate policy is a key reason why many companies are also interested. For example, heavy-emitting industries that expect future regulation will be best able to cope with these regulations if they can build their understanding and develop management systems in advance of a compliance regime while they have more options.

But the reasons are much broader, and often less obvious. One reason is that opening up the books voluntarily builds trust, which is valuable for building of relationships with customers and partners, while at the same time, really not as threatening as conventional wisdom often implies. In all cases, business managers increasingly view the tracking and sharing of such information as a natural step towards increasing the predictability of energy prices and stability of energy supply, creating stronger relationships with key stakeholders in an efficient way, and minimizing risks associated with negative sentiment.

4.1 A Business Case

There are a number of reasons why understanding the flow of energy and carbon within a company is increasingly important, all of which are part of long term trends that are only likely to become even stronger. First, energy prices in China are converging with

global market prices,[19] and as part of this, energy is expected to become more expensive, especially energy from high-carbon sources, such as coal. The most obvious cost element here is the direct cost that results from rising energy prices—which the Energy Information Administration forecasts could reach $200/barrel by 2020. Also important to consider is the growing likelihood of carbon taxes and/or caps. A final though subtler element is public sentiment favoring the use of clean energy, and, consequently "dirty energy" is associated with reputation and other social-oriented risks.

Second, investors and business partners are seeing proactive energy and carbon management as good practice and increasingly giving preferential treatment to companies that communicate a clear understanding of their carbon and energy flows.

Third, governments—in particular, the government of China and its key trading partners—are considering new subsidies, grants and incentives that apply to companies which demonstrate fluency and openness about energy and carbon issues.

Fourth, advances in information technology are making it easier for competitors to get ahead, while at the same time, stakeholders can learn what companies are *not* doing. As proactive carbon and energy management becomes a basic business hygiene factor, acting now, rather than later, is cheaper and prone to fewer risks than waiting.

Finally, measuring and communicating carbon and energy data has become very easy in recent years, with energy audits becoming inexpensive (in many cases free) and tools have been developed for conducting carbon inventories.

[19] Daniel H. Rosen and Trevor Houser, "China Energy: A Guide for the Perplexed," Center for Strategic and International Studies and Peterson Institute for International Economics, May 2007. http://www.petersoninstitute.org/publications/papers/rosen0507.pdf

4.2 Tracking Information

Having a clear picture of a company's inputs and processes is fundamental to managing risk and change within that company. However, most companies understand very little about the opportunities and risks associated with the flows of energy and carbon in their businesses. Tracking carbon and energy through a carbon inventory and energy audit is a prerequisite for attaining this view. At the same time, the simple act of tracking information is likely to lead to myriad indirect benefits.

Tracking Information about Energy

There are numerous benefits for proactively tracking energy, which often competes with the tax liability and staff costs as a company's largest expense item. Tracking energy information, which can be done by analyzing energy bills or more thoroughly through inexpensive energy audits, can provide the knowledge needed for making important decisions. For example, companies can troubleshoot energy problems and billing errors and provide a basis for prioritizing energy capital investments, evaluating energy program successes, budgeting more accurately, and shopping for lower prices for energy in a changing electricity market.[20] Tracking energy

Some Special Situations

Tracking energy and carbon makes increasingly good sense for every company, though some are in situations that require special attention. One such situation is the case of large emitters. Companies which have relatively high energy use and emissions are the most likely to be targeted both for regulation and as the potential recipient of energy technology subsidies. Those with over 10,000 metric tons of carbon equivalents from Scope 1 and 2 emissions, especially companies with other 25,000 metric tons, are in this category. Companies in the Top-1000 Energy-Consuming Enterprise Program, which comprise around 1/3 of all of China's emissions, as well as the "Top 50 Provincial Top Energy Consuming Enterprises" have been selected for intensive support on energy efficiency improvements, and will provide leadership and case studies to learn from.

