FEATURE BOX

Sino-Italian Energy and Environmental Cooperation

By Natalie Matthews

In October 2007 a stunning ten-story C-shaped green building was unveiled on the Tsinghua University campus—the Sino-Italian Ecological and Energy Efficient Building (SIEEB). The highly resource efficient building, which is the product of four years of collaboration between Italian and Chinese energy experts and architects, utilizes natural ventilation and lighting, renewable energy, and reclaimed water. Key in the building's low-carbon design is the over 1,000 square meters of photovoltaic panels.[2] SIEEB houses not only Tsinghua University's Department of Environment and Technology, but also the Sino-Italian Cooperation Program for Environmental Protection (SICP). The building is designed to be the center for teaching, experiments, research and Sino-Italian environmental technology exchanges as well as a model for future Chinese eco-building construction.

In September 2010, SICP hosted a series of international workshops at the Shanghai World Expo's Italian Pavilion that highlighted eco-friendly technologies, climate change and sustainable development, as well as progress in the Sino-Italian environmental and energy cooperation over the past decade.[2]

FOUNDATION OF THE BILATERAL GREEN PARTNERSHIP

The SIEEB green building project is just one of the many environmental cooperation initiatives between Italy and China since the SICP was launched in 2000 by the Italian Ministry for the Environment, Land and Sea (IMELS) and China's State Environmental Protection Administration (now Ministry of Environmental Protection/ MEP). Since 2000, cooperation has expanded to many other government departments, universities, research institutes and enterprises. The focus of SICP is primarily high-level technical cooperation to create on-the-ground initiatives with Chinese national institutions and municipal authorities. To facilitate projects, a Joint Program Management Office was established in Beijing coordinated by the Italian Trade Commission.

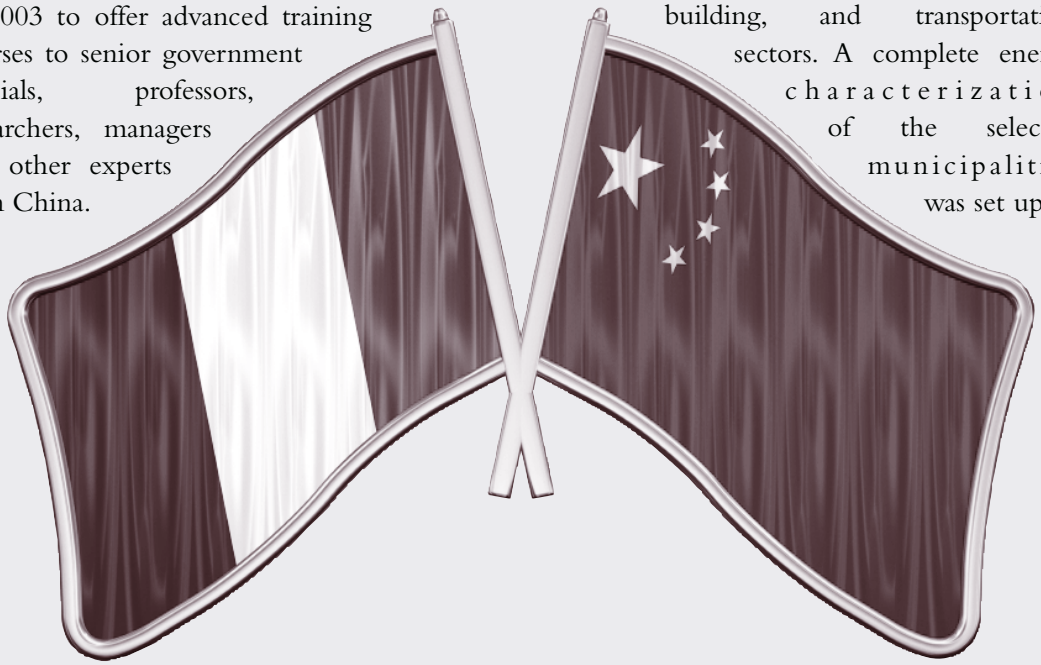
Bilateral work on energy and environment tends to be more technology focused and takes a three-pronged approach: pilot projects; cooperative research programs; and capacity building exercises. Over the past decade, more than 200 projects have been carried out by the two partners and their affiliates in a wide variety of areas. The total value of on-going and past projects is $438 million, nearly half of which was co-financed by IMELS and multilateral funds.[3] Early cooperation projects included plans to green the Beijing Olympic Village through a solar energy system, constructing a solar village in Inner Mongolia, and testing emissions-reducing technology for vehicles in Beijing. Beginning in 2003, cooperation between IMELS and SEPA helped Haier Electric Appliance Company eliminate CFCs in the refrigerator manufacturing process. IMELS and Tianjin's Haihe Economy Development

Office cooperated in a master plan for restoring a wide industrial area near the center of Tianjin for business and community use. The master plan was presented to local authorities in April 2008 and it notably includes plans for an Italian park to serve as a model of environmentally sustainable public space.

SICP's most recent agreement with China's Ministry of Environmental Protection is to develop pilot projects in selected areas affected by pollution from energy production and utilization as well as other environmental issues addressed in international protocols and conventions. On the joint research project front there is an agreement with the Chinese Academy of Social Sciences to undertake a strategic assessment of the future of energy and the environment in China in 2020. The project will start from an evaluation of the structure of energy consumption in the last ten years.

Current areas of SICP cooperation with the Ministry of Science and Technology focuses on joint ventures for producing polycrystalline silicon wafers for solar energy (the Solar Village Project); coastal zone management; and capacity building for using the Clean Development Mechanism.

In the area of personnel and policy capacity building, Venice International University began a Sustainable Development and Environmental Management Advanced Training Program in 2003 to offer advanced training courses to senior government officials, professors, researchers, managers and other experts from China.



SUSTAINABLE RECONSTRUCTION AND URBAN ENERGY PLANNING

Italy is also responsible for the first international cooperation project for earthquake reconstruction in Gansu Province. The only landfill in Wudu district of Longnan city was damaged in the May 12, 2008 earthquake. The earthquake damage to waste disposal and treatment facilities was threatening the local environment, particularly groundwater. Italian researchers have partnered with counterparts at Lanzhou Jiaotong University and local institutions to carry out a program to evaluate the environmental damage, set up a groundwater monitoring system, and help guide local officials in the reconstruction of the landfill. The partners in this project also have been planning a sustainable waste management system that will be integrated into the overall urban reconstruction plan.

