China Renewable Energy and Sustainable Development Report

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China's extraordinary economic growth and heavy reliance on increasingly expensive foreign oil, the vast environmental toll that is one of the most apparent costs of China's economic success, persistent rural poverty in China and periodic power shortages all have impressed upon Beijing that renewable energy must be a large part of China's economy if China is to both complete its economic transformation and achieve "energy security".

China is rapidly moving along the path of renewable energy development. By the end of the 11th Five Year Plan period in 2010 renewable energy will account for 10% of China's energy consumption. At the end of the 11th Five Year Plan period China will have approximately 190,000 MW of hydropower generating capacity, 73,000 MW of which will have been constructed during this period. Wind power is growing at a remarkable rate. During the 11th Five Year Plan period China will vastly exceed its own revised objective of having 10,000 MW of wind power capacity by 2010; it is quite possible that China's wind power installations will approach 20,000 MW by 2010. Power generated from bio-mass is also becoming a significant source of renewable energy in China; by the end of 2010 China will have in place 5500 MW of bio-mass power plants. With regard to bio-fuels, China will be producing more than 2 million tpy of bio-ethanol and 200,000 tpy of bio-diesel. Other sources of renewable energy also are growing rapidly in China, including methane gas fueling 40 million households and having a total of 150 million square meters of built space serviced by solar hot water heaters. In the long term China has set an objective of having 30% or more of its total energy requirements satisfied by renewable sources by 2050. China's ambitious growth target for renewable energy production will require an investment of approximately 2 trillion Yuan (~$263 billion U.S.D.) by 2020 alone.

Our goal at the ***China Renewable Energy and Sustainable Development Report*** is to provide authoritative, timely, informative and useful information about the emerging renewable energy and sustainable development sectors in China for global companies who have products and services to sell to or buy from China's rapidly growing renewable energy and sustainable development sectors and other policy makers, NGOs and interested parties. Drawing from original Chinese language materials of Chinese companies, industry associations, central and local government agencies and non-governmental organizations, the ***China Renewable Energy and Sustainable Development Report*** will cover developments in China's solar, wind, bio-fuel, bio-mass, small hydroelectric and other renewable energy sectors, including regular features on investment, growth, local and

national laws and regulations, leading Chinese companies, industry meetings, tradeshows, exhibitions and conferences and business opportunities.

An interactive map of China's renewable energy projects is now available on China Strategies' website. China Strategies' website also now has a map of significant companies/projects in China in the solar energy sector. To view the *China Renewable Energy Interactive Map* and the *China Solar Map*, visit www.chinastrategiesllc.com, click on the tab for "China's Renewable Energy Industry" and follow the directions to register and receive access. We invite our readers to submit Chinese renewable energy projects to be included on the *China Renewable Energy Interactive Map* and the *China Solar Map*. Please send all submissions to lou@chinastrategiesllc.com.

The *China Renewable Energy Interactive Map* and the *China Solar Map* were developed with the assistance of Ryan Hodum, an environmental and renewable energy professional who recently completed a Master of Arts in Global Environmental Policy from American University in Washington, D.C. with a focus on renewable energy utilization in China.

For more information about subscribing to the ***China Renewable Energy and Sustainable Development Report***, please contact us at lou@chinastrategiesllc.com. For more information about how China Strategies, LLC can assist your firm in its China renewable energy sector projects, please visit www.chinastrategiesllc.com and contact us at lou@chinastrategiesllc.com.

China's Solar Industry

The recent decline in oil prices worldwide has not lessened the worry in China of an impending exhaustion of petrochemical resources nor the determination to bring about the next generation of sources of power. At a recent renewable energy conference in Shenzhen, Shi Dinghuan, the Chairman of the China Renewable Energy Association pointed out that in the past century or so, there were three significant transitions in how people worldwide obtained power, including the primary reliance on firewood, coal and oil and natural gas. We are now in an era of transition to renewable energy sources for power generation, which will not be thwarted by temporary declines in the price of oil and gas. Increasingly the Chinese are speaking about the potential for solar power to play an increasingly important role in the mix of new sources of energy that China will adopt in its effort to transition from coal, natural gas and oil as the primary sources of power. The project that was initiated in 2002 to develop a total of 15,000 MW through the construction of 721 solar PV and wind locations in seven western provinces, not only supplied power to 1.3 million persons in western China, but also was the impetus that gave rise to the Chinese PV industry and such leading companies as Suntech of Wuxi, Jiangsu Province. The {Medium and Long Term Development Plan for Renewable Energy} which was adopted by the National Development and Reform Commission, makes a commitment to further development of solar PV particularly in the deserts of China's

