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CHINA

ON THE HORIZON — RENEWABLE ENERGY IN ASIA

A PRACTICAL GUIDE





ON THE HORIZON – RENEWABLE ENERGY IN ASIA

A PRACTICAL GUIDE

PREPARED BY MERITAS LAWYERS IN ASIA

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On The Horizon — Renewable Energy in Asia was prepared by lawyers in Asian Meritas firms. It offers practical insights targeting foreign investors and business people who are interested in pursuing opportunities throughout Asia. The twelve chapters provide general information, not legal advice. Do not rely upon the materials without prior consultation with legal advisors familiar with the specifics of your particular areas of interest.

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HKD	Hong Kong Dollar	SGD	Singapore Dollar
INR	Indian Rupee	TWD	New Taiwan Dollar
IDR	Indonesian Rupiah	THB	Thai Baht
JPY	Japanese Yen	USD	United States Dollar
KRW	Korean Won	VND	Vietnamese Dong
MYR	Malaysian Ringgit		

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ON THE HORIZON — RENEWABLE ENERGY IN ASIA

As this book goes to press, the global economy is still struggling to climb out of its worst downturn since the Great Depression. At the same time, Japan faces its most significant crisis since 1945 as it deals with the impact of the tsunami and damaged nuclear reactors at Fukushima. While some countries such as China, Singapore, and India have successfully rebounded, most nations are facing dual threats of exceptionally slow economic growth combined with chronic levels of high unemployment. Unlike past recessions, this one has hit developed economies just as hard as less developed countries, which have traditionally borne the brunt of economic downturns.

No matter how the world economy performs over the next few years, two factors stand out that will strongly influence global economic prospects over the next decade. One factor is population growth. Most experts predict that the world's population will grow from 6.9 billion today¹ to 8 billion by 2025 and will add another billion by 2050. This projected increase is as many people who currently live in China and India. Continual population growth places high demands on the world's resources, as more people are demanding more goods and services. Equally significant, the large and rapidly growing economic powerhouses like China and India are accelerating their demand for energy and the goods and services it provides. Between just these two countries, over 3.5 billion people will be pushing their governments to promote rapid industrialization in order to meet the demands of their burgeoning middle classes. These are pressures that neither China nor India, nor any government for that matter, can resist for political reasons.

Economics aside, the combination of these two factors is also putting a heavy strain on our world's delicate environmental balance. The problem is that the energy resources supplied today to meet a growing population's increasing needs for goods and services are mainly derived from carbon-based sources that have significant long-term impacts on the environment. Coal is the dominant fuel in Asia and accounts for 54 percent of energy used today. While this share will go down over time (to an estimated 44 percent share in 2030), the use of coal in developing Asia is expected to increase by nearly 40 percent by 2030.²

¹ U.S. Census Bureau estimate at www.census.gov/main/www/popclock.html

² Estimates from USAID ECO-Asia Clean Development and Climate Program, based on data from International Energy Agency, Asian Development Bank, and Asia-Pacific Energy Research Center

For example, the Peoples Republic of China in 2011 is over 70 percent dependent on coal for its total energy needs, and it is the fastest growing economy in the world. As energy needs increase, so does the degradation of the environment. Adding another 2.5 billion people over the next 40 years will magnify the imbalance even more.

Another consideration involves the political climate where carbon-based energy is extracted and consumed. For example, much of the global oil supply is located in geographic areas that regularly experience bouts of political instability. Think about Venezuela, Nigeria, Libya, and points throughout the Middle East. As we have seen time and time again since the oil crisis of the 1970s, any even minor disruption in the assured supply of oil, gas, or other energy sources can and will have a significant impact on global prices.

And the trends of oil import dependency are going in the wrong direction. Over the past decade, oil imports to Asia have increased by 140 percent, and in 2010 the Asia region imported 60 percent of its oil.³ China's dependence on foreign oil is expected to keep rising, reaching 65 percent by 2015 and 80 percent by 2030.⁴

For all of these reasons, the current global energy mix, which is primarily carbon-based, is untenable over the long run. China, India, and other nations need to find alternate ways to fulfill their energy demands. The only real answer — and our best chance to bring balance back to the environment — is to turn toward alternative sources of energy, which can at least in part replace existing coal and oil sources.

