

# 2010

**HERMES INVESTMENT GROUP** | [Environment + Science + Finance]

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**[GREENTECH COLLABORATION & INVESTMENT SPOTLIGHT: CHINA]**

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## **HERMES INVESTMENT GROUP**

[Environment + Science + Finance]

### **GROUP OVERVIEW**

Hermes Investment Group (Hermes) is an American-run merchant bank based in Shanghai, focused on clean energy and green technology. We work closely with partners, clients, and our human resources and knowledge-base, to identify and implement environmentally friendly solutions. Hermes strives to identify market synergies, trends, companies, and research and development that have commercial and environmental applications for near-term execution and delivery. We have been based in China for five years. We have over 50 years experience at the director level, speak Chinese, and understand how to do business in this dynamic country.

### **HERMES GREENTECH DIVISIONS**

**Advisory** – We assist international clients with China market research, Greentech strategy development, target identification, deal advisory, negotiations and closing.

**Operations** – We also help manage Chinese portfolio companies for private equity funds and divisions of multinational firms operating in China.

### **CLIENT AND PARTNERSHIP CLASSIFICATIONS**

- Private equity, venture capital and angel networks
- Multinational corporations, companies, etc.
- Government and NGO/NFP entities

### **INDUSTRY CLASSIFICATIONS**

- Clean water
- Renewable energy
- Advanced coal technology (a subdivision of clean conventional energy)
- Efficient grid and power integration (smart grid)
- Environmentally friendly engineering and architecture

## Our O-kubed Framework

Before accepting an engagement or merely brainstorming potential operations/projects, Hermes partners and staff use a one-page brief to quickly assess viability.

We call this our O-kubed framework and it includes:

### OBJECTIVE

- What is the objective of this project, engagement, operation, etc.?

→ *EX: The objective of this project is to acquire a Chinese company engaged in the wind turbine parts industry...*

### OBSTACLES

- What are the concerns and potential pitfalls?

→ *EX: The wind turbine industry is fragmented, yet the market leaders are A, B and C. These firms have access to Chinese government contacts. China just enacted new laws that require all wind turbine companies to...*

### OPPORTUNITIES

- How do we turn the previous parameters into opportunities, or what opportunities currently exist?

→ *EX: Hermes has access to senior Chinese leadership in the clean-tech industry. We have worked with China's Ministry of Commerce (MOFCOM), NDRC and...*

## Introduction: Irresistible Trends, Rare Opportunities & Common Challenges

**I**rresistible trends, rare opportunities and common challenges. A decade into the twenty-first century, arguably no three phrases – paraphrased from Chinese President Hu Jintao’s address to the Group of Eight Outreach Session in Japan in July of 2009 – better encapsulate the predominant traits of the moment.<sup>1</sup> Globalization and economic development continue to bring countries closer together, despite a global financial crisis. Economic cooperation and interdependence are creating new opportunities for growth. Flowering economic partnerships are forging mutual interest and common opposition to the shared challenges of the day. These challenges create opportunities for further development by demanding solutions to increasingly complex and far-reaching problems.

Climate change and environmental degradation present two such problems, and under present conditions, they seem as much irresistible trends as the circumstances that precipitated them. Large, developing countries such as China and India continue to grow, as do their immense appetites for energy, water and natural resources. The world’s population continues to expand and the average standard of living is increasing, creating more demand for consumer goods and placing an ever-growing burden on the planet’s resource supply. Developed countries meanwhile waffle over how to apply their superior technical capabilities to

solving escalating environmental problems, and some, including the United States, hesitate to take initiative against these looming challenges for fear that it will compromise their economic status relative to the rising giants. Examining the issue pragmatically however, one path need not come at the expense of the other. Confronting the universal challenge of climate change will require a universal effort from developed and developing countries alike. Rather than hinder economic growth, new scientific, business and political initiatives in the burgeoning sustainable technology industry promise mutually beneficial results for all parties involved.

This report will explore the opportunities before the foremost members in the developed and developing camps – the United States and China – to take the lead in confronting the global challenges posed by climate change and environmental degradation. The two countries, individually and as a pair, sit at the center of the problem, and are uniquely positioned to stand at the forefront of the solution. The United States is the second largest emitter, and largest per capita emitter, of greenhouse gasses (GHG) in the world. It is also the world’s most energy-hungry country. China meanwhile is the largest emitter of GHG and the second largest consumer of energy in the world. Its unprecedented economic ascent is matched only by its voracious appetite for natural

resources and the severe pollution problems that come in its wake.