The recent Urban Energy Planning for Sustainable Development (ENP) initiative was charged with identifying and evaluating optimal solutions for Chinese municipalities to reduce CO_2 emissions and to improve integrated environmental quality in the long run. The project began by selecting three second and third-tier municipalities: Jinan, Suzhou, and Taiyuan, which represent a cross-section of energy efficiency challenges in industry, building, and transportation sectors. A complete energy characterization of the selected municipalities was set up to

gather the fundamental information of the main energy consumption sectors and possible energy efficiency improvements.

The methodologies and outcomes for energy efficiency in these municipalities are being disseminated through an English-language publication and the recently unveiled online "energy portal" that guides users through energy assessment steps. The website (www.e2-china.com) is designed as a platform to promote information sharing on energy efficiency development in China's industrial sector. Chinese industry practitioners who are registered on the site find and exchange technical information with international experts. The ENP initiative's success has sparked ideas for future projects, such as selecting new pilot municipalities, a demonstration project for boiler energy efficiency improvement, and assessing the potential for CDM project implementation in each of the industrial sectors the initial project investigated.

For more information on the Sino-Italian Cooperation Program for Environmental Protection See: www.sinoitaenvironment.org.

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ENDNOTES

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[2] China Daily. (2010, September 13). China, Italy mapping out a greener future. [Online]. Available : http://www2.chinadaily.com.cn/cndy/2010-09/13/content_11291109.htm.

[3] Ibid.

COMMENTARY

Eco-Farming: A Long-Term Strategy for Dealing with Climate Change

by Pan Wenjing (Translated by Ada Wu)

HOPE IN DISASTER

In 2006, huge waves of rice planthoppers attacked blocks and blocks of rice paddies in Yixing, a town famous for its clay teapots in Jiangsu Province. Farmers in Fenghuang Village had to spray the rice paddies with pesticide doses several times stronger than usual. Some villagers even turned to highly toxic pesticides for help. However, pesticides could not conquer the bug infestation. Desperate farmers had to burn down rice paddies that had been destroyed beyond recognition. Among all the farmers in the village, only Wang Falin's crops were spared, not due to any effective use of pesticides, but rather because of his "duck corps." Using a typical ecological farming method—raising ducks in his rice paddies—Wen Falin took good care of both ducks and the rice paddies. Rice planthoppers survived the pesticide sprays, but could not escape the hungry ducks. Weng Falin's duck corps successfully defeated the hoppers, rekindling his hope for a good harvest.

The Spring Festival of 2008 left many Chinese with profound memories. A snow and ice disaster froze almost half of China. In the countryside of Guizhou Province which was hit by the disaster, people sat in ice-cold darkness waiting for the government to restore electricity. On farmland just steps away from their homes, crops lay frozen and dead. The livelihoods of villagers would inevitably be affected by the snow disaster. But in a village called Wayao, a flame of hope was burning warmly in the hearts of villagers who has been practicing eco-farming methods. Under the guidance of agronomists, villagers had built a methane system, used organic fertilizers from the system and other sources, and employed straw coverage technology to protect their crops. The snow and ice disaster made the superiority of eco-farming evident: when many other villages were covered by darkness, the methane system in Wayao was providing clean energy for villagers. When the surrounding villages had no crops to harvest, leeks and Romaine lettuce carefully protected by the coverage technology survived and grew abundantly, offering the villagers of Wayao hope.

In the beginning of 2009, An Jinlei, a farmer from Hebei Province was doing what he usually does that time of year—looking after his wheat seedlings, which would soon turn green. A drought that was occurring in the area seemed to have no influence on his farmland. Local people who had not seen a drought like this in decades watched helplessly as their wheat seedling dried out and died. But that was not the case for An Jinlei, who started practicing organic agriculture more than ten years ago. After so many years, his farmland had developed into an ecosystem full of vitality. The soil structure was healthy and nutrient-rich with good air permeability and had a strong capacity to retain water, which in turn helped the crops resist drought. Unlike Jinlei, other farmers in his village stuck to conventional chemical farming that relies heavily on the use of chemical fertilizers and pesticides. When the drought came, their farmland became extremely dry,

but in Jinlei's field, after digging 30 centimeters down to the earth with a hoe, the soil was still moist (Qiu , 2009).

THE REAL THREAT OF CLIMATE CHANGE TO AGRICULTURE

Climate change effects like high temperatures, extreme weather, and plant disease are affecting agriculture and livelihoods all over the world. China is the world's largest producer of agricultural products and climate change poses a great threat to the country's food safety. In recent years, news stories about the adverse effects various disasters have had on agricultural production frequently appear in the Chinese news media with the link to climate change highlighted as a growing problem. As this article was being written in 2009, almost all the areas of food production in China were facing the second major drought that year.

According to a Climate Change and China's Food Safety report issued by Greenpeace and China's Agricultural Academy on October 16, 2008, the World Food Day, "temperature increment, agricultural water reduction and the diminishing cultivated area will cause China's total grain output to drop 14 to 23 percent compared with the 2000 level (Zhu Hui et al. 2008)." With these stark figures, the report underscores how climate change is endangering China's food safety.

VICIOUS CYCLE

Chemical farming methods that rely heavily on chemical fertilizer and pesticide still dominate China's agriculture, though chemical agriculture can further intensify the effects of climate change. Long-term, intensive use of chemical fertilizers and pesticides has already placed a heavy burden on China's environment: water pollution, greenhouse gas emissions, soil pollution and hardening, and endangered biodiversity. Unwittingly, China's agriculture has fallen into a vicious cycle.

Perennial use of pesticides has made many agricultural pests resistant to chemicals. A large number of natural predators (such as insects, amphibians and birds) that prey on pest species are also killed. In order to get rid of harmful pests which are increasingly difficult to destroy, farmers spray pesticides in greater amounts and with more toxicity. The seemingly easy solution causes harmful pests and germs to develop stronger resistance to chemicals, leaving farmers with little recourse. Climate change alters the distribution range and occurrence patterns of agricultural pests and makes both more unpredictable (FAO, 2008). The majority of farmers still turn to pesticides when facing these problems. But like Wen Falin's fellow villagers, they are still unable to deal with unpredictable pests and plant diseases.

Compared with the vicious cycle of using pesticides (e.g., heavier pesticide use contributes to increased resistance in insects and diseases, which then leads farmers to apply more pesticides), the cycle involving synthetic fertilizers is even more complicated. In China, chemical fertilizer is considered a resource indispensable to food production. In recent years, the chemical fertilizer industry has received government subsidies in the form of lower prices for raw materials (such as coal and natural gas), electricity, and railway transportation. Government subsidies to chemical fertilizer manufacturers not only stimulate the expansion of production but also enable farmers to purchase chemical fertilizers at a lower price, which encourages increased use. According to the 2008 Greenpeace report cited above, China's chemical fertilizer consumption rate remains high and an upward trend is apparent (Greenpeace, 2008).