The most cost-effective way of weaning ourselves from fossil fuels is through energy efficiency, and this can be done by taking actions to make homes, buildings, factories, and our transport systems more efficient.⁵ But at the same

³ National Association of State Energy Officials, "What's Hot in Trade and Imports," available at: http://www.naseo.org/committees/energyproduction/oil/Trade_Hot.htm#What's%20Hot:%20The%20Asian%20Magnet

⁴ Estimates for China's oil import dependency in 2030 range from 75%-82% based on these references: The World Bank, "Winds of Change: East Asia's Sustainable Energy Future," available at: [http://www.recoalition.com/re2010/userfiles/files/Winds%20of%20Change%20\(Full%20Text\).pdf](http://www.recoalition.com/re2010/userfiles/files/Winds%20of%20Change%20(Full%20Text).pdf) and Japan Times, "What is Beijing willing to do to secure oil and gas supplies?" (stating US Dept. of Defense predicts oil imports will amount to four-fifths of oil consumption by 2030), available at: <http://search.japantimes.co.jp/cgi-bin/ea20101227mr.html>

⁵ Based on estimates in International Energy Agency (IEA), World Energy Outlook 2010

time, it is also important to aggressively develop the most feasible alternatives for supplying sustainable fuel and power directly – through renewable energy. Some examples of renewable energy with real potential are solar, wind, hydro, biomass, biogas, and tidal. While some of these technologies have been commercialized and entered the market, none of them has yet reached anywhere near their full economic and market potential.

Such renewable energy sources cannot become commercially viable without long-term financial incentives and comprehensive pricing policies backed by national governments around the world. Just the sheer size of the capital investments required in order to develop and exploit renewable energy demands that governments underwrite part of those costs, at least initially. This includes government-backed targeted incentives and grants for research and development of these emerging technologies, funding renewable energy demonstration projects, and adopting tax regimes for renewable energy that will attract private investors over the long run. Without the right policies and regulatory incentives, renewable energy sources are unlikely to succeed in Asia or elsewhere.

Globally, investments in clean energy have quadrupled over the past five to six years, from USD46 billion in 2004 to USD173 billion in 2008, and then falling slightly to USD162 billion in 2009.⁶ And the upward trend is expected to continue, as technological developments, in combination with the policies and incentives mentioned above, boost the market for clean energy. The total expected investment in clean energy, for just the G-20 countries alone, is expected to be USD2.3 trillion over the next 10 years.

The real growth in global energy demand will occur in developing Asia — most notably China and India — which will demand access to greater and greater levels of energy over the next several decades. The overall demand for energy in the developing Asia region is expected to increase by 65 percent in the next 20 years, and electricity consumption is expected to increase by 114 percent.

Given these strong trends, we wanted to find out where key countries in Asia stand now on renewable energy as a workable alternative and what we can expect in the future.

⁶ UNEP, 2010, Global Trends in Sustainable Energy Investment 2010. Sustainable Energy Initiative (SEFI), in cooperation with Bloomberg New Energy Finance

In order to find the answers, we approached 12 of the leading Asian law firms and asked each to comment on 10 basic questions about renewable energy policies and the regulatory framework in their individual countries:

- 1. What are the driving factors for increasing renewable energy production?*
- 2. Which renewable energy sources are viewed as the best opportunity for your country and why?*
- 3. What role does your government play in regulating the energy industry? Describe the regulating environment and trends in deregulation in your country.*
- 4. What agencies or bodies of government oversee the energy sector? What goals or mandates has your government set for electricity generation or fuels production from renewable sources?*
- 5. What are the opportunities for private ownership (vs. public ownership) in clean energy development and technologies?*
- 6. What is the level of government investment or what incentives are in place to support these goals and targets?*
- 7. What kind of emphasis is placed on researching and developing renewable energy technologies versus looking to outside energy resources?*
- 8. Is your country on track to be a clean energy importer or exporter from the standpoint of power production supply and manufacturing?*
- 9. How developed is your country's workforce to support innovation, development and the production of renewable energy?*
- 10. What are the key barriers to increasing renewable energy as a part of your country's energy mix?*

Each chapter of this book is devoted to insights on a specific country in Asia. Our hope is that this book will spark the beginning of an ongoing dialogue among government officials and planners, venture capitalists, individual entrepreneurs, researchers, multinational corporations in the energy sector, and NGOs as they focus their attention on how best to accelerate the deployment of renewable energy resources in Asia and elsewhere. The stakes are high for all of us. We cannot afford to step back from the challenges and ignore the great opportunities renewable energy technologies offer.