China's environmental woes threaten not only its economic growth, but its social and political stability as well. The immediacy of the challenge has registered with the leadership in Beijing and they are making strides to confront the environmental threats to the country's development, establishing a series of targets for energy efficiency and renewable energy usage for the near and long term, and shaping a regulatory and investment environment to promote sustainable growth. The United States, by virtue of its close economic relationship with China and the importance of China's economy to the international community, faces serious consequences of its own if China's environmental challenges are not overcome. As the most economically developed country in the world, and one of the most innovative and entrepreneurial, the U.S. has the capability to contribute immensely to the resolutions of these challenges, in addition to the motivation.

We at Hermes Investment Group and our partners believe that confronting issues of climate change and environmental degradation through technology sharing, collaboration and calculated, cost-effective investments in green technology presents the best approach to engage pressing and far-reaching problems, and presents win-win

economic opportunities for the parties involved. In this paper, "green technology," or "Greentech," refers to "technologies, products and services that deliver benefits to users of equal or greater value than those of conventional alternatives, while limiting the impact on the natural environment and maximizing the efficient and sustainable use of energy, water and other resources."<sup>ii</sup> The Sino-U.S. relationship provides an ideal case study for exploring the role of Greentech in

*"Green technology," or "Greentech," refers to technologies, products and services that deliver benefits to users of equal or greater value than those of conventional alternatives, while limiting the impact on the natural environment and maximizing the efficient and sustainable use of energy, water and other resources."*

engaging today's challenges. The bilateral relationship embodies the "irresistible trends" of the day and emphasizes that common challenges can create mutually beneficial opportunities for even the unlikeliest of partners. The environmental problems in question are extreme and the potential impact of the solutions is profound.

The paper will explore how the strategies just alluded to can provide solutions to the problems facing both the United States and China. It will examine the dynamic of the U.S.-China relationship and illustrate how the problems of each affect the other and the international system as a whole. It will examine the severity of said problems in closer detail then identify target areas for Greentech collaboration and investment. Finally, the document will discuss the role of Hermes Investment Group (henceforth referred to as "Hermes") in facilitating solutions and affecting results.

## Collaboration in Context: An Emerging Framework

### IN THIS SECTION

- The U.S.-China Relationship: the Emerging Strategic Partnership
- China's Challenges
- Bilateral Challenges
- Green China Rising?



(Picture taken by William Buck)

### The U.S.-China Relationship: the Emerging Strategic Partnership

The U.S. - China relationship exemplifies the pull of the twenty-first century's most "irresistible trend": globalization. Former Cold War rivals have evolved into vital economic and strategic partners in the face of shared interests and common challenges. This partnering of a technology powerhouse and the fastest developing economy in history naturally creates a pairing whose relationship carries significant weight in the world. The size and scope of the each country not only makes them vital to the global economy, but also makes any decisions, tensions or conflicts that arise between the two of great significance for the rest of the international community.<sup>iii</sup> Some have called for the formation of a Group of 2 (G2) between the U.S. and China, emphasizing the influence of the oft-called "strategic partnership" on the rest of the world.

It is this significance to the rest of the world, and critical role in the other's success, that continue to push the relationship towards

engagement and cooperation. President Obama's trip to China in November, 2009, amongst other examples of expanding bilateral dialogue, reflects the increasing importance each side places in working with the other against mutual concerns, namely, anything that compromises continued economic prosperity or peace. The concerns are many. Historical suspicions linger (many will be familiar with the "rise of Red China" debate), and as the economic relationship has matured, new challenges have emerged. For the United States, concerns endure over the outsourcing of jobs from the U.S. to China, an influx of poorly made products to the United States and a \$263 billion dollar trade deficit, to list a few examples. For China, concerns focus largely on the domestic issues that arise with decades of breakneck economic growth, namely, supplying the energy and resources to maintain development and minimizing the environmental impact of growth.

A third challenge for Beijing, less obvious to many outside observers, is maintaining political legitimacy in an era of such rapid transformation. Sustaining economic growth has become the bedrock of political stability for the Chinese Communist Party (CCP), as their traditional ideology has all but evaporated in China's increasingly capitalist environment. As China reaches its threshold for inefficient and pollution-spewing development, the stakes become higher for leadership as the environment worsens and the energy supply remains

uncertain. Depleting water levels in the Yangtze River Delta, and aquifers and basins across China, further magnifies the severity of the problem. It is from these concerns that China conducts itself on the international stage. Some observers interpret China's behaviors as aggressive or confrontational, and return to anxieties over whether or not the world is witnessing the quiet rise of "Red China." As the following sections will illustrate, the more pragmatic and pressing concern ought to be whether or not we will see the rise of "Green China."

## LEADERSHIP IN PERSPECTIVE

"It is my deeply held belief that in the year 2009 – more than at any point in human history – the interests of nations and peoples are shared...The technology we harness can light the path to peace, or forever darken it. The energy we use can sustain our planet, or destroy it."

*– President Barack Obama's opening address to the UN General Assembly on September 23, 2009.*

"Both President Obama and I believe that at present the international situation continues to undergo profound and complex changes. There are growing global challenges, and countries in today's world have become more and more interdependent. In this context, it is necessary to step up international cooperation...China and United States share extensive common interests and broad prospect for cooperation on a series of major issues important to mankind's peace and stability and development.

... ..

President Hu and I also made progress on the issue of climate change. As the two largest consumers and producers of energy, there can be no solution to this challenge without the efforts of both China and the United States. That's why we've agreed to a series of important new initiatives in this area. As President Hu indicated, we are creating a joint clean energy research center, and have achieved agreements on energy efficiency, renewable energy, cleaner uses of coal, electric vehicles, and shale gas."

*– Presidents Hu & Obama's joint statement at the conclusion of President Obama's visit to China, November 17, 2009.*

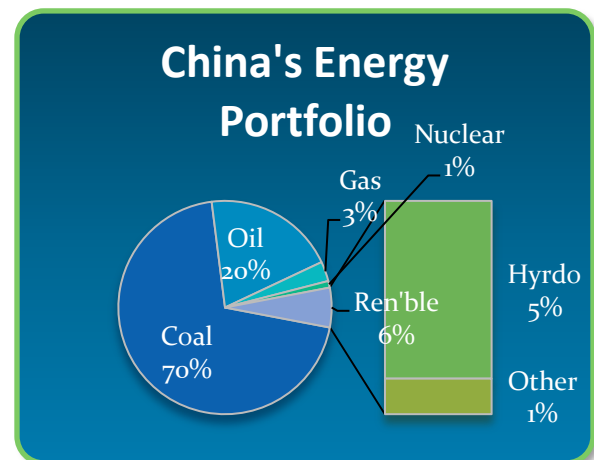
## China's Challenge: Sustaining Growth

Sustaining economic growth, and all of the challenges therein, has been the almost-exclusive agenda in Beijing for decades. If the country's march towards prosperity is compromised, social and political stability could falter. The task before Chinese leadership has grown more complicated in recent years, as environmental and social problems mount and access to a secure and adequate energy supply remains ever-unsettled. Urban development, the expansion of industry and infrastructure, and a growing demand for consumer goods like televisions, kitchen appliances and iPods place an ever-increasing burden on the energy sector to provide the power supply, materials, and resources to sustain growth. The current trajectory guarantees the country's continued environmental decline should its habits not take a turn towards green technology, clean energy supply, and efficient water resource management.

From 1978 to 2006 China's energy consumption grew at an average annual rate of six percent, compared to the global average of two percent.<sup>iv</sup> From 2000 to 2005 alone, China's energy consumption increased by sixty percent. By 2006, the once impoverished Asian power had become the second largest consumer of energy in the world.

China's growth rate accelerated throughout the first decade of the century, with energy consumption accounting for nearly sixty percent of the growth in energy consumption worldwide from 2000 to 2005. In 2008, China accounted for three quarters

of energy consumption growth worldwide.<sup>v</sup> China's energy consumption is projected to slow going forward, and increase at an average annual rate of 4.2 percent until 2020, almost doubling the country's current total energy output during that span.<sup>vi</sup> According to the Energy Information Administration's (EIA) annual *World Energy Outlook* publication, China, along with India, will account for approximately 70 percent of world-wide energy demand growth through 2030.<sup>vii</sup>



**Figure 1: China's Energy Portfolio**  
(Source: BP World Statistical Review of World Energy, July, 2009)

The challenges associated with these projections become more apparent when one examines Beijing's energy portfolio. 93 percent of China's energy comes from conventional sources: coal, oil and gas. Coal accounts for 70 percent of China's energy consumption, while oil accounts for 20 percent, and gas three percent. This fuel mix is dirty and inefficiently used,<sup>viii</sup> and as demand continues to grow, the burden placed on China's environment increases and

China's energy needs manifest themselves in the international arena. China's domestic resources are not enough to satisfy the country's ever-growing demand. Beijing must look abroad for the fuel it needs to drive growth. Oil and gas are the primary treasures of its search.