The large amount of chemical fertilizers used in China cannot be completely absorbed by crops. Studies show that the chemical fertilizer efficiency rate is only 15 to 30 percent in China. Unabsorbed fertilizers can enter the water causing pollution, remain in the soil giving rise to the imbalance of nutrients, or transform into

greenhouse gases (mainly nitrogen monoxide) entering the atmosphere. A large amount of chemical fertilizers will not only transform to greenhouse gases thus intensifying climate change; these agents also cause soil to harden and reduce its air permeability, making agricultural systems too fragile to survive natural disasters like drought and flooding.

When farmers face food production reduction directly or indirectly caused by climate change, they often choose to use more chemical fertilizers. This is how the vicious cycle came into being: massive use of chemical fertilizers intensifies climate change, which in turn reduces grain output thereby leading farmers to apply more chemical fertilizers. Exacerbating the situation are government subsidies to the fertilizer industry that ultimately fuels the vicious cycle. The situation in China parallels what one Greenpeace report discussed regarding government subsidies in India which is a major reason for overuse of pesticides, soil nutrient imbalance, and declining soil productivity (Roy & Reyes, 2009). Furthermore, these subsidies indirectly contribute to greenhouse gas emissions, intensifying climate change. In both India and China well-intended chemical fertilizer subsidies to help poor farmers are imposing high environmental costs.

The soil in An Jinlei's farm is healthy and fertile. Photo Credit: Greenpeace

A NEW CHOICE

Climate change is endangering agricultural activities in an unprecedented way. As these threats become increasingly clear, seeking an agricultural plan that guarantees long-term food safety has become a topic that is attracting the attention of governments around the world.

With 1.3 billion people to sustain, China is in dire need of an escape from the vicious cycle of chemical agriculture to a better path for agricultural development. The eco-farming that has given hope to Wen Falin, An Jinlei and villagers from Wayao is an option that should be pursued. However, given the deep roots of chemical agricultural practices, support for ecological farming is far from sufficient. The sooner the Chinese government can change its mindset and support eco-farming with as much as enthusiasm and intensity as it gives to chemical agriculture, the sooner we will see positive change.

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COMMENTARY

Too Much of a Good Thing?
Phosphorus Flows and Water Eutrophication in China

By Marcy Nicks Moody

For readers of the *China Environment Series*, the following story is pretty old: At some point in the summer of 2007, we woke up, drank our coffee or tea, opened the newspaper, and probably saw images of an alien-looking lake in eastern China. Previously a source of water for as many as 30 million people, well known for its productive fishing industry, and traditionally considered one of the most lovely natural settings in China, over one-third of Lake Tai's 2,250 square kilometers had turned a sickly, fluorescent green. Locals complained about an unrelenting stench, and the cyanobacteria, which had overrun the lake, killed off many of the other things living in it. Water supplies from the lake had to be suspended, and at least two million people were left without their primary source of water for cooking, much less drinking. The price of bottled water in surrounding areas increased six-fold, price controls were undertaken, and eventually water was rationed. Less than a year later, in April 2008, it happened again. Despite the evidently anthropogenic nature of the chain of events, a natural disaster was declared, and official promises were made to clean up the lake by 2012.

Though the story is old, the problem is far from solved. As of this writing, Lake Tai still suffers from ongoing eutrophication, the same imbalance of nutrients that led to the algae outbreaks of 2007 and 2008 (Li, 2009). A study of the precise origins of the Lake Tai disaster, as well as strategies for avoiding or mitigating future such disasters, thus merits further attention. After a short overview of the industrial and agricultural activities that lead to water becoming eutrophic, this paper discusses the environmental and geopolitical challenges posed by such activities in order to explore opportunities for alleviating them.

Water eutrophication is one of China's most severe environmental challenges, and is particularly worrisome given the country's limited water supplies, with per capita resources reaching only one quarter of the world average (Xie et al., 2009). It is caused by an excess of nutrients, chiefly nitrogen and phosphorus, which promotes growth of 'choking' vegetation. This growth, known as an algal bloom, clouds the water, deprives it of oxygen, and can interfere with drinking water treatment. Organisms living in the water that need light and oxygen to survive subsequently die, and the quality of the water decreases sharply. It has been argued that phosphorus is the key limiting nutrient in water eutrophication and thus determines the rate of algae growth (Liu, 2005). Therefore, remedial actions must focus on phosphorus flows, and strategies for shifting them.

Buildup of excess phosphorus in water bodies can be caused by a variety of sources, two of the most important of which are agricultural runoff and discharge of untreated waste by municipal sewage systems. In the Lake Tai disaster, chemical fertilizers and disposal of untreated industrial waste were found to be the key culprits. In considering strategies for addressing water eutrophication in China,

agriculture and waste management are thus two important places to start brainstorming.

PHOSPHORUS CONUNDRUM ON THE FARM

With regard to agriculture, it should be noted that phosphorus is not all bad. On the contrary, it is essential to all life and a key component of fertilizer. Phosphorus does not occur as a free element in nature. It is bound up in phosphate rock, which must be extracted (usually via strip-mining). Not surprisingly, the most important commercial use of phosphate rock is for the production of chemical fertilizer. There are no known substitutes for phosphorus in agriculture, and phosphate rock is not a renewable resource. That is, the world could run out of it.

With global population on track to reach 9 billion by 2040, however, demand for chemical fertilizers is unlikely to decrease any time soon. Indeed, beginning in late 2007 and continuing into 2008, the price of phosphate rock rose dramatically due to increased agricultural demand and tight supplies. U.S. prices for phosphate rock doubled between 2007 and 2008, and the 2008 average spot prices from some exporting regions were more than five times their 2007 average (World Bank, 2009; USGS, 2009). Though other factors were involved in this price increase and the price of phosphate rock has fallen substantially from its 2008 highs, increasing demand and dwindling supply suggest that prices will rise again.

Complicating this picture is the fact that phosphate's geographic distribution is highly skewed. India and Europe are net importers. Though the United States still has commercially viable reserves, they are estimated to be exhausted in 30 years, according to the Stockholm Environment Institute. The largest reserve base of phosphate rock is located in Morocco and the adjacent territory of Western Sahara. The world's leading producer of phosphate rock and country with the second largest reserve base is China. Given these circumstances, a likely scenario in the coming decades could include a complex array of geopolitical movements to control production and prices, not unlike the current political economy of petroleum. For China, then, the picture is ironic. In the ground, it has an enormous quantity of a highly valuable and very limited commodity and, for better or worse China stands to play an important role in the political economy of phosphate.

After phosphate rock is extracted and processed to create fertilizer, it is applied to agricultural fields to encourage plant growth. China has the world's highest rate of fertilizer use per unit of arable land (McKinsey & Company, 2005), but more fertilizer does not necessarily mean more productive land. Much of the phosphorus applied to agricultural fields as fertilizer becomes bound to the upper soil layer, making it unavailable for plant growth, and the only way to release it is through 'slash and burn,' which can lead to severe local pollution. Of course, runoff from fields containing excess fertilizer that has not been absorbed contributes to water eutrophication. One way to limit phosphorus flows in China, then, is to curb overuse of fertilizer. Economic realities—that is, rising prices of fertilizer—should eventually lessen problems of overuse, but environmental realities dictate that the issue be addressed now.

China has already taken two important steps in this regard. First, in 2005, the Ministry of Agriculture began promoting technologies to calibrate fertilizer usage according to the land's soil type and characteristics. This project has been estimated to save five percent of the fertilizer used nationally (McKinsey & Company, 2005), and should be continued. Second, in early 2009, the National Development and Reform Commission announced that it would remove price controls on domestically-produced fertilizers, which had been set artificially low. Though this may have happened because prices of phosphate rock have now dropped from their 2008 highs, the elimination of price caps

should not be ignored. More aggressive training and dissemination of information on overuse of fertilizer should be undertaken by the Chinese government. There are notably very few international or Chinese NGOs working on this issue.

While China has large reserves of phosphate rock and substantial capacity to produce chemical fertilizers, supplies are not infinite. Worldwide phosphate reserves are estimated to be exhausted in the next 50 to 125 years, according to the Stockholm Environment Institute. Though the world could run out of commercially viable phosphate rock, phosphorus can be recycled from elsewhere in the ecosystem. Indeed, we have not always had synthetic fertilizers. Traditionally, food was consumed close to the land on which it was produced, and the human and animal wastes that are high in nutrients including phosphorus, were returned to that land in the form of manure. One way to ease the demand for phosphate rock is, frankly, to use this ancient form of recycling.

OVERCOMING THE "ICK" FACTOR

While major cities surrounding Lake Tai have wastewater treatment plants that are more efficiently run since 2007, considerable household sewage is generated from the thousands of smaller villages and towns in the basin. Untreated sewage is thus another major area in which phosphorus flows need to be addressed. However, this waste represents both problem and solution to water eutrophication in Lake Tai and other water bodies in China. Specifically, while poorly managed waste disposal contributes to water eutrophication, sustainable forms of waste management could both decrease instances of eutrophication and ease the demand for phosphate rock. To be sure, there is an "ick" factor involved. Few people like talking about their bathroom habits, and "any innovation in the toilet that increases owner responsibility," caring for its contents and turning it into compost to spread on one's garden "is probably seen as downwardly mobile," observes Carol Steinfeld, an importer of composting toilets (George, 2010). But sustainable waste disposal is particularly important in the developing world, where 80 to 90 percent of sewage is discharged untreated into nearby waters, according to the U.N. Environment Program. At some point, whether because of expensive fertilizers, severe degradation or crippling limitation of water resources, people will need to overcome disdain for composting toilets, which can be used to produce fertilizer or with biogas facilities also generate electricity.

In China, there have been forays into sustainable waste management, with some success. In Dongsheng, Inner Mongolia Province, for example, where water resources have already been highly stressed, the local government partnered with a private construction company and several other organizations to install dry composting toilets and an associated decentralized system of wastewater treatment, which would decrease household water usage, prevent water contamination, and provide an alternative to chemical fertilizers. The project was

undertaken in several residential buildings, and became fully operational in 2007. However, that aforementioned ick factor—what might be termed social or cultural barriers—was too high. Dongsheng now plans to replace their dry toilets with the traditional variety, though the local government will continue to use the less energy intensive decentralized wastewater treatment facilities. In Guangxi Province, however, where water and financial resources are also highly stressed, UNICEF, the Red Cross, and the Swedish International Development Agency have supported the installation of over 650,000 dry composting toilets, with fewer signs of rejection and plans for more. A similar project completed in 2009 in Shaanxi Province seems to be more in line with the experience in Guangxi. (Editor's Note: See Commentary by Yan et al., on biogas projects in Chengdu). There are notably not yet many such projects to address household waste in Lake Tai.

Water eutrophication poses a serious challenge to water security in China, and scarcity of phosphate rock will likely pose a serious challenge to food production for both China and the world. Curbing overuse of synthetic fertilizer to conserve scarce resources and managing waste to mitigate further demand for those resources can help address the water crisis in China. It will take more efforts of farmers, NGOs, countless government agencies at all levels to begun to address these challenges, but there is much work still to be done, particularly in Lake Tai.

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COMMENTARY

Local Understanding of a Melting Glacier:
Conversing with Lamas and Circumambulators in Shangri-La

By Zhou Lei

The news of glacier melt is finally being given more attention in the media, but for most people in the world glaciers are still something far away and abstract. While the speed of glacier melt due to global climate change is debatable, for those living near these impressive ice giants their disappearance is a very real and frightening trend. I am in a way fortunate to have become acquainted with a community of people who live and worship in the shadow of one of the fastest melting glaciers in the world. Located in northwestern Yunnan Province, the Mingyong Glacier on the Kawadgarbo Peak of the Meili Snow Mountain is one of Tibetan Buddhism's eight sacred mountains. The area is considered by some the real Shangri-La and every year thousands of Tibetan pilgrims come to circumambulate this holy mountain.

The Mingyong is in Deqing County where local officials regard the glacier as a quintessential tourist destination that woos both Chinese and international travelers. However, this tourism cash cow is rapidly disappearing due not only to global climate change but also to tourism activities and inappropriate infrastructure building. Located a mere 2,700 meters above sea level, the Mingyong Glacier is at the lowest elevation and latitude among all of China's glaciers. One researcher from a local meteorological research center voiced concern that the Mingyong Glacier has shrunk by at least forty meters over the past thirteen years and the Meili Snow Mountain will likely be deprived of all the snow cover within 80 years if global warming trends continue. The annual average temperature in Shangri-La County has risen from 4.8 degrees Celsius since 1990 to 5.2 degrees in 2006. Barry Baker, a climate change modeler for The Nature Conservancy concurs with these claims, noting that "northwest Yunnan—which has one of the most diverse temperate ecosystems on Earth—is threatened by rising temperatures, the magnitude of which doubles the average global trend" (Fetzer Sheehan, 2010).

While local government and businesses see the melting as a threat to their income, many Tibetan villagers and pilgrims I have spoken with see the tourism development and the melting as an affront to the deities of the sacred mountain that will lead to punishment on humans who have caused it.

TOURISTS AND DEITIES

During one of my many visits there, one tourism bureau representative told me that the number of domestic tourists in Deqing County had increased from 517,500 in 1997 to 2.86 million in 2006 with an additional 308,000 foreign tourists. However, a local meteorologist told me that while many people tend to think that the melting of the glacier is due to tourist influx, there is no clear proof that it is the main cause. Many experts I spoke with list global climate change combined with mining and industrial activities in Deqing as the biggest drivers to the melting glaciers.

Very few Tibetan villagers in Deqing benefit from the lucrative business of tourism,

especially tourism from circumambulation even though the local government promotes economic growth around the pilgrimage traffic through building transportation infrastructure, hotels, and restaurants located along many of the major circumambulation routes and holy sites. The majority of local Tibetan people in the holy mountain area sustain themselves through mushroom picking, farming and animal husbandry; occasionally, they can make some extra money (100-200 Yuan/day) by working as tourist guides during peak tourism seasons or major pilgrimage years—such as the Year of Sheep in 2003. That particular year drew nearly 100,000 pilgrims, for Tibetan people believed that all the major sacred deities would gather in Kawadgarbo at the time, making all the merits and virtues the pilgrims accrued even greater.

Lamas have been unwillingly transformed as workers in the tourism industry, performing "authentic" religious activities for curious tourists. Lamas on Snow Mountain must be prepared to answer the bombardment of questions from outsiders in this omnipresent tourist Panopticon.[1] Many Lama informants have told me in many occasions their understanding of the melting glacier, "These are our sacred mountains, where deities live. Now all have been changed into tourist resorts. In Mingyong Glacier, they built wooden and steel stairs all the way to the heights of the sacred mountains, there was one time, people doing karaoke business in the heart of a sacred mountain, tourists chanting and waving barbequed chicken wings to deities. This place can not avoid to be ruined with such behavior."

Religion still observably holds sway in the everyday lives of local villagers, where people are extremely conscious of respecting and honoring deities. The local Tibetan people live in awe of the omnipresent spiritual world. Deities are part of everyday conversation, folk literature, dreams and the natural environment—rivers, mountains, flora and fauna are all spiritual entities. The circumambulation is seen by Tibetans as an important life journey that not only pays tribute to an otherworldly sacred domain, but is also a physically challenging and solitary ritual that aims to bring a more blissful life to the individual pilgrim and his/her surrounding world. Unfortunately, the Tibetan pilgrims at Meili Snow Mountain and elsewhere have involuntarily become part of the marketing for tourism development, for their journey is seen as exotic. Tourists come to this region not just to view the landscape, but also to experience and in some ways "consume" the image they have of Tibetan-ness.

Left: Meili Snow Mountain and Right: Zhou Lei conversing with Lamas in Lamasery. Photo Credit Zhou Lei

INDIGENOUS UNDERSTANDING OF MELTING GLACIERS

In the course of my research I have discovered starkly different views on development and environmental protection. Specifically, I have been struck that while the development in western China is claimed as being sensitive to environmental concerns—such as "construction of ecological civilization" (*shengtai wenming jianshe*)—ultimately the top priority of the government is to promote economic growth and reduce poverty in a region that lags far behind eastern China in per capita income and standard of living. Most of the indigenous communities I met with see the world through a strong religious lens that prioritizes the protection of nature for reasons that differ from the government planners, domestic business investors, and even environmental groups.

Specifically, while Chinese officials, environmentalists, and scientists are advocating that the area be designated an environmental protection zone (*baohuqu*) or a national park, I heard from many local Tibetans that they would prefer the concept of Circumambulation Protection Zone. Such a designation acknowledges would prioritize the needs of religious pilgrims to use the area.

In the eyes of some Tibetans, the propaganda and policies promoting environmental protection, science, and eco-friendly education are seen as sinister rather than beneficial to the protection of their local environment, which they value not as economic or biodiversity resource, but as something sacred. Conversely, calls by the Tibetan or other minority communities that their mountains or lakes are sacred and should not be developed are usually viewed with suspicion by the government and industry in China. This is a major area of not just miscommunication but no communication.

One Tibetan informant told me that he made a documentary about Tibetan attitudes of life during one circumambulation. He filmed how the circumambulators saved the life of one frog in a puddle, anticipated their afterlife on a mountain top, strewing clothes, bowls, tsamba, and jewelry in honor of ancestors and deities. "I want to stress that Tibetan people's concern about the environment and life is different from you Han people and foreigners," noted one Tibetan informant. Repeatedly, they expressed their anger at the encroachment of consumerism and money-rules-all mentality from lowland Han societies. Strikingly, when my lama informants and pilgrim friends complain about the environmental degradation of sacred mountains and glaciers, they do not turn their discontent into political action. Ultimately it seems that it is, in essence, pure nostalgia of the spiritual place and time that will never com back.

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ENDNOTES

[1] This is a prison designed in a way that allows a guard to observe all of the prisoners without the incarcerated knowing they are being watched.

Zero-Waste Comes to China: The Green Anhui-GAIA Partnership

By Skye Gilbert

One hot, mid-June day in 2009, I enter the office of Green Anhui's Wuhu Ecology Center and smell Zhang Huiying's incredible red bean soup. She has left the rice cooker on to keep it warm for me, but has already abandoned breakfast to begin our day's work. I pour myself a bowl, and walk out onto our office balcony before I join Huiying. The smell of smoke fills my nostrils; Anhui farmers are harvesting rapeseed right now and the sky is a dark gray from all the stock burning. Ironic, since we are currently on a scavenger hunt for incinerators. We want to know how many of them exist in Anhui Province and in China. Back at my desk, I eat my red bean soup and browse the Internet for incineration stories. In addition to incineration, articles about illegal dumping, China's inadequate waste infrastructure and growing consumption flood my search results. Overwhelmed by the magnitude and variety of waste disposal problems in China, I reread the website of Green Anhui's newest international partner, the Global Anti-Incinerator Alliance (GAIA). Fortunately, since its founding, GAIA has expanded its knowledge base and expertise to include all aspects of sustainable waste management systems and obstacles towards implementing them. I begin writing a report on China's waste situation, hoping GAIA's experience and Green Anhui's local knowledge can improve a terrifying situation.

CHINA'S CHALLENGES: A CLOSER LOOK

Disposable chopsticks, double- and triple-wrapped packaged goods, streets lined with potato chip bags, disposable razors, and pill bottles—even the most insulated tourists cannot fail to recognize the enormous volume of waste in China. In 2008, industrial, municipal and agricultural waste in China totaled 8 billion tons. The country's problems are multifaceted and, as with everything else, unique to China. While the per capita waste generation is low relative to other countries, the infrastructure for waste collection and management is inadequate, in some regions resulting in over 40 percent of waste being illegally or improperly disposed. The negative impact of China's waste has global consequences, from mercury poisoning in North America's rivers to the spread of viruses. Leaking landfill sites, inefficient coal-burning plants, factories that ignore municipal pollution laws, illegally imported toxic waste, and piles of abandoned garbage are the main culprits. What about incineration? Fortunately, burning garbage has been slower to take hold in China, where so much municipal waste is wet and organic that burning is often impractical and expensive. Unfortunately, waste incineration has received large investments in recent years and now comprises over 5 percent of municipal solid waste disposal, compared to 1.7 percent in 2000, leading to increasing health concerns locally and media attention internationally.

GAIA'S ACTIVITIES IN ASIA

GAIA has a strong presence in the Asia-Pacific region, with over 200 partnerships with nonprofits in 20 countries. These partnership organizations have already been met with some success. In the Philippines, the nonprofit

WISHCRAFT has successfully implemented a Cash-for-Trash scholarship program, where students collect recyclable waste for money that they use to purchase school supplies or pay tuition fees. South Korea has recently implemented a volume-based waste collection fee system, where citizens must pay based on how much waste they produce (recycling is free). A Malaysian partner successfully canceled plans to build an incinerator in Selangor. In each of these countries, GAIA relies on nonprofit partnerships to localize their extensive knowledge base and apply it to specialized regional issues.

THE GREEN ANHUI-GAIA PARTNERSHIP

GAIA had wanted to work in mainland China for many years, but it was constrained by the language barrier and limited financial resources. In 2009, Pacific Environment's Wen Bo came to the rescue by helping GAIA understand the political, social and economic role of nonprofits in China. After studying Chinese environmental NGOs and the environment in which they operate, GAIA determined that Anhui Province's lone environmental organization, Green Anhui, would be an excellent partner. As Manny Calonzo of GAIA explained to me in an interview:

Green Anhui has a considerable number of experts and volunteers and has been implementing various programs since it was established in 2003. More importantly, Green Anhui is working on issues that are directly of interest and concern to GAIA and its members, such as chemical pollution and environmental health.

With the right focus, a strong staff, active programs and smaller budget requirements than Beijing- or Shanghai-based nonprofits, Green Anhui was a natural choice for China's nexus of zero-waste advocacy. When asked how Green Anhui differs from some of GAIA's other Asian partners, Manny stressed the youth of the organization and its members, but confirmed that like most of GAIA's partners, Green Anhui has a clear mission and a passionate devotion to its activities.

In China, Green Anhui's initial focus is on building awareness through local education programs and the China National Waste Information Network, a website that went online in late 2009 that will provide a national forum for academics, professionals and activists interested in sharing information on China's waste issues. Fortunately, Green Anhui will not have to "start from scratch" as many communities in China have implemented recycling and waste advocacy initiatives. Rather, Green Anhui's programs will formalize and expand on what has already begun organically. In addition to these two primary projects, Wuhu Ecology Center has set up a team of local volunteers to translate GAIA's documents into Mandarin, supporting translation efforts initiated in Taiwan and Hong Kong. In 2009, Zhang Huiying, Green Anhui's GAIA contact, completed a month of training in the Philippines, the location of GAIA's Secretariat and one of the more progressive countries in terms of waste management. She published an article in the fall of 2009 in China Development Brief about community waste management and how successes in the Philippines could be adapted to Chinese communities. Huiying is very aware of how challenging waste management activism will be in China. She is particularly focused on how to make the initial education initiative result in a functional waste classification system. She notes that:

There is a lot of construction in China, so area for composting is not easy to find. We'll have to do some environmental education [for] people don't know where to put their waste. It will take a long time to find cooperative groups. I know of three [grassroots] groups that are already working on similar projects, doing simple waste classification. But even they mixed up some waste.

In addition to initiating activities, Huiying has spent significant time in the past month reaching out to Chinese nonprofits doing similar work and writing grant proposals to support future projects. On the fundraising side, Huiying is applying for a grant from Frontline to begin an education program and waste classification system in a 1000-household community in Hefei City. GAIA's Gigi Cruz recently met with the Social Science Research Council's Beijing office to discuss possible funding for future projects. Both recently participated in the CAN Regional Training on Climate Change in China, along with Green Anhui Director Zhou Xiang. Huiying and Gigi Cruz did presentations and discussed zero-waste strategies with 30 participants in a special, daylong mini-workshop called Zero-Waste Zero-Warming. Two Chinese NGOs—Xiamen Green Cross and Shanghai's Green Oasis—presented their already-initiated efforts at waste classification. This was GAIA's China-focused conference.

In the few months since I left Green Anhui, the Green Anhui-GAIA partnership has made enormous progress. Huiying's days are no longer filled with scouring the Internet for information over red bean soup. Instead, she is actively educating others about successful campaigns implemented in other Asian countries, China's waste issues, and zero-waste strategies. When she is not giving talks, she is coordinating the activities of a committed and growing volunteer base, or seeking out local communities that may face severe waste pollution issues and would welcome an advocate. With its quick progress and well-informed strategy, the Green Anhui-GAIA partnership will be an interesting one to watch in the coming year. But do not hold your breath for radical change. As Manny Calonzo says:

The change in attitude, value and practice that we seek will certainly not happen overnight. But through painstaking effort to share information and foster meaningful relationships with the Chinese people, we surely will get there.

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金 木 水 火 土

FEATURE BOX

Anatomy of a Partnership: Benefits of U.S.-China Private Sector Cooperation in the Power Sector

By Claire Casey and John Juech

Overview of a Garten Rothkopf study commissioned by Duke Energy that was presented at a China Environment Forum meeting on October 6, 2010

Accounting for 42 percent of global energy demand, together the United States and China can lead the world in addressing energy and the deployment of new power generation technologies. Both countries face a similar set of challenges including the need for trillions of dollars in power infrastructure investment over the next two decades while reducing their CO2 emissions and diminishing their dependence on coal-based power generation.

Collaboration in the power sector, unlike other sectors, offers potential for mutual economic benefit and job creation through the development of clean energy technologies. Power generation, after all, is a domestically developed good. However, little work has been done to date to quantify this potential. In order to better understand how this relationship would impact the United States and China and the range of potential benefits, Garten Rothkopf conducted a study, Anatomy of a Partnership: Benefits of U.S.-China Private Sector Cooperation in the Power Sector. In this groundbreaking report, Garten Rothkopf mapped the supply chain of four model clean energy projects, using employment projections based on actual budgeted estimates and supply chain dynamics based on current perspectives and purchasing decisions.

However, and it is vital to note this, all of these potential benefits depend on a level playing field between the two countries, a fair and balanced currency and trade regime, and a set of rules that are clear and that do not inappropriately disadvantage any actors on either side. Also, this particular study does not focus on or draw conclusions about the broad U.S.-China relationship overall, but rather focuses very narrowly on specific prospects for cooperation in the power sector.

The report focused on four power technologies identified as having potential for advancement through U.S.-China technical cooperation: (1) IGCC and carbon capture, (2) solar PV manufacturing and installation, (3) supercritical coal, and (4) smart grid development. Across all four, Garten Rothkopf found potential for shared benefits. From R&D, to manufacturing, construction and installation and operations and maintenance, there is the potential for tens of thousands of direct and in-direct jobs, with 66-95 percent created in the project's home market, even in those cases where the capital equipment was imported.

SHARED CHALLENGES

Though China recently passed the United States in total CO_2 emissions, the United States still leads the world in per capita emissions, with the average individual responsible for 19 tons of CO_2 each year—a full 7 tons more than the

next largest emitter, Russia. The two countries face enormous power infrastructure investment challenges as well. In order to account for growing demand, China is projected to spend $3.1 trillion cumulatively on electricity to 2030. The United States, faced with the need to update its aging infrastructure, is expected to spend $2.1 trillion. Further, the United States and China still largely rely on coal as a cheap and reliable source of energy. It is estimated that coal will account for 48 percent of U.S. power generation by 2030. In China, coal use is expected to grow an average of 3.5 percent per year for the next twenty years, making the country 82 percent dependent on the fossil fuel for power generation in 2030.

Pressure from both national and state governments is also creating a similar investment environment within the two economies. In China, the national government has committed to producing 15 percent of its electricity from renewable sources by 2020. It also announced the goal of reducing its carbon intensity by 45 percent from 2005 levels in that same period, and is expected to embrace further renewable energy developments in its next five-year plan. U.S. states have taken the lead in crafting renewable energy mandates and tax incentives to attract renewable investments. The U.S. House of Representatives has passed a renewable energy standard and it remains possible, though not likely, that the U.S. Senate will take it up before the end of the year.

Shared Opportunities

In the midst of these challenges, the two countries share unrealized economic potential. Across the four key prospective areas of collaboration (IGCC and carbon capture, solar PV manufacturing and installation, clean coal technologies, and smart grid development) the report found opportunities for both countries to increase access to growing markets, accelerate development of these clean energy technologies, and create tens of thousands of new jobs. The report also found that some U.S. and Chinese energy firms are already taking advantage of opportunities in solar PV, wind, and battery production. These companies are benefiting from U.S. and Chinese incentives to expand their operations, create new jobs, and establish global supply chains to reduce costs, illustrating the tangible benefits of collaboration.

PROJECT MODELS

To understand the benefits of collaboration across four different power generating sources, Garten Rothkopf conducted over 30 interviews with leading power and technology industry executives and academics, with a view to acquiring employment projections based on actual budgeted estimates and an understanding of the supply chain based on existing projects and purchasing decisions. Though each technology offers unique opportunities, there are broad trends that run throughout each study model. The advantages include acceleration of energy technologies, expanded access to new markets, and rapid growth of emerging industries. However, the most common feature is that regardless of project location, these collaborations create jobs in both markets, with the majority created in the country where the power generation is taking place. Further, across all the projects, if we think of job creation in terms of wage creation, the United States economy greatly benefits from a positive "balance of wages," with quality jobs created that cannot be exported. Below is a summary of findings in each of the technology areas.

IGCC with Carbon Capture. Collaboration in this area would produce 3.25 GW of additional capacity through an agreement to construct five 650 MW IGCC plants with carbon capture in China. The project would lead to $5 billion in total investment between participants and government incentives. China would acquire critical technology transfer and know-how, while the United States would gain

the opportunity to smooth the learning curve and later apply this knowledge to the U.S. market. This serves a major need in the United States, as there is the potential for 56 new IGCC plants in the country by 2030, driven by large increases in power generation capacity and a need for cleaner and more efficient generation.

Direct Jobs Created: *US*: 19,715 jobs at $23 - $40/hour / *China:* 35, 053 jobs at $2.70 - $3.05/hr.
Total Jobs Created: *US:* 40, 950 jobs at $23 - $40/hour / *China:* 136,636 jobs at $2.70 - $3.05/hr.

Utility-Scale Solar PV. U.S.-China cooperation with solar PV technology has the potential to lead to 400 MWs of additional capacity through an agreement to construct utility-scale solar power plants in the United States. A total of $1 billion in investment would be required between participants and government incentives. Under our projections, annual U.S. solar PV installations are to increase to 1515MW by 2013, creating a large market for solar PV cells (assumed to be from China for the purposes of this study) and installation and maintenance services in the United States.

Direct Jobs Created: *US:* 9,880 jobs at $15 - $41/hour / *China:* 4,820 jobs at $1.50 - $ 3.00/hr.
Total Jobs Created: *US:* 18,772 jobs at $15 - $41/hr / *China:* 18,798 jobs at $1.50 - $ 3.00/hr.

Clean Coal Technologies. Collaboration between the two countries on clean coal technologies would lead to $5 billion in total investment between participants and government incentives, and six 1,000 MW ultra supercritical plants (potentially with carbon capture). China would benefit by gaining heat resistant materials technology, while U.S.-based firms expand exports and flatten the learning curve, reducing costs of constructing new plants. There is a huge market potential for clean coal technology given additional electrical capacity; as many as 377 clean coal plants in China and 36 in the United States by 2030 may be needed.

Direct Jobs Created: *US:* 23,430 jobs at $23 – 51/ hour / *China:* 78,810 jobs $1.50 - $3.05/hr.
Total Jobs Created: *US:* 44,517 jobs at $23 – 51/hour / *China:* 307,360 jobs at $1.50 - $3.05/hr.

Speakers at the October 6, 2010 CEF meeting *A Roadmap for Economic Growth: U.S.-China Private Sector Cooperation in Power Sector* included (L to R): Duke Energy's CEO Jim Rogers and Vice President and Chief Technology Officer David Mohler; Commerce Secretary Gary Locke; and President of ENN Group North America Sun Yunquan.
Photo Credit: David Hawxhurst.

Smart Grid. Between the United States and China there would be two million meters of smart grid deployed, leading to $1.4 billion total investment between participants and government incentives. Under such collaboration, the United States provides technology and expertise, while China provides meter manufacturing and gains access to a burgeoning U.S. market; as much as $63 billion is needed to implement smart meters nationally in the U.S. over the next 15 years.

Direct Jobs Created: *US:* 3,374 jobs at $20 - $45/hour / *China:* 172 jobs at $1.52 - $2.70 /hr.
Total Jobs Created: *US:* 6,410 jobs at $20 - $45/hour / *China:* 671 jobs at $1.52 - $2.70 /hr.

CONCLUSION

Through access to expanding markets and technology transfers, U.S.-China partnerships in the power sector speed technology development, promote economic growth, and drive local job creation. The generation options and private partnerships profiled in this study indicate that there can be mutual benefits gained from collaborative efforts in power generation and distribution. While economic competition and employment remain very active concerns in the U.S.-China relationship, this study demonstrates that collaboration in clean energy technologies has the potential to not only directly generate jobs for both countries, but provides a foundation for sustained economic growth and further investment opportunities.

Please visit the China Environment Forum Event Summary page to watch the webcast of the meeting where this report was presented. Speakers included Secretary of Commerce Gary Locke, Jim Rogers (CEO of Duke Energy); Sun Yunquan (President of ENN North America); and David Mohler (CTO of Duke Energy).

The full study is available on the Duke Energy website at: http://news.duke-energy.com/2010/10/06/u-s-china-energy-partnership/

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FEATURE BOX

The China Carbon Forum: Enhancing China's Response to Climate Change through Network-building and Stakeholder Dialogue

By Leo Horn-Phathanothai

As the world's largest emitter of greenhouse gases and one of its fastest growing economies, China will be at the crux of global efforts to tackle climate change. It is no surprise, therefore, to find that Beijing is brimming with diplomats, lobbyists, consultants, lawyers, investors, and technologists – including the very best minds in their fields—all sharing a commitment to working with China as it offered a pledge to cut its GHG emission growth at a level unmatched by any other developing economy as it became a signatory of the Copenhagen Accord. The China Carbon Forum's aim is to help organize this potentially tremendous collective resource, and to help the Chinese government make productive and beneficial use of it.

The China Carbon Forum is a not-for-profit organization set up in 2007 to enable constructive dialogue between major stakeholders in the Chinese carbon sector. It aims to enhance the contribution of the international business and non-governmental community to low carbon development in China by: (i) facilitating the sharing of knowledge and expertise between key participants in China's power sector, and; (ii) providing an independent and neutral platform for businesses and NGOs to engage in structured, strategic level dialogues with senior Chinese government decision-makers.

The China Carbon Forum now counts over 350 individuals and 200 firms in its network of low carbon solution providers. It has been particularly active over the past year in conducting structured consultations between business executives, international experts and the top Chinese government climate decision-makers on the topic of clean technology development and diffusion.

BUILDING A PROFESSIONAL NETWORK OF SOLUTION PROVIDERS IN CHINA

China's carbon sector is highly fragmented and made up of a broad array of local, foreign, private, and public players. As an example there are more than 70 local and foreign wind turbine manufacturers (more than the rest of the world put together) competing to supply turbines for China's wind market. With cutthroat competition and a general lack of transparency as to market norms there has been little incentive for information sharing between companies.

Initially, the China Carbon Forum's primary aim was to improve the sharing of information, knowledge and best practices between the various participants in China's carbon sector through the establishment of a professional network of low carbon solution providers within China, and by developing an information and knowledge resource powered by a WIKI-engine that members would contribute to, called the 'WiKiCarbon'.

The China Carbon Forum organizes regular networking and speaking events to build professional communities around key themes, to share authoritative analysis and

views on important issues and developments, and to communicate new knowledge. To date, 16 distinguished policy makers and market shapers have spoken at these networking events, including: Jonathan Pershing, former Director of the Climate Program at the World Resources Institute, and currently Head of the U.S. delegation to UN climate negotiations; Zou Ji, a then) member of the Chinese delegation to UN climate negotiations and adviser to Minister Xie Zhenhua; and Andrew Aldridge, Vice President of Climate Change Capital. The events are usually held in a 300-year-old Manchu Courtyard, providing for a congenial and relaxed atmosphere for discussion and networking.

ENHANCING BUSINESS-TO-GOVERNMENT DIALOGUE ON KEY PUBLIC-PRIVATE THEMES: THE PARTNERSHIP WITH RENMIN UNIVERSITY

As the network evolved it became clear that there was a mismatch between the aims and objectives of Chinese regulators and realities facing foreign and local companies in the market. At the same time there was a clear desire on the part of Chinese regulators to reach out to foreign and local companies in the sector to understand the policy obstacles and better understand what they needed to do to facilitate market development and, in particular, the development of foreign technologies amongst Chinese companies.

The China Carbon Forum has been able to step in to fill this role, rapidly becoming a key conduit for businesses to engage with senior Chinese government decision-makers on climate-related reform. Its identity as a neutral and independent platform with wide representation from across industry and non-governmental organizations gives the China Carbon Forum credibility in the eyes of the Chinese authorities. Furthermore, drawing on

Photo Credits: The China Carbon Forum

Chinese government policy is grounded in an understanding of the interests of these key stakeholders.

For more info about the China Carbon Forum see: www.chinacarbon.info, or contact the General Manager, Xusheng 'Simon' Wan, at: simon@chinacarbon.info.

Leo Horn-Phathanothai is an environment and development professional currently working with the United Nations Development Programme (UNDP) as the technical focal for Africa on climate change. In 2007, Leo co-founded the China Carbon Forum, and led the organization for two years. He remains a director-at-large with the China Carbon Forum. Leo holds degrees from Oxford, Cambridge and Sussex universities. He can be contacted at: leo@horn.net.