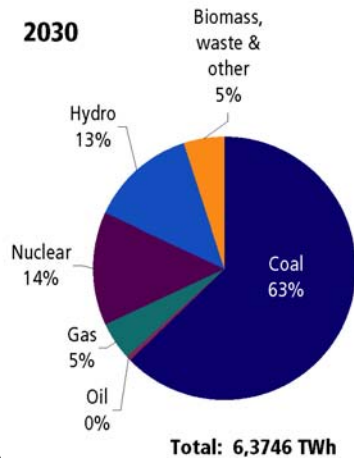
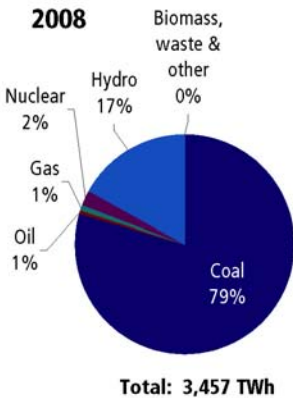
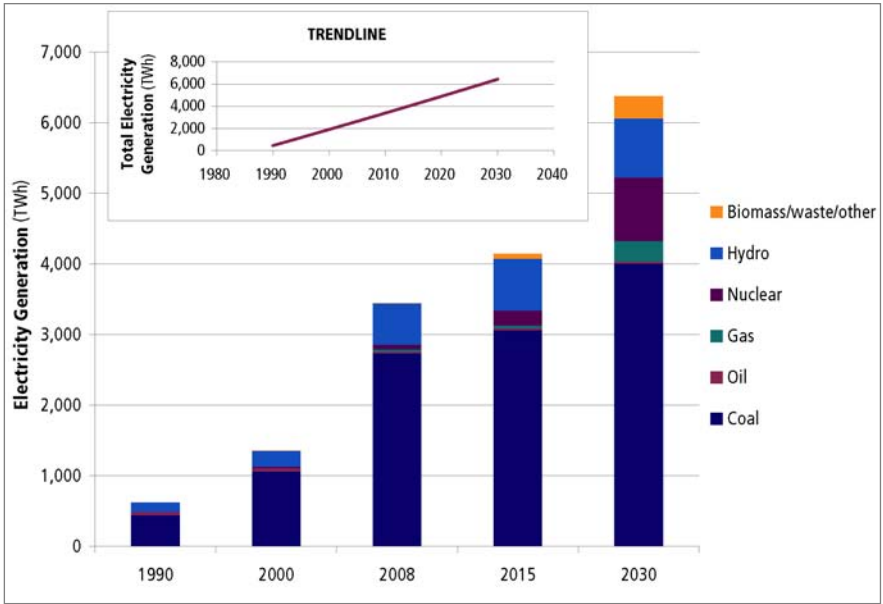
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USAID's ECO-Asia CDCP program uses policy and market interventions to promote the scale up of investment and implementation in clean energy in developing Asian economies. The program is active in China, India, Indonesia, the Philippines, Thailand, and Vietnam. ECO-Asia CDCP partnered with Meritas in the development of this guide as part of its Asia Clean Energy Policy and Regulatory Dialogue, which is aimed at building capacity in the region to design and implement effective policy, regulatory, and legal frameworks for energy efficiency and renewable energy.

Electricity Generation by Fuel Type: China



Source: Asian Development Bank, International Energy Agency, Asia-Pacific Energy Research Center, and The World Bank

1. What are the driving factors for increasing renewable energy production in China?

Government mandates, dwindling fossil fuel reserves, the need to increase energy security, climate change, and the desire to create new economic opportunities and markets are the driving factors for increasing renewable energy production.

Government Mandates. The Chinese government has recently established laws that set ambitious targets for developing renewable energy resources. Government targets are the most important factors driving the development of any sector in China given the intricate role state planning has in the development of China's economic markets.

The Chinese government first established targets for developing renewable energy resources through the Renewable Energy Law, which the government passed in February 2005. Pursuant to this law, the government issued a number of pertinent new rules and criteria. These include issuing the Mid- to Long-term Development Plan for Renewable Energy in 2007, as well as the 11th Five-Year Plan. These both have the objective of increasing renewable energy's share of total primary energy. Under the 11th Five-Year Plan, renewable energy's share of total primary energy is to increase from 7.5 percent in 2005, to 10 percent in 2010, and then to 15 percent in 2020.

Currently, the Chinese government is updating the renewable energy targets in its 12th update to the Five-Year Plan and is expected to further increase the target for renewable energy's share of total primary energy.