Another situation in which tracking energy and carbon requires special attention is in the case of suppliers to global companies. Global companies are increasingly interested in understanding the issues that their suppliers face with respect to energy and carbon largely in order to assess regulation-related risks. As major global companies commit to ambitious emissions reductions goals, they are including their supply chain as an area for improvement and looking for emissions reporting from suppliers. As a result, more companies are asking suppliers to explain and improve their energy and carbon footprints, and those that are prepared have comparatively strong footing over their competitors. In any case, there is a growing need to be prepared for this conversation with as much data as possible.

Another special attention situation is that of companies that generate renewable energy. With over 90% of China's energy being driven by fossil fuels, companies that generate renewable energy are ahead of the technology driven sustainability curve. For them, tracking their overall energy portfolio is helpful for internal decision making, and those that publicize their efforts will be much more attractive to investors and many business partners than their peers. With clear signals from the national government that renewable energy will become an increasingly important part of China's energy mix, companies in this sector are particularly well positioned.

[20] "Energy Accounting: A key tool in managing energy costs," California Energy Commission, Jan. 2000. http://www.energy.ca.gov/reports/efficiency_handbooks/400-00-001B.PDF

information also establishes systems and data needed for estimating most carbon footprints, since energy drives 60% of carbon emissions globally, and 95%+ for a typical company in China.

Tracking Information about Carbon

Companies that have begun to manage carbon directly are finding that tracking carbon also has similarly strong payoffs and can be done inexpensively by using the Greenhouse Gas Protocol and/or tools that use it as a basis. Tracking carbon, which is usually done to establish a greenhouse gas (GHG) emissions inventory, sheds light on a number of risks and reduction opportunities. It underpins a number of next steps, such as participating in GHG markets, developing skills in carbon finance, and pursuing opportunities with the Clean Development Mechanism (CDM) of the Kyoto Protocol. Tracking carbon is needed for developing a credible climate or carbon management plan, setting comprehensive corporate-wide GHG reduction goals, involving employees in carbon-reducing initiatives, and sharing and comparing information with others.[21] Finally, tracking carbon information also has potential strategic benefits such as improving the understanding of critical policy discussions, and positioning for emerging regulatory programs.

Tracking Energy and Carbon

Because energy and carbon are tightly interdependent, there are several advantages common to both. Benefits include identifying opportunities to reduce energy or process costs, determining strategies to enhance competitive advantage, and developing informed opinions about standards and governance issues and influence their development in policy communities. Tracking energy also sends signals that energy management is important, and thereby can underpin the development of culture and incentives that promote resource conservation. In all cases, tracking energy is an

[21] See "The Greenhouse Gas Protocol: A corporate accounting and reporting standard," World Resources Institute and World Business Council for Sustainable Development, http://www.ghgprotocol.org/files/ghg-protocol-revised.pdf, "Benefits of Partnership," US Environmental Protection Agency, Web, Apr. 2009. http://www.epa.gov/climateleaders/benefits/index.html, and The Climate Registry website: http://www.theclimateregistry.org/how-to-join/why-join/

important—and inexpensive—practice that can lead to numerous cost savings, often with short or even immediate paybacks.

4.3 Sharing Information

Beyond tracking information for a company's internal use, it is becoming more common—and beneficial—to share information with others. Some companies, like China Mobile for example, are communicating results publicly through Corporate Social Responsibility Reports.[22] Others, like suppliers of Wal-Mart, are providing business customer with information in exchange for preferred status, access to technical expertise, group training and networking, and recognition.

Companies like Hewlett Packard and numerous members of the Electronics Industry Citizenship Coalition are not only sharing information but developing common industry approaches to create efficiencies. Finally, numerous companies around the world are submitting information to the Carbon Disclosure Project investor network.