Tens of thousands of new cars hit the road every year in China. The rising giant recently passed its neighbor Japan as the second largest market for automobiles in the world. Accordingly, it is the second largest consumer of oil behind the United States, but unlike the United States, China must import roughly half of its oil. To give a sense of how significant this growth in demand has been, as of 1993, China was self-sufficient in oil. Since that time, demand has more than doubled, recently averaging 13 percent growth annually. In 2005, China imported 3 million bpd. It is projected to import 8.1 million bpd by 2030.<sup>ix</sup> Finding the

fuel to keep pace with this rapidly increasing demand has resulted in a pragmatic and proactive approach on Beijing's part, bordering on indiscriminate, to secure oil supplies. This strategy bears significant implications for the United States.



Now imagine when these are all cars...  
(Photograph taken by Wolfman Matt)

### Bilateral Challenges: From Sustaining Growth to Sustainable Growth

*“Just as the speed and scale of China’s rise as an economic power have no clear parallel in history, so its pollution problem has shattered all precedents. Environmental degradation is now so severe, with such stark domestic and international repercussions, that pollution poses not only a major long-term burden on the Chinese public but also an acute political challenge to the ruling Communist Party.”*

- *The New York Times 2007 Special Series “Choking on Growth”*

China's energy policy and unbridled development present potential strategic, security, economic and environmental challenges to U.S. interests. Strategically, China's pursuit of the most readily accessible fossil fuels often leads Beijing into partnerships with states that potentially

compromise U.S. strategic interests in the world, such as Iran, Sudan, Venezuela, and Myanmar (Burma). Misperceptions that result over the nature of these relationships, or China's corresponding military modernization aimed largely at securing its energy investments overseas, eventually

could risk a major confrontation with the United States or one of its allies.<sup>x</sup> Economically, China's ever-growing energy demand has obvious consequences for the price Americans will pay for oil. As China spurs global demand, prices Americans pay at the pump will increase.<sup>xi</sup>

Environmental problems present the most immediate and pressing challenge to the bilateral relationship however. Years of indiscriminate development and the prioritization of growth at all costs has decimated China's environment and ecosystems, to the point that pollution threatens the economy and the health of people across the country. To paint a clearer – or hazier – picture, as of 2004, China was home to 17 of the 25 most polluted cities in the world.<sup>xii</sup> Toxic smog envelops much of country's cities. In 2007, only one percent of the country's 560 million urban residents breathed air deemed safe by the European Union.<sup>xiii</sup> Air and water pollution has elevated cancer to the leading cause of death in China, according to the Ministry of Health. Hundreds of thousands of people die from air pollution-related problems every year and nearly 500 million people lack access to safe drinking water.<sup>xiv</sup> As one journalist observed:

*“Environmental woes that might be considered catastrophic in some countries can seem commonplace in China: industrial cities where people rarely see the sun; children killed or sickened by lead poisoning or other types of local pollution; a coastline so swamped by algal red tides that large sections of the ocean no longer sustain marine life.”<sup>1</sup>*

The magnitude of these pollution problems affect the international community, not only through their effects on China's ability to develop, but also directly. China's pollution has become the world's pollution. The country is the largest emitter of green house gases in the world. It contributes an estimated one-sixth of the world's sulfur pollution, resulting in acid rain across much of China and in other parts of Asia as well, including Seoul and Tokyo. According to the Journal of Geophysical Research, much of the particulate matter polluting Los Angeles originates in China.<sup>xv</sup> Again, China's environmental problems are the world's environmental problems.

Simply put, China is on an unsustainable growth trajectory. Without steps to embrace green technology and sustainable development, instead of simply trying to sustain development, it risks unlivable levels of domestic pollution, counter-productive and economically destabilizing conflict, popular uprisings in the wake of unmet economic expectations or unlivable conditions, or all of the above. The encouraging news is that China recognizes it must adopt new policies and practices to facilitate a transition from sustaining growth to sustainable growth.

China's emerging sustainability strategy includes relying on cleaner and renewable fuel sources, mitigating the effects of pollution from industrialization and urbanization, developing and implementing new innovative technologies, and constructing a regulatory environment that facilitates all of the above.