These ambitious targets address China's challenge to satisfy the country's rapidly increasing demand for energy. Over the past two decades, China has sustained rapid and continuous economic development, and this high rate of growth is expected to continue during the next five years. Due to this rapid economic growth, China currently faces a potential shortfall in traditional energy resources. China is highly dependent on coal, which provides almost 70 percent of China's primary energy. While China is relatively rich in fossil fuel reserves, its reserves of traditional fossil energy resources are lower than the average level across the world on a per capita basis. This means that even if China manages to stick to its minimum targets, the government will not be able to rely indefinitely on traditional fossil fuel resources to fulfill its national energy needs.

The scale-up of renewable energy will require a gradual transition from an energy supply infrastructure that is heavily fossil-based to a system that is much more focused on renewable energy. Renewable energy resources are abundant in China: two-thirds of China's territory enjoys rich solar energy, with total solar radiation per unit area of over 5 GJ per square meter, which is around 1.7 trillion tons of coal equivalent (TCE) solar energy absorbed by the earth's surface. The national potential for wind power is 3,200 GW, with an immediately exploitable wind potential of at least 1,000 GW. Based on the experience of advanced wind-power users such as Germany, Spain, and Denmark, China's long-term wind power capacity may even surpass 3,000 GW.

The estimated technically exploitable capacity of ocean energy is 400-500 GW. Future reserves of geothermal energy are estimated at 135.3 billion TCE, and proven reserves are already at 3.16 billion TCE. Existing biomass resources including straw, forest residues, organic MSW, and industrial organic wastes can provide 700 million tce worth of energy, and this number could be doubled by improving breeding and extending energy crops.

Air and water pollution. Having exploited fossil fuel resources, especially coal, in an intensive manner, China's economic growth has been accompanied by worsening air and water pollution. This presents a serious threat to the environment and the health of the people. Due to the heavy reliance on coal, energy production has resulted in severe environmental problems. More than two-thirds (70 percent) of particle emissions come from coal-fired power generation and consumption in China, and the resulting air and water pollution has harmed public health and the environment. Five out of the ten top polluted cities in the world are in China. Chinese leaders recognize the need to adjust the country's energy infrastructure to be more sustainable.

Energy security. The issue of energy security is another driving factor. The need to increase energy supply in order to meet the demand caused by rapid economic development, dwindling fossil fuel reserves, and pressures of environmental pollution has resulted in an urgent need to increase imports of oil and coal. Beginning in 1993, China became a net importer of energy resources. Since then, China's degree of dependence on imported oil has been rising rapidly. By the end of 2010, China imported

50 percent of its oil. Given the volatile nature of international geo-politics, it is unwise for a country to be overly dependent on imports, and it is vital to a country's security for the government to be able to guarantee a reliable energy supply. In this regard, renewable energy resources such as wind, solar, and biomass energy are essential energy alternatives.

Climate change. China has acknowledged the need to address climate change by reducing the country's emissions of greenhouse gases (GHGs). The accumulated GHG emissions from China have contributed only nine percent to the accumulated global total of CO₂ emissions, and China's per-capita emissions of GHG are only one-fourth the world average. While these figures are low, developed countries continue to transfer GHG-intensive manufacturing industries to China. The Chinese government is serious about contributing to global efforts to mitigate climate change and is making an effort to realize the GHG reduction targets that it has promised. The scale-up of renewable energy production is an important method to achieve the national GHG reduction targets.

Renewable energy production scale-up. The potential for new economic development opportunities and expansion of relative industry sectors is another driving factor. Renewable energy production scale-up promotes expansion of domestic industries such as manufacturing of key equipment and components, and services and maintenance. Renewable energy production scale-up has attracted investment and will impact its scale-up speed. The Chinese government is currently finalizing the 12th Five-Year Plan for renewable energy development, with ambitious targets by 2015 compared to the 11th Five-Year Plan, including hydro power capacity to 300 GW from 190 GW, wind to 120 GW from 100 GW, and solar to 20GW from 3GW. These targets send a strong signal for increasing investment during the coming five year period, estimated up to several thousand billion RMB.

In conclusion, China has a significant base of renewable energy resources and the technological potential to scale-up renewable energy production. China's desire to ensure a secure energy supply, reduce pollution from burning fossil fuels, and reduce greenhouse gases has motivated China to rapidly expand renewable energy development.

2. Which renewable energy sources are viewed as the best opportunity for China and why?

Hydropower, wind, solar, biomass and geothermal energy sources are viewed as the best opportunities for renewable energy sources in China.

Hydropower

Hydropower production is an important component of the Chinese power industry and is the country's leading sector in renewable energy. Currently, China's hydro-energy represents 23 percent of the nation's growing electricity consumption and is second only to coal-generated electricity. The Three Gorges Dam in Hubei is the world's largest hydro-electric power station.

Hydropower resources are rich in China. According to the results of the 2003 Nationwide Hydropower Resource Assessment, China's total potential capacity of technically exploitable hydropower is 540 GW, with an annual power generation potential of 2470 TWh. The total potential capacity of economically feasible hydropower is 400 GW, with an annual power generation potential of 1750 TWh. These hydropower resources are distributed mainly in the nation's western regions. Seventy percent of the total is located in Southwest China, which has the advantage of rich resources available for development and easy transmission to load areas.

Government targets for hydropower are ambitious. The Mid-to-Long-Term Development Plan for Renewable Energy and the Renewable Energy Development Plan for the 2006-2010 Five-Year Planning Period sets ambitious targets for increasing hydropower generation. Under these plans, China expects an increase in installed capacity of hydropower from 117 GW (including 7 GW pump stations) in 2005 to 190 GW in 2010 (official data is not yet available), and projects an increase to 300 GW by 2020.

Hydropower development in China is mature. Hydropower has long been proven to provide a positive impact on local community economic development. For this reason, hydropower has been in development longer than other renewable energy. Hydropower technologies, especially for smaller-scale projects, have gradually matured over time, with the technology, industry, and incentive management mechanisms in place to support these projects.

Wind Power

The wind-power industry has been booming over the past five years. Wind power, in both newly installed capacity and WTG manufacturing, is rapidly becoming a leading renewable energy resource in China.

Wind resources are abundant in China. According to the most recent wind energy resource assessment, the nation's exploitable potential onshore wind capacity is 300 GW. Together with offshore wind resources, the total potential wind capacity is about 1,000 GW.

Wind-power development has rapidly grown in the past five years. By the end of 2005, more than 60 wind farms had been connected to the power grid in China, with a total installed capacity of 1.26 GW. By the end of 2009, the installed capacity reached 25.8 GW, which represented the second highest installed capacity in the world. The installed capacity in 2010 was unofficially over 40 GW, which represents the greatest installed capacity amount in the world.

Government targets for wind energy are ambitious. Under the pending 12th Five-Year Plan, China aims to have 150 GW of wind-power capacity by 2020.

Solar Power

Solar resources are rich. Two-thirds of China's territory enjoys over 2,200 hours of sunshine annually, with a total solar radiation area of over 5000 MJ per square meter. The West China region has especially favorable conditions for solar energy development.

There is a huge potential market for solar energy utilization. At the end of 2005, the total installed capacity of solar photovoltaic power in China was about 70 MW, with most of this energy being used for supplying power to remote residential areas. During the 11th Five-Year Period (2006-2010), solar-power capacity increased rapidly to 220 MW of installed capacity by 2009. The Chinese government plans to add an additional 20 GW of installed capacity by 2020 and currently supports investments in solar-power technological advancements. The government is currently discussing a more ambitious possibility of increasing that target to an additional 30 GW of installed capacity by 2020.

The solar industry is driving the utilization market in China. The foreign market for photovoltaic cells has driven China's polysilicon industry to

develop rapidly. For instance, in 2008, a module's production capacity was 5 GWp, yielding 3 GWp. By 2009, technological innovations driven by market demand led to development of modules with outputs of more than 4 GWp. The level of output for modules is projected to continue to increase and in 2010, output is expected to be have been double 2008 levels. Despite China having been ranked first in the world for production of solar cells with the greatest output capacity, China has yet to develop a domestic market for photovoltaic cells. Ninety-eight percent of China's photovoltaic cells are exported.

Other Renewable Energy Sources

China's biomass market is yet to scale-up to a commercial level. The current installed capacity for biomass energy is roughly 2,381 MW. However, China is expecting to achieve 30 GW of installed biomass capacity by 2020 by improving the process of feedstock collection. Geothermal energy exploitation in China began around 1970. The current total thermal installed capacity is around 3,700 MW. Geothermal heat pumps were also used to heat and cool some of the venues at the 2008 Olympic Games in Beijing.

3. What role does the Chinese government play in regulating the energy industry? Describe the regulating environment and trends in deregulation.

ROLE OF GOVERNMENT

China's Renewable Energy Law defines the role of government as follows:

- ♦ Set medium- and long-term total volume targets for the development of renewable energy.
- ♦ Set and publicize technical standards for relevant renewable energy resources and support development of renewable energy technologies.
- ♦ Encourage and support the promotion of renewable energy and provide economic incentives.
- ♦ Determine electricity feed-in tariffs and/or purchase prices for renewable energy purchased from producers.
- ♦ Inspect and supervise renewable energy enterprises.

REGULATORY ENVIRONMENT

Passed in 2005, with subsequent amendments adopted in 2010, China's Renewable Energy Law serves as the principal framework for development of the renewable energy sector. This law offers a variety of financial incentives and policies to encourage major advances in the development of renewable energy.

The Renewable Energy Law has the following five main implementation regulations and mechanisms:

Planning and Target. *Mid- to long-term Development Plan for Renewable Energy and The Renewable Energy Development Planning during the 11th Five Year Planning Period* have established targets for increasing installed capacity for hydropower, wind, solar, geothermal, and biomass energies.

Mandated Grid Connection. *The Management Regulations for Renewable Energy Power Generation, The Trial Management Measures for Renewable Power Pricing, The Catalogue for the Guidance of Renewable Energy Industry Development, and The Regulations of Power Enterprises* are regulations established under the Renewable Energy Law that require power grid operators to purchase resources from registered renewable energy producers.

Feed-in Tariffs. *The National Development and Reform Commission Notice on Feed-in Tariff for Wind Power Grid Connection* established a fixed feed-in tariff for new onshore wind-power plants in order to change inconsistent pricing and thereby facilitate investment in the wind-energy sector.

Cost Sharing. *Provisional Management Measures on Renewable Electricity Tariffs and Cost Sharing Program* provides the added cost of developing renewable energy will be "shared in the selling price" meaning that all end users of electricity must pay a renewable energy surcharge.

Special Fund Mechanisms, Taxation and Credit Systems. *The Trial Management Measures for the Special Development Fund and The Trial Management Measures for the Special Fund of Wind Power Equipment Localization* provide tax credits for industries in renewable energy development.

In December 2009, the National Development and Reform Commission (NDRC) adopted amendments to the 2005 Renewable Energy Law. The amendments, which took effect on 1 April 2010, contained these three main provisions:

- ♦ *Requiring more detailed planning and coordination between renewable energy development and overall electric power sector development and transmission planning.* For example, the amendments call for coordination between local (provincial) level energy developments with national development plans, further define the responsibilities of electric power companies in connecting renewable energy generators to the grid, define different classes of renewable generators, and address in more detail energy storage and smart grids.
- ♦ *Strengthening provisions to guarantee that electric utilities purchase all renewable power generated.* Previously, utilities were only obligated to purchase renewable energy if there was sufficient power demand on the grid. Under the amendments, utilities must buy the power in all circumstances but can subsequently transfer surplus power to the national grid company for use elsewhere.
- ♦ *Strengthening and consolidating the renewable energy fund established under the Ministry of Finance.* Previously, the fund collected a 0.4 fen/kWh (USD0.06/kWh) surcharge on electric power sales nationwide (with some customer classes exempt). The Ministry utilizes these funds for government-supported renewable energy projects and to support the costs of feed-in tariffs for renewable energy. However, the surcharge had not kept pace with expenditures, and the amendments allow the Ministry to supplement the renewable energy fund with general revenues.

Since the passing of the amendments to the Renewable Energy Law, a number of new regulations are under development with some being close to publication. The list below presents most of the regulations, and standards regarding renewable energy policy, regulations and standards issued through 2009 pursuant to the Renewable Energy Law.

- ♦ The Renewable Energy Law passed on 28 February 2005 by the 14th Session of NPC Standing Committee
- ♦ The Catalogue for the Guidance of Renewable Energy Industry Development; NDRC Energy No. (2005) 2517

- ◆ The Trial Management Measures for Renewable Power Pricing and Cost Share; NDRC Price No. (2006) 7
- ◆ The Management Regulations for Renewable Energy Power Generation; NDRC Energy No. (2006) 13
- ◆ The Trial Management Measure for the Special Fund of Renewable Energy Development; MOF Construction No. 237
- ◆ Implementation Notes of Enhancement of Renewable Energy Industry Development; NDRC Energy No. (2006) 2535
- ◆ The Trial Management Measure for Allocation of Renewable Energy Tariff Surplus Revenue; NDRC Price No. (2007) 44
- ◆ The Notice for Enhancement of Bio-ethanol Project Construction and Management; NDRC Industry No. (2006) 2842
- ◆ The Management Measures for Product Oil Market; MOC (2006) 23
- ◆ The Standard for Fuel Ethanol GB 18350-2001
- ