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BY KATIE HOWE

The Era *of* Greentech

Green technology is poised to transform the way we consume the earth's diminishing supply of natural resources and how we develop our businesses. China is set to become a global market leader in the growth of "greentech," and its collaboration with the U.S. will set the direction for the way greentech is applied around the world.

The sustainability of human development, especially how the growth and development of one generation impacts the next, has emerged as a major question as the world continues to industrialize. Of particular concern is the state of the natural resources that determine quality of life – land, water, vegetation and the air we breathe – and how they are being left to the next generation.

The current pace and form of development cannot continue indefinitely into the future without decimating natural resources and jeopardizing the ability of future generations to fulfill their needs. Consequently, finding a way for sustainable development becomes crucial to continuing the current pace of progress. Green technology, or greentech, is one of the sectors that has emerged as an increasingly accepted solution.

Greentech is considered to be innovative technology and practices that are used for the sustainable production of energy, manufacturing, transportation, agriculture and construction. It also encompasses the responsible use of renewable resources and related products and services, such as water treatment, recycling and waste management. All greentech practices aim to reduce the use of non-renewable resources and minimize environmental impact. The environmental impact of development becomes more apparent every day, and even as the world economy recovers from a major economic crisis, there is a shift towards greentech happening throughout the world.

On a global level, the European region outranks all others for its development and application of greentech solutions, particularly in recycling, solar energy and wind power. In 2005, the Environmental Sustainability Index (ESI) was launched at the annual meeting of the World Economic Forum in Davos, Switzerland. Developed by Yale University's Center for Environmental Law and Policy and Columbia University's Center for

International Earth Science Information Network, this "environmental scorecard" is used to evaluate the environmental sustainability of 146 countries.

The 2008 results of the index, since rebranded the Environmental Protection Index (EPI), revealed that Switzerland, Sweden, Norway and Finland are the top four environmentally sustainable nations. The United States ranked 39 while China came in at 105.

China and the U.S. face a number of common challenges such as pollution control, including combating sulfur dioxide emissions, and natural resource management, including stress on water resources due to agricultural requirements. According to the EPI, the U.S. and China rank one and two in terms of sulfur dioxide emissions.

"This EPI ranking points out that while China has been making great strides in developing its green energy market, its progress in the pollution control sector still lags somewhat," says Charlie McElwee, counsel at Squire, Sanders & Dempsey in Shanghai. "It reveals the paradox that is becoming commonly referred to as 'green energy and black skies.'"

Unique opportunity

China and the U.S. both have a unique role to play in the development of green technology and its applications. Despite differing economic and political systems and a large disparity in the level of development, each country has a significant impact on the global environment and the health of its inhabitants. China is second only to the U.S. in energy and electricity consumption, and its electricity consumption is expected to nearly triple over the next two decades, growing by an average of 4.3 percent per year. As the leading consumers of energy, both countries have a national and international responsibility to further develop their capacity for sustainable growth.

POLLUTION PROBLEM: **China and the U.S. face a number of similar challenges such as pollution control and natural resource management.**

IMAGINECHINA

The rapid development of China's economy has resulted in significant environmental impacts. While this is not dissimilar to other countries which have undergone industrialization, the scale and pace of China's development has attracted international attention. At a time when global attention is focused on meeting "green" standards, China has the unenviable task of balancing the increased welfare and living standards of its people with the need to protect and nurture the natural environment.

"China's industrialization comes at a time where sustainability has been recognized as a critical factor in development strategy," says Jonathan Woetzel, a director in McKinsey and Company's Shanghai office. "China has the opportunity to learn from the mistakes of others in their historical industrialization and establish sustainable cities and industries from the beginning, as opposed to building without regard to sustainability and then retrofitting."

The environmental issues now facing China are similar to those experienced by developed nations as they progressed towards mass industrialization. Many European countries in the 18th and 19th centuries found themselves faced with mounting environmental concerns such as increased air pollution, water shortages and the exhaustion of natural resources. Countries such as the UK and U.S. are now well placed to support the sustainable development of China. Last year the Worldwatch Institute, an environmental research group, reported that clean technology is actually the third-largest sector for venture-capital investment in both China and the United States.

Both the risks and the rewards are high for potential investors. "The Greentech sector is so vast that it will represent the greatest investment opportunity of the 21st century," says Gary Rieschel, founder and managing director of Shanghai-based Qiming Venture Partners. "But investors need to be aware of the technology and market risks."

Because the greentech market is still in its early stages of development, it is important for participants to understand the landscape. The China Greentech Report 2009, initiated by the newly formed China Greentech Initiative (CGTI), has outlined seven key areas for investment

and development: renewable energy, cleaner conventional energy, electric power infrastructure, green building, alternative transportation, cleaner water and cleaner industry. China's unique capacity for catering to the production needs of the global market has positioned it as an important production base for the alternative energy technologies that other nations will be implementing over the coming years. Government support, in the form of subsidies and regulations, is expected to encourage the local application of such technologies.

Development in the United States

Fossil fuels were the key energy source that enabled the U.S. to develop as a world power in the industrial era. However, in the last five to ten years, there has been international recognition that this form of energy is simply not sustainable. Energy use in the U.S. amounts to US$2 trillion a year - one trillion spent on acquiring an energy supply in the form of oil, coal, natural gas, nuclear power and renewable energy, and another trillion spent on the consumption and harnessing of that energy.

Economic growth and environmental concerns have both resulted in the development and implementation of cleaner energy sources. The U.S. auto industry, in both consumer demand and manufacturing systems, is one sector that is beginning to reflect this change. The U.S. government launched a US$25 billion program to provide affordable loans to car manufacturers who develop electric cars and other fuel-efficient vehicles. American businesses are also taking the initiative. General Electric, for example, invests six percent of its industrial revenue each year into the research and development of more efficient and cleaner wind turbines, jet engines, locomotives, power turbines and appliances.

U.S. President Barack Obama has already committed the U.S. to becoming "the world's leading exporter of renewable energy." A crucial component of this approach will be China and how the two countries work together to ensure sustainable development. China is just one of many overseas markets that could stand to benefit from U.S. clean-energy products.

Development in China

The number one energy source in China is coal, which has fueled the country's power plants since the late 19th century. Coal accounts for 70 percent of China's energy supply, compared to the global average of 28 percent in 2006. While it is a cheap and abundant natural resource, coal creates enormous environmental challenges for China. Burning coal to generate power produces significantly more emissions than most other energy sources. In fact, over 80 percent of China's carbon dioxide emissions from energy use come from burning coal. China is also continuing to increase its energy generation capacity by an equivalent of two 500 megawatt (MW) coal-fired plants per week.

While this heavy reliance on coal-based energy is concerning, China actually leads the world in the production of two alternative energy technologies – solar and wind power. The nation's capacity for solar photovoltaic (PV) power has been increasing steadily, reaching 100 MW in 2007. The introduction of government subsidies for the construction of building-integrated photovoltaic and utility-scale solar power projects is expected to increase this capacity further.

The China Greentech Initiative

The China Greentech Initiatve (CGTI) is an open source, commercial collaboration of 80 of the world's leading technology and service companies, entrepreneurs, investors, NGOs, and policy advisors. Through the Initiative, these organizations have come together to define greentech market opportunities and solutions which will contribute to a sustainable China and world. CGTI was co-founded by Ellen G. Carberry and Randall S. Hancock. The Initiative's Founding Partners are AmCham Shanghai and PricewaterhouseCoopers.

"The vision of the Initiative is to address the most pressing sustainability issues that both China and the globe faces, while uncovering commercial opportunities which provide workable solutions," says Carberry.

The China Greentech Report 2009, the first deliverable of the Initiative, provides cross-sectoral analysis of the market and environmental issues facing China, the country's regulatory response, the available technical solutions that can be used to address these issues and key development challenges and opportunities to accelerate greentech market growth. The Report focuses on 7 key sectors: renewable energy, cleaner conventional energy, electric power, infrastructure, alternative transportation, cleaner industry, green buildings, and clean water.

"One of the most interesting findings is that China will not just be one of the world's largest consumers of greentech, but also a key exporter and potentially innovator of these solutions," says Hancock.

The China Greentech Report will officially be released at the World Economic Forum China Talks in Dalian on September 10, 2009. A simultaneous launch will be held by AmCham Shanghai and PricewaterhouseCoopers in Shanghai. The Report will be published online and will be available free of charge.

SOLAR SOLUTION:
China is leading the world in the usage and manufacturing of solar water heaters.

While China's capacity for photovoltaic power is currently 1 percent of the world's total, it is a leader in the manufacturing of photovoltaic cells. In 2007, China accounted for nearly 30 percent of all PV cells manufactured worldwide, due to the success of large domestic companies such as Suntech Power Holdings, Yingli Green Energy Holdings and Trina Solar. Over 95 percent of the cells manufactured in 2009 have been exported overseas.

China also leads the world in the use of solar water heaters. Currently, China boasts the world's largest installed base of solar water heaters, with panels powering water heaters covering over 125 million square meters, and one in ten families having adopted the technology. Chinese companies such as Himin Solar Energy Group produce over 95 percent of the world's core solar water heating technology, according to the China Greentech Report 2009. China's annual production of panels to power solar water heaters in 2007 reached 40 million square meters, accounting for two-thirds of global output.

China's wind power market has also experienced rapid development. Installed capacity has doubled over the last four years to reach 12 gigawatts (GW) in 2008. In fact, China reached its original target of 5 GW for 2010 three years ahead of schedule. Accordingly, the National Development and Reform Commission upgraded the 2010 target to 10 GW, which has already been surpassed.

Today, China produces 10 percent of the world's total wind power capacity, ranking fourth in the world behind the U.S., Germany and Spain. This figure does not include China's offshore wind resource potential, which is currently being developed and is estimated to be three times greater than its onshore resources.

In the automotive sector, China is clearly establishing itself as a world leader in the production and adoption of new energy vehicles.

"In terms of local application, China has made impressive progress in fostering the growth of green technologies," says McElwee, who has also worked closely with the China Greentech Initiative. "It has quickly emerged as a leader in renewable energy and cleaner modes of transportation, and continues to improve its efficiency of resource use."

China has continued to reduce pollution stemming from transportation by implementing stricter fuel economy standards for pollution emission. "China's national standards for pollution emission and fuel efficiency are actually stricter than those set in countries like the U.S., Australia and Canada," says Ruth Dobson, a partner in advisory services at PricewaterhouseCoopers. "This step alone will significantly reduce the pollution that results from road transportation."

China has increased its fuel economy standards for automobiles several times in the last nine years, bringing the overall average up to 32 miles per gallon in 2008. By 2015, it will be further upgraded to nearly 40 miles per gallon.

In order to ensure that fuel economy standards are met, the Chinese government has strongly supported the development of electric vehicles that have the ability to alleviate local pollution, mitigate the demand for oil, and potentially reduce carbon dioxide and other gasoline and diesel engine emissions. Pilot programs focusing on clean transportation have already been announced in a number of major cities and there are widespread plans to subsidize the adoption of electric vehicles.

In December 2008, Shenzhen-based BYD Auto launched the world's first mass-produced plug-in hybrid, the F3DM sedan. Other domestic manufacturers, including Chery, Geely and Foton, are developing their own models and have announced plans to enter the market. By 2011, China aims to increase its annual production of hybrid and electric vehicles to 500,000, roughly 5 percent of annual new vehicle sales.

Meanwhile, the China State Grid has announced plans to build networks of charging stations for electric vehicles in major cities like Beijing and Shanghai.

Areas of collaborative growth

Although both countries have very different economic and manufacturing systems, China and the U.S. are well suited to support each other's development and application of greentech solutions. Financially, China is well placed to develop its greentech markets, having allocated 38 percent of its economic-stimulus programs to green programs. As both countries have been early adopters of green technology, there is enormous potential for cooperation.

"It's exciting to see the expanding cooperation of the U.S. and China in this area and the 'original mind' that both sides are bringing to the discussion," says Rieschel.

Many U.S. companies have begun to work closely with Chinese companies in developing sustainable technologies. Duke Energy, one of the largest coal-burning power companies in the U.S., recently signed an agreement with China Huaneng Group to share information on renewable energy and clean energy technology, with the goal of reducing carbon dioxide emissions.

"If our two companies can come up with technical solutions and work together, ultimately we can each agree on the best way forward to address climate change," says Jim Rogers, chairman and CEO of Duke Energy. "Working together, the U.S. and China can commercialize and drive down the cost of these technologies for the benefit of the entire world."

Growth areas

"In almost every greentech sector – from energy conservation and renewable energy to pollution control and clean water, China will be one of the world's leading consumers of greentech investment and one of the prime end markets for greentech products and services," says Paula Beroza, co-founder and managing director of Sierra Asia partners, an investment advisory firm. "You can't be a serious player in the global greentech arena without a significant interest in China."

The American Chamber of Commerce in Shanghai has been quick to identify greentech as a key growth area in China in terms of bilateral trade, local business development, investment and corporate social responsibility. CGTI was established in 2008, with AmCham Shanghai and PricewaterhouseCoopers as founding partners, as a collaborative project to uncover, create and promote business opportunities in China's greentech markets.

"As greentech represents one of the world's newest markets for development, it's obviously a key focus for many of our members," says Brenda Foster, president of AmCham Shanghai. "The value of the China Greentech Initiative is that it recognizes the complexity of this market and the need to approach it collaboratively by bringing together business leaders and policy advisors to understand the commercial potential of greentech solutions in China."

The Chinese government has continued to adopt policies that support this goal. Government planning for cleaner transportation and industry will result in the more sustainable development of public transport systems and industrial activities. A top priority is the expansion of the country's national railway capacity. By increasing the number of trains that run on electricity from 32 percent to more than 45 percent by 2010 and more than 60 percent by 2020, China hopes to promote transportation efficiency and reduce dependence on oil imports. Regarding primary and secondary industries, the central government has launched a top-1000 Energy Consuming Enterprises Program, which aims to reduce overall energy intensity by 20 percent.

In addition to CGTI, a number of bilateral and multilateral initiatives focused on developing sustainable solutions have been developed in China, including the China Environmental Law Exchange, the United Nations Shanghai City Development Program, the U.S. China Green Business Exchange and the Clean Energy Forum.

As China's greentech market continues to develop, many industry players believe it will soon lead the global market and provide solutions for other countries.

"As the world's largest developing nation, China is the only country which has the scale to independently achieve commercial economies of scale in many developing technologies such as concentrated solar and electric vehicles," says Woetzel. "It is also one of the few with a sufficiently large scientific establishment and capital resources to independently invest in technology development on a large scale."

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