## Green China Rising?

This report does not focus on the specifics of China's efforts to achieve a sustainable course of development, however a number of positive signs and data point towards the beginnings of a shift. Within the last few years, Chinese leadership has put forth a number of targets to reduce the environmental toll of the country's growth and lay a foundation for sustainable development. In 2008, 34 percent of the country's fiscal stimulus plan was directed towards green development. Another 3 trillion yuan is projected to be spent in a separate stimulus plan in the near future. The country's 60 percent decrease in energy intensity per unit of GDP since 1980 suggests that its efforts are having an impact.<sup>xvi</sup> Recent targets concentrate primarily on cleaning and greening the country's energy portfolio, including generating 15 to 20 percent of energy from renewable sources by 2020 and reducing the country's 2005 energy intensity by twenty percent by 2010.<sup>xvii</sup> The renewable energy market is promising, as is nuclear power. China is the largest user of hydro-electric power in the world, and its wind power market has grown faster than its economy, with capacity doubling each of the last four years.<sup>xviii</sup> Solar capacity is growing steadily.<sup>xix</sup> China is also one of only three countries (along with India and Russia) projected to account for two-thirds of global growth in nuclear power generation capacity by 2030.<sup>xx</sup>

Improving energy efficiency and cleaning up pollution are two other major priorities for

Chinese policy-makers. Expanded public transportation infrastructure, stricter fuel economy standards, and sustainably-powered alternative vehicles are being introduced in cities throughout the country.<sup>xxi</sup> In construction, central and local governments have introduced new efficiency standards, and consumer goods also have an efficiency rating system to encourage consumers to make greener decisions. Industrial development has shifted to more technology-intensive practices, particularly in more advanced cities like Shanghai, and efforts to control water and air pollution at a local level are taking effect and beginning to have positive effects on a regional scale.<sup>xxii</sup>

China's shift towards sustainable growth coincides with a growing recognition worldwide of the challenges of pollution and the reality of climate change. A change of course in Beijing and Washington DC, with the arrival of the Obama administration, has opened a new window in Sino-U.S. relations for collaborative engagement across a number of pressing bilateral and international challenges. For this report, we will focus on challenges largely addressed through collaboration and investment in environmental science, technology innovation and sustainable development. The following sections will discuss obstacles and opportunities for successful investment in and development of the Greentech market in China. It will then identify strategies and solutions to address the specific sectors of the China Greentech market with the highest likelihood of success.

## The Road Ahead: Strategies and Solutions in Focus

### IN THIS SECTION:

- Mapping Collaborative R&D and Technology Exchange
- Driving Green Technology in the U.S. and China
- 2010/2011 Action Plan



(Photo taken by William Buck)

### Mapping Collaborative R&D and Technology Exchange

The previous sections underscored the range of benefits China and the United States stand to gain should green technology solutions be applied to China's many environmental and energy-related problems. If we combined the existing technologies around the world, we would probably find more Greentech solutions than we realize. However, while international collaboration in many instances seems logical – certainly for China and the United States – obstacles exist for any prospective partnership in energy and/or technology. For example, many new or developing technologies are owned and protected within countries and thus bound by political lines. Many projects that involve energy development are deemed classified or confidential and consequently are rarely shared or open for collaboration.

Nonetheless, with the right regulatory environment and policies in place, thoughtful step-by-step planning and precise execution, we can create a successful business model that will yield fruitful results. Over the past

few years, we have witnessed developments allow innovative solutions in environmental science and technology to take new priority, and solutions that preserve and clean our planet to supersede traditional practices of hoarding technology, energy, and conservation techniques. The next five, ten, fifteen years and beyond, should address needs and solutions that consider the health of the whole planet, beyond the human race. A renewed focus on collaborative research and development (R&D) and technology exchange present only a few such solutions, but represent a significant first step.

In previous sections, the report touched on ways in which the U.S. and China are making steps towards bilateral cooperation. If you have followed events in the last six months alone, you can see both countries are making the right steps. In July 2009, the U. S. Department of Energy (DOE) Secretary Stephen Chu and China's Minister of Science and Technology (MOST) Wan Gang signed a pact to develop a U.S.-China Clean Energy Research Center. At the provincial/state level, China's Jiangsu province and the state of California signed a Memorandum of

Understanding (MoU) to facilitate technology exchange, clean energy development, and energy efficiency. In November, Obama visited China to officially launch the U.S.-China Energy Efficiency Action Plan, the Electric Vehicle Initiative and a joint \$150 million commitment to the U.S.-China Clean Energy Research Center. The question remains how – and if – the US and China will create value out of these agreements.

### Driving Green Technology in the U.S. and China

With an effective model for collaboration in place, companies and governments can focus their efforts on green technology advancement and the commercialization of cost-effective solutions. For the Chinese Greentech market, Hermes has flagged two areas for potential investment, technology development and exchange and commercialization: Advanced Coal Technology and Renewable Energy. The following “spotlights” examine each sector in greater detail, but are not designed to be exhaustive.

#### Advanced Coal Technology

Environmental concerns aside, China will continue to use coal. Beijing has made it clear that energy security and access to natural resources remain a priority, as this paper illustrated earlier with China’s dramatic transition from oil self-sufficiency to one of the largest importers in the world. But whereas China’s pursuit of oil abroad has raised flags in Beijing and elsewhere about future supply, coal is an abundant domestic

resource that is not likely to disappear. It accounts for 70 percent of China’s energy consumption, and in 2008, China accounted for 85 percent of global coal consumption growth.<sup>xxiii</sup>

Simply put, China will continue to derive its energy from coal, therefore we should focus on cleaner ways to use it. Emerging solutions exist, but they are dispersed. One solution is to create Clean Conventional Energy hubs where China and the U.S. could explore a range of technology to identify cleaner methods of fossil fuel power generation, use and efficient utilization. Figure 2 on the next page lists a few such areas we have identified. While technology such as integrated gasification and combined cycle (IGCC) and underground coal gasification (UCG) remain new ideas, combined heat and power (CHP) has already been used and represents a great case study for efficient energy use in China. Many of the other areas are methods to further utilize coal, but in a cleaner and more efficient manner. Lasers, for example, could be used to replace water in specified areas of coal treatment, but still need to be pilot tested before industry leaders adopt the concept.

#### Renewable Energy

Wind, Water and Solar (WWS) technologies represent the most effective ways to curb future GHG emissions in the long term. The challenge is that in China many areas of WWS technology are not yet developed enough to be produced or even sustained locally. Areas such as wind, solar, geothermal, tidal and hydroelectric power are dominated by new technologies either too costly for China or not yet commercially

viable; some technologies are not yet available. Other technologies, like hydroelectric power generation, involve methods such as dams that remain questionably ‘green’.

Wind and solar are getting the most attention in China and represent promising areas for future collaboration and development. Bio-energy also offers emerging opportunities in areas such as algae and biomass utilization. It is our observation however that this sector requires a long-term investment approach and will need significant maturation in terms of developing industry standards and regulations. It was thus left out of our short-term Action Plan. We also do not include hydro power in our assessment of target sectors, given the restrictions on foreign investment.

In Figure 3, we note some logical investment trends, and other areas that we consider niche. China is a leader in the development of thermal water heating technologies and it is advancing in solar thermal technology as well. What China needs is development in domestic manufacturing of solar farms for both Photovoltaic (PV) and thermal generated solar power. Power storage in both systems still needs development globally and China provides a clean slate for many developers of fully integrated systems. In terms of Wind generated power, China maintains that 70 percent of wind power systems should be sourced domestically. This creates a bottleneck in areas such as blade manufacturing and precision technology to develop wind bearings.

SECTOR SPOTLIGHTS

ADVANCE COAL TECHNOLOGY/ CLEAN CONVENTIONAL ENERGY SPOTLIGHT				
Gasification	IGCC	Blending	CCS	UCG
Scrubbing	Laser Screening	Liquefaction	De-dusting	CHP

Figure 2: Advanced Coal Technology/Clean Conventional Energy Spotlight

RENEWABLE ENERGY SPOTLIGHT				
Offshore Wind	Onshore Wind	Solar Thermal and Heating	Renewable Energy Power Storage	Solar PV
Integrated PV Systems	Concentrated Solar Thermal	Wind Blades	Wind Bearings	Solar Farms

Figure 3: Renewable Energy Spotlight Table

If we fully utilize renewable energy the Earth would have an unlimited supply of energy, and the questions of energy security alluded to earlier would diminish. We need to make a consistent effort to move away from fossil fuels, balance the use of nuclear and hydroelectric power, and develop bioenergy solutions that use conservative amounts of

water. If China and the U.S. take the lead as the world's largest CO<sub>2</sub> emitters to move away from fossil fuels and adopt a blended approach to phase out polluting energy sources, then change will occur. If we vacillate, then the Earth and everybody on it loses.

### 2010-2011 Action Plan: Practical Steps for Investors and Operators Interested in China

As a foreign investor, finding pragmatic solutions and a realistic action plan for entering China can seem daunting. To date, we have witnessed numerous companies continue to make the same mistakes, investing in restricted areas only to find out the government will not permit what investors have 'heard' is a great investment or strategy. Complicating the picture is the fact that "Greentech" often serves more as a buzzword than a tenable set of technologies with specific, practical applications for the near future.

Yet, 2010 is a year that will predictably be a new era of investment opportunities for China. In January, 2010, the world will have concluded discussions on climate change in Copenhagen and China most likely will continue to be a leader in developing sustainable energy solutions. That said, we urge investors looking for three to five year

exits with unrealistic returns on investment and internal rates of return to stay home. Finding sustainable solutions in China will take patience, care and developing technology with a long-term perspective in mind.

An ideal action plan for 2010-2011 can be split into two general categories: Development and Conservation. The *Greentech Development Matrix* on the next page represents our theorized approach. Along the Y-axis we see "Clean Development" as a pragmatic step to provide supply to meet growing energy, water and efficiency demands. "Conservation" accounts for the necessary cleaning of past contamination and general neglect of the environment. The X-axis (Energy, Water, and Efficiency) categorizes what industry, agriculture and municipal players will need to satisfy those demands.

The Greentech Development Matrix

	ENERGY	WATER	EFFICIENCY
DEVELOPMENT	<ul style="list-style-type: none"> <li>• Clean conventional energy</li> <li>• Advanced coal tech</li> <li>• Solar</li> <li>• Wind</li> <li>• Bioenergy</li> <li>• Geothermal</li> <li>• Hydro and wave power</li> </ul>	<ul style="list-style-type: none"> <li>• Extraction and reuse</li> <li>• Desalination</li> <li>• Distribution materials</li> <li>• Agricultural</li> <li>• Industrial</li> <li>• Municipal</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient water and energy use balance</li> <li>• Green buildings</li> <li>• Power distribution and transmission</li> <li>• Smart grid</li> <li>• Combined heat and power (CHP)</li> </ul>
CONSERVATION	<ul style="list-style-type: none"> <li>• Oil and gas extraction</li> <li>• Carbon capture and sequestration</li> <li>• Coal-bed methane</li> <li>• Coal screening and scrubbing</li> <li>• Coal gasification and liquefaction</li> </ul>	<ul style="list-style-type: none"> <li>• Nanoscience and treatment</li> <li>• Distribution maintenance</li> <li>• Monitoring</li> <li>• Metering</li> <li>• Sludge treatment</li> <li>• Disposal and reuse</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated renewable energy, CHP and green building design and architecture</li> <li>• Rural education and training</li> <li>• Corporate social responsibility</li> </ul>

Figure 4: Hermes Investment Group's Greentech Development Matrix

## Summary

The Chinese Greentech market will play a pivotal role in China's future economic growth, and the United States is in a unique position to play *the* pivotal role in engaging and developing a Green China. Both countries recognize the need to pursue sustainable development and incorporate green technologies into their development portfolios and each is taking steps to do so. As one of the most technologically advanced and innovative countries in the world, and as a vested partner in China's sustainable development, the United States should capitalize on the opportunities presented. At the infant stages of a century that will be defined by the impact of China's continued development on the international system and by mankind's ability to pursue sustainable, green growth, the time to act is now.

This briefing has identified a foundational strategy and several sectors for green technology investment to catalyze U.S.-China collaboration on development and implementation in 2010. We have touched on the role of sectors such as Advanced Coal Technology and Renewable Energy. Innovation hubs for Clean Conventional Energy, which includes cleaner coal production and carbon capture and sequestration, create dual advantages by curbing GHG and sustaining energy supplies for the near future. Renewable Energy still needs considerable development, but the combination of nuclear energy with hydroelectricity could offer cleaner solutions for the near term, instead of burning coal. Energy Efficiency is a catch-all phrase that describes a growing awareness and collective conscience towards energy conservation and optimal utilization trends. Energy systems are being designed in China with a greater understanding of how to integrate and utilize energy from multiple sources both on and off the grid.

Our report only covers a sample of the growing population of Greentech solutions applicable in China, and includes only a snapshot of the observations we have made while operating in Mainland China. Hermes has an expansive and growing network there, and sees the growing demand for commercially viable solutions in Greentech. We are excited about the recent developments in environmental science and technology, the Chinese regulatory structure, and emergence of environmental awareness globally.

*We invite questions and comments to this report and look forward to working closely with your team to find environmentally friendly solutions in China, the US, and abroad.*

*Please feel free to visit our website at [www.hermesinvgroup.com](http://www.hermesinvgroup.com) or contact Paul C. Watson directly (details on page ii).*

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## End Notes

<sup>i</sup> “At present, with the further progress of economic globalization, countries are increasingly interdependent, and pursuit of peace, development and cooperation has become an irresistible trend of the times, presenting the world with rare opportunities for development. At the same time, uncertainties and destabilizing factors in world economic growth have increased recently, as evidenced by continued turbulence in the financial market, rising prices for energy and resources, acute problems of food security, and growing pressure of global inflation. There remain numerous grim challenges in the effort to build a harmonious world of lasting peace and common prosperity.” - *President Hu Jintao’s remarks at the G8 Outreach Session in Japan in July, 2009*

<sup>ii</sup> The China Green Initiative, 2009, [The China Greentech Report 2009](#), Mango Strategy, LLC., Shanghai, China, p. 17.

<sup>iii</sup> The US-China Business Council, “US-China Trade Statistics and China’s World Trade Statistics,” *Table 1: China’s Trade with the United States*, <http://www.uschina.org/statistics/tradetable.html>. In 2008, China’s total trade volume with the U.S. was \$409 billion.

<sup>iv</sup> The China Green Initiative, 2009, [The China Greentech Report 2009](#), Mango Strategy, LLC., Shanghai, China, p. 25. “Between 1978 and 2006, China’s primary energy consumption grew an average of 6% per year, compared to the world average of 2%. This growth accelerated after 2000, increasing to over 10% per year and doubling China’s primary energy consumption between 2000 and 2006 alone.”

<sup>v</sup> BP p.l.c, 2009, [BP Statistical Review of World Energy, June, 2009](#), p. 2. [www.bp.com/statisticalreview](http://www.bp.com/statisticalreview)

<sup>vi</sup> According to Hermes research, China’s energy output in 2005 was 74 Quadrillion British Thermal Units (QBTU). By 2020 it is projected to reach 138 QBTU.

<sup>vii</sup> United States Department of Energy, Energy Information Administration, May, 2009, [International Energy Outlook 2009](#), Chapter 1 “World Energy and Economic Outlook.”

<sup>viii</sup> The top 8 electricity-consuming industries in China waste 47% more energy than those in advanced countries, which equates to 200 to 300 million more tons of coal per year.

<sup>ix</sup> United States Department of Energy, Energy Information Administration. May, 2009, [International Energy Outlook 2009](#), page 33.

<sup>x</sup> Herberg, Mikkel & Lieberthal, Kenneth. “China’s Search for Energy Security: Implications for the United States,” *NBR Analysis, Volume 17, Number 1*, National Bureau of Asian Research, April, 2006.

<sup>xi</sup> This international news story from 2005 highlights how energy prices can escalate tensions between the U.S. and China, and reflects some of the mistrust that still flavors the relationship: “CNOOC Withdraws Unocal Bid,” Xinhua News Agency, August 3<sup>rd</sup>, 2005, <http://china.org.cn/english/2005/Aug/137165.htm>.

<sup>xii</sup> The China Green Initiative, 2009, [The China Greentech Report 2009](#).

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Mango Strategy, LLC., Shanghai, China, p 27.

<sup>xiii</sup> Khan, Joseph and Yardley, Jim, “As China Roars, Pollution Reaches Deadly Extremes,” *New York Times Special Series: Choking on Growth, Pt. I*. The New York Times, New York, NY, 2007.

<sup>xiv</sup> *Ibid.*

<sup>xv</sup> *Ibid.*

<sup>xvi</sup> The China Green Initiative, 2009, The China Greentech Report 2009.

Mango Strategy, LLC., Shanghai, China, p. 38.

<sup>xvii</sup> “Energy intensity” refers to the amount of energy consumed to produce one unit of GDP.

<sup>xviii</sup> China reached its initial target wind power generation capacity of 5 (GW) three years ahead of schedule and is currently working to achieve 10 GW capacity by 2010.

<sup>xix</sup> China had 150 MW of solar capacity in 2008.

<sup>xx</sup> United States Department of Energy, Energy Information Administration. May, 2009, International Energy Outlook 2009, p. 5. “Nuclear generation is projected to increase by 8.9 percent per year in China and by 9.9 percent per year in India. Outside Asia, the largest increase in installed nuclear capacity among the non-OECD nations is projected for Russia, with increases in nuclear power generation averaging 3.5 percent per year.”

<sup>xxi</sup> According to the UNEP To diversify and reduce the impact of vehicle pollutants central and local governments are encouraging the development of alternative vehicles. Fuel economy standards are currently tougher than the United States’ (32 miles per gallon in 2008). Shanghai has been conducting trials with hybrid buses and clean cab technologies; twenty-three Chinese cities are scheduled to have a metro line by 2010.

<sup>xxii</sup> *Ibid.*

<sup>xxiii</sup> BP p.l.c, 2009, BP Statistical Review of World Energy, June, 2009. [www.bp.com/statisticalreview](http://www.bp.com/statisticalreview)