northwest; the goal is for there to be 200 MW of solar PV installed in China's deserts by 2020. In 2006, as part of the "863" Plan Beijing also began supporting the solar thermal to generate heat and proposed to have a 1 MW test power station up at Beijing's Badaling. The Chinese emphasize the enormous potential of the nearly 2.5 million square kilometers of area that are desert or near desert conditions for solar power development. According to a 2007 study conducted by the Geologic Sciences and Resources Institute of the Chinese Academy of Sciences, if China were to use only 1% of marginal desert lands in the Qinghai/Tibet plateau and existing solar technologies, China could construct solar power stations having an output of 2.5 million MT; the potential for power generation would be equivalent to 50 Three Gorges Dams and would basically be able to satisfy all of Chinese society's power needs in 2020. Of course such a system requires a network of power transmission from the far northwest of China, where the power would be generated, to the central and coastal regions of China where power is mostly consumed. As the technological and storage issues with respect to transmission of power are resolved, solar power generation may well become China's preferred source of power generation. China already is the world's largest producer of solar cells with the capacity to produce more than 1000 MW/year of solar cells; more than 98% of the solar cells that China's solar PV industry produces, however, are sold overseas and only 20 MW/year are deployed domestically. The failure of solar PV to have greater penetration in China is due to the fact that the cost of solar PV to generate power is 10x that of coal and policies by the central government to encourage the use of solar PV isn't yet in place; among other policy based initiatives that await implementation is a on-grid price that reflects the cost of production and transportation plus a reasonable profit for both the solar PV power station and the transmission companies. According to Chairman Shi Dinghuan, the NDRC is now working on a plan that would provide a 4 Yuan/kW subsidy for the desert-based solar PV power stations. According to a scientist at MIT China can support the solar PV industry by instituting compulsory grid connection of solar power coupled with State purchases of power generated from solar PV stations and a price subsidy. The benefits of solar thermal power generation include that the price is almost at parity with coal and "storage" allows for the 24/7 availability of power.

Beginning in November 2008 in Hebei Province, new construction of residential buildings of 12 stories or less must include the installation of an integrated solar hot water heater system. This new requirement is contained in the {Notice Concerning Implementing Integrated Technologies for Solar Power Hot Water Systems and Civilian Construction} promulgated by the Hebei Province Office of Construction. The new regulations also apply to hospitals, schools, hotels, swimming pools and other public amenities; they are also applicable to any other construction project undertaken with the investment of any government agency. A project can obtain an exemption if the developer can prove that the installation of a building integrated hot water system is not feasible, but for those who do not obtain an exemption and do not provide for installation of a solar hot water system, the local administrative body in charge of approving blueprints will not approve their blueprints and the administrative body for issuing construction permits will not issue the necessary permits, etc. As the design of new construction must include

design of an integrated solar hot water heating system, if these design change in the course of construction the revised designs must be approved by the administrative agency in charge of approving the blueprints for the original design. If the construction proceeds without an integrated solar hot water heating system or a solar hot water heating system that is modified from the original approved design, then the whole project will not be approved for occupancy. In the past the ad hoc installation of solar hot water heaters have created a chaotic and visually unpleasant result as individual homeowners (apartment dwellers) each installed their own system. These new regulations are designed to make the installation of solar hot water systems less visually unpleasant, more comprehensive and more cost effective, while continuing to show the benefits of energy conservation. The estimated cost to an average household that uses 2 MT of hot water/month is approximately 20 Yuan/month, much less than the estimated 45 Yuan/month cost for conventional hot water heating.

On October 23, 2008 the Hainan Province Development and Reform Commission, the Hainan Province Office of Construction and the Hainan Province Office of Science and Technology jointly issued {Implementing Opinion on Promoting Scale Utilization of Solar Power in Hainan Province}. The Opinion designates the cities of Haikou and Sannya as trial cities for the implementation of scale development of solar power, provides for the development of a Hainan Province Solar Power Research and Development Center and instructs various departments of provincial government (including the Office of Finance, the Development and Reform Commission, the Office of Construction, the Bureau of Land Taxation and the State Bureau of Taxation) to research and formulate policies within their functional areas to help give impetus to the scale development of solar power in Hainan Province; these incentives likely will include fiscal subsidies, reductions and exemptions from taxes to further the efforts of research, development and manufacture of solar energy infrastructure and manufacturing capabilities. One such example of how the abundant sun in Hainan Province coupled with tax and other incentives already is bringing development in this area to Hainan Province is the emerging cooperation between Hainan Province and Wuxi Suntech to develop a solar PV power plant in Hainan.

Solar cell phone charging stations are making cell phones a green high tech product. With a solar cell phone charging station, wherever there is sun cell phones can be used, thus allowing the wider proliferation of cell phones. According to one analysis by 2013 there will be at least 335,000 cell phone charging stations worldwide.

China's Wind Power Industry

In mid-October 2008 the China Huaneng Group International Power Development Co. entered into an agreement with the government of the city of Tongliao (located in the northeast region of Inner Mongolia) to develop a 5 billion Yuan 500 MW wind farm in Tongliao city. The project will be divided into phases; in the first phase a

total of 50 MWs will be constructed at a cost of 500 million Yuan. Construction will begin at the end of 2009 and will be completed by 2010. Including this most recent project, the China Huaneng Group International Power Development Co. has a total of 1000 MW of wind power planned for the Tongliao city area of Inner Mongolia alone.

On October 28, 2008 the first wind turbine of Jiangxi Province's first wind farm was successfully connected to the Jiangxi Power Grid and began transmitting power. The Jishanhu Wind Power project, which is located in Duchang County, was constructed at a cost of 437 million Yuan. The 30 MW wind farm will generate 55 million kwh/year.

The Second Phase wind farm project at Gansu Province Jiuquan Yumen has obtained approval to proceed with construction.

With more than 30 manufacturers, the wind power manufacturing industry is growing in Wuxi, Jiangsu Province. According to a plan for the development of the Wuxi wind power manufacturing industry, the city's goal is to develop an industry that includes manufacturing of 2000 MW of whole wind turbines by 2012 and having an output value of 50 billion Yuan.

Studies show that technologically feasible potential coastal wind power development in Fujian Province is approximately 6000 MW and offshore wind potential is 3-4 times that amount. Fujian Province plans to have 600 MW of wind power operating by 2010. 00

China's BioFuel and Bio-Mass Industries

In mid October 2008 the Datang Anqing Bio-Mass Power Plant Project, Anhui Province's first biomass project, was completed and went on-line. Construction on the project, which was developed by the Anhui branch of the Datang Group, the Anhui Jinli Power Group, the Anqingheng River Group and the Anhui Province Nongkenwan River Farm, got underway in June 2007; by July and September of 2008 the two generators had been installed and were operating. The total investment in the project is 274 million Yuan and when fully operational the Anqing Bio-Mass Power Plant will produce 195 million kwh/year of electric power. The feedstock for the power plant will be approximately 220,000 tpy of agricultural waste, which feedstock will supplement farmer's income by a total of 60 million Yuan/year. In addition to making good use of 210,000 tpy of agricultural waste, which otherwise would have been discarded, the project will bring about the avoidance of burning approximately 100,000 tpy of coal (to produce a like amount of power), which in turn will allow for the avoidance of approximately 80,000 tpy of carbon dioxide emissions.

According to the {Mid to Long Term Development Plan for Renewable Energy} by 2010 China is to add an additional 2 million tpy of non-grain fuel ethanol and be producing a total of 3 million tpy of non-grain fuel ethanol; by 2020 the amount of non-

grain fuel ethanol that China should be producing is 10 million tpy. According to Vice Chairman of the Renewable Energy Development Center of the NDRC's Research Institute, there now are four companies that are producing fuel ethanol, but the production from these companies is just now beginning. In this realm COFCO (0606.HK), the large diversified conglomerate whose businesses include grain trading, beer manufacturing and real estate development, has a distinct advantage. According to Yue Guojun, a spokesperson for COFCO, in 2007 the total amount of fuel ethanol that was produced was 1.32 million MT and of that total COFCO's output was 620,000 MT. In 2008 COFCO went on-line with a fuel ethanol refinery in Guangxi Province with a capacity of 200,000 tpy, so COFCO's total capacity at present is 820,000 tpy of fuel ethanol. In all COFCO runs three fuel ethanol refineries and has an ownership interest in a fourth refinery. Because of the change in policy respecting using grains to produce ethanol (which policy went into effect in September 2007), there is a hiatus in developing grain ethanol refineries. Going forward COFCO has entered into agreements with the governments of Inner Mongolia, Hebei, Hubei and Shandong Provinces to invest a total of 5 billion Yuan to development an additional 750,000 tpy of fuel ethanol refining capacity. The Guangxi refinery--the Beihai Fuel Ethanol Plant, which cost a total of 1.3 billion Yuan to build, is using tapioca as its feedstock and is now China's only fuel ethanol plant that is using a non-grain feedstock. This is the second stage of fuel ethanol development--using non-grain feedstock to produce ethanol. For a variety of reasons, including that tapioca can only be cultivated in tropical regions (which for China is primarily Guangxi Province) and because the price of tapioca has risen rapidly (the price of tapioca was only 1/10th today's price when COFCO began construction of its Guangxi fuel ethanol refinery), there is only limited additional value that can be realized from using tapioca as a feedstock and to achieve the goal of the central government with respect to capacity growth of fuel ethanol, other feedstock will also have to be employed. COFCO has had a research project with BP to development fuel ethanol based on sweet sorghum, but that feedstock is not yet ready for commercialization. According to COFCO the third stage of fuel ethanol development will be based on cellulosic ethanol; in 2006 an experimental cellulosic ethanol plant (having capacity of just 500 MT) was developed by COFCO with Denmark's Novozymes Corp.

China is the world's third largest producer of fuel ethanol (behind only the U.S. and Brazil), producing approximately 1 billion gallons/year.

Legal and Policy Developments Related to Renewable Energy Development

The National Development and Reform Commission has created the National Energy Conservation Center. The principal responsibilities of the National Energy Conservation Center include researching energy conservation policies, laws, regulations and administrative systems, conducting energy conservation evaluations of fixed asset investment projects, organizing the dissemination of energy conservation technology, products and new systems and undertaking the launch of energy conservation

communications, training, information dispersal and consulting services and international exchanges and cooperation.

On October 28, 2008 the Ministry of Finance announced the promulgation of the *{Provisional Measures for the Administration of a Secondary Energy Conserving Building Materials Financial Subsidies Fund},* which sets up a special fund to support the manufacture and adoption of building materials from waste building materials and other scrap materials. One of the objectives of these provisional measures is to incentivize the proper handling and reuse of the building waste generated from the May 2008 Wenchuan, Sichuan Province earthquake. The Provincial Measures, which took effect on October 10, 2008, provide for discounted interest on loans for enterprises to expand capacity to produce secondary energy conserving building materials; for the promotion and use of such building materials; and for research into and formulation of corresponding technical standards. The discounted interest rate on loans under the provisional measures is tied to interest rates established by the People's Bank of China. Interest rate discounts are for no longer than 3 years; if the loan is for longer than 3 years, the discounted interest will apply for 3 years.

China and CDM

As of October 24, 2008 the NDRC had approved a total of 737 CDM projects. Of that total there were 265 Chinese CDM projects that had been registered with the Executive Board of the UNFCCC. The number of Chinese registered CDM projects is second only to CDM projects that India has registered. As of April 2008 the amount of carbon reductions attributable to then registered Chinese CDM projects totaled 100 million tpy of carbon dioxide; this amount accounted for 51% of worldwide carbon dioxide emissions reductions related to CDM projects. According to the World Bank, between 2008-2012 Chinese carbon trading will account for approximately 200 million tpy of carbon dioxide emissions reductions

In early October 2008 the Agriculture Committee of the city of Chongqing entered into the world's first methane gas development CDM project agreement with a Japanese company that specializes in worldwide carbon trading. According to the agreement, the Shuangli Co. of Japan will invest 700 million Yuan over the next five years to develop methane gas pools for 500,000 households. The project will begin with the expenditure of more than 17 million Yuan to build a total of methane pools for 13,750 households. At present the city of Chongqing already has 860,000 households using methane gas.

The bankruptcy of Lehman Brothers has raised concerns about a portion of the Chinese CDM market where that company is invested. Prior to its bankruptcy, Lehman Brothers was active in the CDM market, having approximately 15 million MT of CER credits worldwide; of that total approximately 2/3rds originated in China. With the bankruptcy, Lehman Brothers closed its carbon emissions trading department. The CER credits acquired by U.S. investment banks typically are resold to European companies, as

the U.S. is not a signatory to the Kyoto Protocol. As recently as July 2008 Lehman Brothers entered into CER credit agreements with respect to the Jiangsu Province State Power Taizhou Chaochao Linjie Power Plant project and the Zhejiang State Power Beicang Chaochao Linjie Power Plant project; over the next five years Lehman Brothers was to purchase carbon reduction amounts from these two company's coal-fired power plants. Other investment banks, including Merrill Lynch, Goldman Sachs and Morgan Stanley, are also invested in Chinese CDM projects.

China's Energy Production and Consumption

In 2007 China's renewable energy sector produced 220 million MT of coal equivalent power accounting for 8.5% of non-renewable power production in China and well on the way towards achieving the objective of having 10% of power production in China in 2010 being renewable energy. As of the end of 2007 installed capacity of hydropower, wind, biomass, methane, was, respectively, 145,000 MW, 6000 MW, 2000 MW and more than 1 billion square meters.

According to a report issued by the State Statistical Bureau in late October 2008, the total amount of China's energy production in 2007 was 2.35 billion MT of coal equivalents, 2.8 times as great as total energy production in 1978; this averages growth in energy production of 4.7%/year for that period. China is now the second largest producer of energy of any country in the world (after the U.S.). In 2007 China produced a total of 2.526 billion MT of coal, the most of any country in the world and 3.1 times the level of coal production in 1978. As of the end of 2007 China's capacity to produce electricity totaled 718,000 MW. 11.6 times greater than China's capacity to produce electricity in 1978; this averages growth in electricity production over that period of time of 9.1%/year. In 2007 China produced a total of 3.2816 trillion kwh of electricity, 11.8 times the electricity production in 1978; this averages growth in electricity production over that period of 9.2%/year. The growth in alternative energy production from 1978-2007 also has been dramatic; China produced 3.1% of its energy from renewable energy sources (wind, solar, hydropower, etc.) in 1978 and is now producing ~8.2% of its energy from renewable energy sources.

Though China's coal industry was opened up relatively early, enabling it to grow rapidly, production became widely dispersed, resulting in an increasingly low concentration of productive capacity. The proliferation of small coal mines has resulted in a waste of resources, environmental degradation and frequent mine accidents, among other problems. The *{Decision On Several Issues Regarding Perfecting the Socialist Market Economic System}* that was passed at the Third Meeting of the Sixteenth National People's Congress made clear that Beijing would further use state capital to invest in important industries that had an impact on state security and the health of the national economy. The energy sector is clearly one such industry that fits those criteria. In this regard Beijing rejects completely relying on the "invisible hand". One of the reasons why there has been tightness in energy supplies is that the pricing of energy in China has been irrational; this

in turn has lead to increased demand and waste and has resulted in producers reducing investment in new energy capacity development.

Though the absolute amount of energy production in China is large the per capita energy consumption is vastly less than modern standards; China's per capita use of energy is approximately 80% of the world's average per capita consumption of energy and only ½ to 17th of per capita energy consumption of the developed world. Because of this in the foreseeable future China's energy consumption will continue to grow.

Developments in Energy Conservation and Environmental Protection in China

Recently the President of Qinghua University spoke at the 4th Environment and Development China (International) Conference about the continuing issues that confront the effort to bring about greater energy conservation and pollution reduction. These issues include 1) the "imbalances" in China's industrial structures, which continue to emphasize growth in the high energy consumption parts of China's economy; 2) that the energy structure in China is not conducive to energy conservation; 3) that energy conservation and pollution reduction technologies are not particularly advanced in China; and that 4) there is an inadequate policy formulation, evaluation and administrative system in China with respect to energy conservation and pollution reduction. President Gu of Qinghua University in his talk elaborated on these four issues that are obstacles to the goal of achieving energy conservation and pollution reduction. Among other things, President Gu pointed out that from 2001-2006 the growth rate of heavy industry in China averaged 16%, higher than the growth in industrial value-added in China; in the first half of 2007 value added growth for heavy industry was 19.5%, higher than the domestic industrial value added, which was 18.5% in that same period. The industries that are large energy consumers include the steel, non-ferrous metals and power industries. The difficulty is compounded if one considers the effect on employment on the closing of capacity in such industries. There has been progress toward energy conservation in China; per unit energy consumption in the first half of 2008 was 2.88% lower than the first half of 2007. China also is confronted with an energy infrastructure that is extremely dependent on burning coal. China's consumption of energy is expected to double by 2030, yet in that time period many believe that the relative mix of energy inputs will not have changed substantially. As a consequence, as the carbon emissions of industrialized nations fall, China's emissions are expected to continue to increase.

Wang Shaohua, the Chief of the Taxation Department of the Ministry of Finance, recently indicated that the Ministry of Finance plans to enact or further implement a series of taxes to address the serious ecological and environmental protection situation that China faces. These taxes include an environmental protection tax, a resources tax and an oil tax. In addition, the scope of the consumption tax also will be expanded to include coal, oil and other non-renewable sources of energy. The overall goal is to "greenify" the tax system. Mr. Wang said that there is no "timetable" for putting into place an environmental protection tax and that they were in the process of researching the

parameters of such a tax. Wang Shaohua also said that in recent years, as China has promoted clean manufacturing and clean consumption, Beijing has put in place more than 30 preferential tax policies, principally relating to the income, resources and land taxes.

On October 30, 2008 three Chinese companies became the first Chinese companies to become members of the Climate Group, the preeminent NGO established by former Prime Minister Tony Blair and others, whose mission is to devise plans address climate change; those three companies are China Mobile Group, Far East Air Conditioner Co., Ltd. and Shangde Power Joint Stock Co., Ltd. Wu Changhua, the general manager of the Climate Group (China) praised China Mobile Group has having an exemplary low carbon consciousness, whose actions in energy conservation and emissions reductions vastly exceed most Chinese companies. Ms. Wu also indicated that it was unlikely that there would be more than 25 companies that had become members of the Climate Group by 2010 because the Climate Group must first qualify the company in terms of their efforts to make themselves into a low carbon company, before offering membership.

The Carbon Disclosure Project (CDP) is an independent not-for-profit organization that acts as an intermediary between shareholders and corporations on all climate change related issues, providing primary climate change data from the world's largest corporations, to the global market place. The data is obtained from responses to CDP's annual Information Request, sent on behalf of institutional investors and purchasing organizations. The record of disclosure by Chinese companies is weak according to a report of the CDP's initial request of 100 "test case" companies, which report was issued on October 24, 2008. Of the 100 surveys issued by the CDP to Chinese companies, there were only 5 public companies that directly responded to the survey; 20 companies provided partial answers; 58 didn't clearly respond and 17 companies refused to participate. These 100 companies who were asked to participate in the CDP survey included a large proportion of Chinese companies that had gone public on foreign stock exchanges; these companies are in the steel, oil, natural gas, automotive, building materials and finance industries. The five companies that directly responded to the survey were the China Bank of Industry and Commerce; Shenhua Energy; Great Wall Automotive; Huaxing Cement and Foxconn Corp. Among those that didn't directly respond to CDP's survey were China National Petroleum Corp., Sinopec,China Mobile, China Telecomm, China Life Insurance Co and China Coal Energy, etc., etc. The rate of response to the CDP survey by Chinese companies was the lowest in the world. By comparison U.S. companies' rate of response to the CDP survey was 82% and the rate of response to the CDP survey by European companies was 83%; even the Asian Fortune 500 companies' rate of response was 50%. The reasons for the abysmal rate of response by Chinese companies range from their unfamiliarity with CDP to the lack of systems within their companies to collect the data that the CDP survey requested. The companies also are largely unfamiliar with the Greenhouse Gas Protocol that the CDP uses.