Yet, the practice of sharing energy and carbon information is in its infancy in China, and outsiders are still learning how to constructively promote sharing. For example, when Carbon Disclosure Project recently asked China's 100 largest firms to provide basic information about carbon data in a survey, only five (5%) answered all of the questions. Since then, leader companies—such as Wal-Mart—are emphasizing development and capacity building with suppliers over compliance "requests," and the results are promising. There is a clear trend towards company-company engagement on more even terms.

As entities strike up the dialogue that will inevitably breed more sharing, there is value in being open today. Already, sharing information can have various benefits, such as:

- Attracting investors and business partners looking for good governance;

[22] See "China Mobile Limited: 2007 Corporate Social Responsibility Report," http://www.chinamobileltd.com/images/pdf/2008/crr/crr_2008_e_full.pdf.

- Developing relationships with experts that provide technical assistance on inventories and reporting and access to GHG tools, technologies and protocols;

- Gaining national public recognition, including recognition for early action;

- Coordinating and engage with other partner companies demonstrating climate leadership;

- Engaging in critical policy discussions;

- Integrating climate change strategies with state, regional, and international GHG accounting schemes.[23]

Meanwhile, companies that have had experience sharing information are noting that a number of traditional concerns are not as problematic as once thought (see Figure 4).

[23] See, for example, EPA Climate Leaders and The Climate Registry.

Figure 4: Concerns vs. Realities of Sharing Carbon and Energy Information

Concern	Reality
"We don't have the information readily accessible and there are administrative costs to doing so."	In fact, the benefits of tracking data are far greater than then costs of doing so, and usually pay back by leading to more efficiency and reduced risk quickly and easily.
"We don't want to reveal information for competitive reasons."	It may be traditional to treat information as "need to know," but fears are often exaggerated, and the benefits of sharing energy and carbon data usually outweigh the startup and other minor costs
"The results might be used against us."	Generally speaking, most stakeholders are interested in company data primarily to gain confidence that management understands what is going on in their companies and preparing for the future, rather than scrutinizing actual data itself. For them, the aim is to reduce risk by creating more open channels of communication.
"If we share data once, it will open the floodgates for all kinds of requests."	Collaborating with stakeholders which are interested in energy and carbon data holds an opportunity to set and agenda and terms that work for you, which may include requesting information yourself of them.

To conclude, it can be summarized that tracking and sharing energy and carbon information is becoming a low-cost, high-value business activity that is increasingly seen as a standard and expected practice. While there is some administrative expense and possibly some perception hurdles to clear with respect to sharing information voluntarily, leader companies are showing that the gains generally outweigh the costs. A key challenge now is the development of a publicly shared, inclusive information management system that sets forth standard rules and metrics, promotes robustness and credibility of data, and leverages shared processes such as a single entry point to reduce the cost of company participation.

Chapter 5: Developing a Methodology: Adapting the General Reporting Protocol to a Chinese Context*

**written by The Climate Registry and iCET*

In China today there are several governmental and non-governmental groups working on carbon accounting and energy efficiency management. This section will provide an overview of the work in this area being done by five organizations: China National Institute of Standardization, The Ministry of Environmental Protection, Carbon Disclosure Project, China Business Council for Sustainable Development/World Resources Institute and Ecofys/World Wildlife Fund.

5.1 International Standards: ISO 14064

ISO (International Organization for Standardization) is a network of the national standards institutes of 161 countries. ISO is the world's largest developer and publisher of international standards. Well-known for its environmental management standards ISO 14000 and more, in 2006, ISO launched a greenhouse gas accounting standard, ISO 14064. This three-part standard is policy and program neutral, and outlines requirements for designing and developing a corporate GHG inventory (14064-1), requirements for quantifying, monitoring and reporting GHG emissions reductions (offsets) (14064-2), and for validation and verification of these activities (14064-3). Consistent with the GHG Protocol principles, ISO guidance focuses on the process of developing these activities, rather than prescribing step by step calculation methods. Because there is a growing community of organizations that undertake ISO audits, these standards may increase the participation in GHG accounting.

In support of the accounting standard, the ISO community is now developing two additional standards: ISO 14065 which outlines requirements for a verification body to become accredited for this purpose, and ISO 14066 which is attempting to specify requirements for individuals to become accredited as GHG verifiers or validators. Because ISO is program neutral, it can arguably be considered best practice to use an

ISO-compliant process together with a GHG accounting program to report a GHG inventory.

The Chinese National Institute of Standardizations (CNIS) – a government agency and a project partner of the Energy and Climate Registry is currently working to adapt ISO standards. CNIS is the research institute of the China Association of Standardization, which is the agency that will formally adopt the standards. *i*CET is working with CNIS to develop a methodology for China. CNIS has adopted or is developing the following standards (see following page):

Figure 5: ISO Management Standards Supported by CNIS

ISO GHG Management Standards Supported by CNIS	
ISO14064-1,2,3	GHG quantification, monitoring, reporting, and assertion
ISO 14065	Validation & verification bodies
ISO 14066 (drafting)	Competency requirements for validators and verifiers
ISO 14067-1,2 (drafting)	Carbon footprint of products (quantification and communication)

Source: "Using Standardization to Address Climate Change in China," presentation by Liu Mei, China National Institute of Standardization, April 25, 2009.

5.2 Other Carbon/Energy Inventory Projects

In addition to the work being done by *i*CET and China National Institute of Standardization toward adapting a GHG accounting protocol including Chinese emission factors, there are other similar or supporting efforts underway in China today.

Carbon Disclosure Project

Increasingly, governments are assigning a cost to emissions of carbon, most notably in the European Union Emissions Trading Scheme (EU ETS). Whether today or in the future, investors, shareholders, and/or other stakeholders are interested to understand the risks or liabilities of public companies. The Carbon Disclosure Project (CDP), headquartered in London, was created to gather exactly this type of information.

CDP is an independent non-profit, which collects corporate climate change information from businesses all over the world. The Executive Agency of CDP in China

is SynTao Co., Ltd. SynTao is a consulting company that focuses on promoting corporate social responsibility (CSR) and socially responsible investment (SRI) in China. It was established in 2005 and currently has offices in Beijing and Washington DC.

The CDP issues an annual survey to more than 3700 corporations worldwide on behalf of institutional investors, purchasing organizations and government bodies. Its survey requests information on a variety of carbon-related topics including total emissions, management policies around climate change, estimated risks, liabilities and more. Response is voluntary. Perhaps not surprisingly, there is a high response rate in Europe and the US, but much lower responses in other parts of the world. Responses can show a company's strategy and level of commitment to addressing the potential risks associated with climate change. Results are published through CDP's website (www.cdproject.net), although confidential information is not publicly disclosed. The first year of doing CDP in China is 2008, the objectives were participation from the 100 largest companies in China based on market capitalization. Of these, 5 filled out the questionnaire, and 20 provide some related information.

A response to CDP is evidence of a corporation's awareness of climate change, and an obligation to publicly disclose its efforts to understand and mitigate its activities. One common criticism is that questions are framed very generally and thus responses can vary widely in terms of quality and accuracy. CDP continues its work to raise the level of awareness among corporations and public organizations of the importance of addressing climate change.

China Business Council for Sustainable Development/WRI

The China Business Council for Sustainable Development (CBCSD) is a coalition of leading Chinese and foreign enterprises registered and operating in China. It plans to get more support in its energy and climate change project by strengthening cooperation with China Council for International Cooperation on Environment and Development (CCICED), CDM Fund, Energy Research Institute (ERI), World Bank (WB), International Energy Agency (IEA), and other international or governmental institutions.

Working together with WRI, CBCSD is developing a project of energy conservation and GHG emission reduction, which aims at the development and

demonstration as well as wide application of measurement methods and emission reduction plans for national key industrial sectors with high GHG emissions, in order to promote the implementation of climate change strategy. The project is supported by the State Development and Reform Commission and the Strategic Programme Fund of the UK government.

The China Corporate Energy Conservation and GHG Management Program was launched June 1, 2007 in Beijing, China. It is a joint initiative between WRI, WBCSD, and the CBCSD. The program links energy conservation with GHG emission reductions under the motto "energy conservation is GHG emission reduction" (*jie neng shi jian pai*), coined by the CBCSD. The program strategy is built upon the basis that to meet energy reduction goals, enterprises will have to gather much of the same information that can then be used to measure GHG emissions. By developing GHG inventories as well as energy inventories, companies can gain additional understanding of their GHG-related risks and opportunities at little additional cost.

The program is being executed in two phases that target the most energy- and GHG-intensive industries in China: the cement, oil and gas, petrochemical, chemical, power generation, and iron and steel sectors. The first phase of the program aims to customize GHG calculation tools to Chinese conditions in each of the identified sectors and then to establish those tools and protocols as national standards. The second phase seeks to assist businesses in developing solutions to reduce energy consumption and GHG emissions.

Ecofys

Ecofys is a sustainable energy consulting firm with headquarters in The Netherlands. Ecofys and GtripleC have developed draft "Sectoral Proposal Templates" which have been road-tested in Mexico (and are planning to be tested in China in 2009). Sectoral crediting mechanisms, especially sector 'no lose' targets have attracted considerable interest in the informal processes of the international climate negotiations for commitments after 2012. The concept of such targets is that developing countries would pledge to achieve voluntary sector "no lose" targets for certain sectors

(e.g. electricity, steel, cement, transport, pulp and paper) expressed as an intensity target (e.g., CO_2/tonne of cement or CO_2/kWh).

Beijing Environmental Exchange

The Beijing Environmental Exchange is a comprehensive environmental equity transaction institution authorized by the Beijing Municipal Government. It is a unique and professional platform for trading all kinds of environmental equity. It is involved in the transactions of energy conservation and environmental protection technology. It is also working on pollutants emission trading including of SO_2 and Chemical Oxygen Demand. Additionally, it is developing a program for Certified Emission Reductions (CERs) that can be traded through the Clean Development Mechanism, Comprehensive Information Service Platform and Registering, certification and trading for carbon sinks.

China National Institute of Standardization

CNIS is a research body at the state level directly subordinate to General Administration of Quality Supervision, Inspection and Quarantine. It's the only comprehensive standardization research base in China, and shoulders great responsibilities for pioneering and developing China's standardization research.

CNIS is working to convert some matured ISO standards into Chinese National standards. So far only ISO 14064 are currently being converted. The UK Strategic Performance Fund has awarded CNIS a grant to work toward adopting PAS2050 (sponsored by Defra and the Carbon Trust), which has been developed in response to broad community and industry desire for a consistent method for assessing the life cycle GHG emissions of goods and services.

CNIS cannot do accreditation or verification. Instead the Standardization Administration of China (SAC) develops the standardization and Certification and Accreditation Administration of P.R.China (CNCA) does certification and accreditation.

World Wildlife Fund

World Wildlife Fund (WWF) China and the Secretariat of China Council for International Cooperation on Environment and Development (CCICED) have signed the

Agreement on Joint Launch of China's Ecological Footprint Report Project in 2007. The Ecological Footprint is a measure of human demand on ecosystems (the biosphere). It measures how much nature we have, how much nature we use, and who gets what. It represents the amount of biologically productive land and water a population (an individual, a city, a country or all of humanity) requires for the resources it consumes and to absorb its waste, to use prevailing technology.

WWF China- with the support of local and global partners – is driving a Low Carbon City Initiative (LCCI) in China in 2009. LCCI will explore low carbon development models in different cities, initially focusing in Beijing, Shanghai and Baoding on energy efficiency building and renewable energy industry development. The initiative will also replicate successful experiences in other cities in China.

"Climate Savers" is one of the key initiatives that WWF and leading companies are currently exploring to combat climate change. So far Johnson & Johnson, IBM, Lafarge, Nike, Tetra Pak, etc., have joined this project, promising respectively an ambitious yet achievable emission reduction target for a fixed period of time. "Climate Savers" provides quality assurance to ensure the selected companies are at the forefront of emissions reductions in their particular sectors, while maintaining profit commercially.

5.3 Adapting the General Reporting Protocol to China

The Energy and Climate Registry will use many of the same organizational structures and methodologies used by The Climate Registry. The following is a detailed breakdown of how the adaptation will take place:

Protocol – The development of the protocols will be based on The Climate Registry's General Reporting Protocol but framed within a Chinese context.

Website – The Climate Registry's website provides a good structure for ECR to follow. The website will help educate the public on the ECR's concepts,

objectives and protocols, provide the web tools to report the energy use and GHG emission.

Software – ECR's software will be developed based on The California Climate Action Registry's CARROT and The Climate Registry's CRIS software. The development will be based on the protocol development.

Recruitment – One of the starting points for *i*CET's recruitment process will be to approach members of CCAR or The Climate Registry who have either reported or indicated that they wish to report, which have operations in China that they may wish to report to the ECR. We will work in conjunction with The Climate Registry and other project partners to achieve this goal.

Member Services – ECR will provide a welcome kit to new members and also a call-in help line for reporters and will work with project partners that will be able to dedicate more resources to providing necessary member services. Since ECR is a fresh concept in China, we expect that there will be more training services needed.

Events – the ECR will include workshops, training sessions and conference exchange both in Beijing and Guangdong. ECR project leaders and partners will speak at domestic and international conferences to raise awareness and build partnerships for the ECR.

To successfully adapt The Climate Registry's GHG reporting program to a Chinese context *i*CET will need to take a number of factors into consideration:

Beneficial:

1. Reporting Process – Because ECR will be done on a pilot and experimental basis, the ECR provides an opportunity for comprehensive member feedback during the protocol development process.

2. Because of the large size and central control structure of most Chinese companies, the ECR will be able to measure carbon emissions and energy use at a higher level of the company thereby incorporating more branches of the company's operations.

3. Potentially easier to measure Scope 3 and supply chain emissions because many companies in Guangdong are the supply chains or have local suppliers.

4. No need to reconcile mandatory vs. voluntary reporting regimes in China because there is no long-term voluntary reporting system in China.

Potential Challenge:

5. Verification in China is at a less developed stage than in Europe and North America. A goal of the ECR project is to facilitate the development of a reliable, accredited, transparent and consistent third party verification process.

6. Lack of transparency in China's business community. No precedent or infrastructure to support reporting or disclosure in general.

Neutral:

7. The ECR must take into consideration units used to measure electricity used, fuel consumed, calendar used, rate of production, efficiency and emissions in China.

8. The protocol will need to include Chinese emissions factors consistent with those used at the national level. Also *i*CET will conduct a needs assessment to determine the organizational and geographic boundaries to use in the protocol.

Chapter 6: Recommendations

In this chapter we will offer several recommendations. The recommendations will vary from large- to small-scale assessments and will be organized based on the intended audience. The two sections of recommendations are directed to:

1. Policy makers and government officials
2. Business leaders and entrepreneurs

6.1 Recommendations to Policy Makers

Central themes for policy on carbon accounting should be cooperation, mutual respect and large-scale innovative thinking. *i*CET believes that carbon accounting methodologies should reflect some effort to achieve fairness with regard to respective responsibility for contributions of GHGs into the atmosphere. It is becoming well known that almost one-third of China's carbon emissions are directly linked to products that are directly linked to export. While it is clear that the economic activity associated with the export market is beneficial to the Chinese economy in crucial inalienable ways, it is also important to consider that the consuming countries avoids a certain measure of domestic carbon emissions due to the outsourcing of many manufacturing jobs overseas that is part and parcel of an increasingly globalized world. Policy makers in the United States have long lamented the loss of American jobs to overseas labor markets, but rarely is the case made that along with those jobs goes the accompanying factories and pollutions.

*i*CET recognizes that this type of thinking brings forward a terrible conundrum of fairness and responsibility regarding the sourcing of the greenhouse gases that contribute to climate change. And the problems of fairness get even more complicated. Should GHG measurements reflect how much GHG countries have emitted into the atmosphere over time? If that were the case, although China has now pulled ahead of the US in annual emissions, the US would have to take a larger portion of the responsibility since it has emitted more GHGs into the atmosphere over time. Likewise, there is the question of per capita emissions vs. total emissions. China's per capita emissions are still much lower

than that of the United States – one-fifth of the US number to be exact. While we don't recommend a way to solve this conundrum in this paper, we do suggest that this problem be addressed in other ways. For instance, because China's emissions are lower on a per-capita and historic basis and because one-third of China's emissions are a result of the manufacturing of goods that are exported mostly to American markets, we recommend that policy makers in the United States make special considerations to help Chinese policy makers deal with the formidable task of emissions management. Specific recommendations for policy makers include:

1. National policy should emphasize and be conducive to collaborations between local/regional geographic areas such as California and Guangdong province.

2. National and local policy should first focus on GHG accounting methodologies to achieve increased transparency, and more accurate data.

3. International cooperation should consider input from both sides equally and be done in the spirit of serving shared interests and mutual benefits, not as one system imposing solutions onto another.

4. Develop flagship, experimental and pilot projects to learn more about low-carbon development.

5. Focus on economic opportunity and continued growth through green innovation.

6. Improve US-China relations by creating more opportunity for successful cooperative policies.

6.2 Recommendations to Companies Operating in China*

**written by Business for Social Responsibility*

Following are key recommendations to companies operating in China:

1. **View voluntary reporting as a risk-avoidance strategy**, to prepare your company for the inevitable move towards mandatory reporting. Acting now reduces the cost of compliance later on.

2. **Stay one step ahead.** Especially as a supplier, if you create your own tools and reporting system, you can do a single report and avoid having to answer multiple questionnaires from different purchasers.

3. **Start small.** Begin with internal data on fuel and energy usage within your own operations, and move on from there.

4. **Get comfortable with your data and systems.** Begin to build the foundation for comprehensive data collection and reporting systems that will give you confidence in your emissions data.

5. **Look for innovative ways to gain from your disclosure.** Participation in voluntary disclosure may help you to position yourself as a progressive, environmentally aware company.

6. **Use the data to your advantage.** Look for opportunities for potential savings in fuel and energy efficiency.

7. **Let investors know.** The financial investment community is increasingly interested in whether a company has taken stock of its carbon emissions, as a sign of competent management and awareness of upcoming shifts in the regulatory and business environment.

8. **Take advantage of existing reporting systems and protocols** to make sure your efforts are in line with industry practice, to streamline your data collection practice, and to ensure that your company's work is fully recognized.

6.3 Recommendations to Business Customers of Companies Based in China*

**written by Business for Social Responsibility*

Effective information systems are critical to progress. However, it is beneficial for companies engaging with suppliers on carbon and energy management in China to consider recent experiences that illustrate some important lessons about managing sustainability more broadly. In a nutshell, myriad experiences have shown that focusing on requests for suppliers to *comply*, without the customer credibly committing to *collaborate* on mutually-identified problems, is a recipe for promoting misinformation, while actual issues at hand being avoided altogether.

As a result, some movements that have preceded the current one of energy and carbon—such as improvement of factory labor conditions, for example—have transitioned from being oriented to compliance to emphasizing supplier development. Energy and carbon professionals would be wise to learn from these experiences. In fact, because carbon and energy management are chock full of technical details and have direct financial implications, the costs of compliance-orientation will likely be even higher.

Companies buying from China-based companies that want to explore energy and carbon issues in their supply chain would do to well to observe these lessons. In particular, they should incorporate four important elements into supplier development:[24]

1. **Alignment**: Aligning their own commercial and social/environmental objectives—and their messages about them.

[24]Ryan Schuchard and Dunstan Hope, "Creating Systemic Change Lessons from Responsible Labor," Business for Social Responsibility, Leading Perspectives, Fall 2008. http://www.bsr.org/reports/leading-perspectives/2008/fall/systemic-change.pdf

2. **Ownership**: Developing objectives and methods with suppliers in collaboration and in a way that supports their interests.

3. **Empowerment**: Ensuring that individuals at supplier companies have the education, recourse, incentives and channels to manage.

4. **Engagement**: Building and strengthening institutional frameworks, especially policies and infrastructure.

An important implication is that understanding root causes and building environments, which cultivate sharing is critical to progress. Of course, there are often numerous gaps. One of these gaps—a trustworthy, public system for sharing verified information about energy and carbon—is within reach of closing through the development of an Energy and Climate Registry in China.

In their supplier engagement work, companies would do well to consider the benefits of incorporating the Energy and Climate Registry into their data sharing, because it represents a proven, readily available means for storing and obtaining trustworthy data, while at the same time reduce the strain from various unsynchronized efforts by creating a standard, open database system.

Conclusions

It is important to keep in mind The Climate Registry's motto: "You can't manage what you don't measure." There are many different variables that will go into the development of China's climate change policy but it is almost certain that any policy will include a mechanism to accurately measure greenhouse gas emissions in a way that is aligned with international standards. It is this idea that is a cornerstone of the Energy and Climate Registry project. Moreover, the central pillars of the ECR – transparency and accurate carbon accounting methods – are a first step toward any global climate change solution. In addition to innovative tools such as those offered by The Climate Registry and the Energy and Climate Registry, there must be sustained government leadership in the direction of increased transparency and accountability around issues of energy use and greenhouse gas emissions. At the same time NGOs and business leaders can work alongside of, in cooperation with and also outside of the government context to get a head start on this idea of reducing carbon emissions.

About *i*CET

The Innovation Center for Energy and Transportation is a non-profit organization registered in Beijing, China and Los Angeles, California. iCET is dedicated to promoting clean, sustainable, low carbon policies and technologies and seeking solutions to combat issues that contribute to climate changes throughout China. iCET focuses its activities on the following three key areas: Low Carbon Transportation, Climate Change and Energy Efficiency.

*i*CET pursues its goals through actively developing projects with different stakeholders, both inside of China and around the world. More information on current and past projects is available at *i*CET's website, www.iCET.org.cn

*i*CET is an officially recognized Chinese NGO with political support from the Science Commission in Beijing. The organization has developed partnerships with a number of high level government bodies and organizations in China, including:

Ministry of Environmental Protection, Vehicle Emissions and Control Center (VECC)
Chinese State Council, Development Research Center (DCR)
The Climate Change Division, National Development and Reform Commission (NDRC)
Chinese National Institute of Standardization (CNIS)
Chinese Administration of Standardization (SAC)
Tsinghua University
Chinese Automotive Technology and Research Center (CATARC)
The Climate Registry
California Environmental Protection Agency and California Air Resources Board (CARB)
EcoLinx Foundation

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iCET and Friends at the Energy and Climate Registry Project Launch in Beijing, April 25, 2009. From left to right: Robyn Camp (The Climate Registry), Laura Ediger (Business for Social Responsibility), Lucia Green-Weiskel (iCET), Dr. Feng An (iCET), Dr. Yang Fuqiang (WWF), Linda Adams (Secretary of Environment, State of California), Robert Jones (Ecolinx Foundation) Robert Earley (iCET), Dr. Yufu Cheng (iCET), Fang Fang (iCET), Margret Kim (California Air Resources Board).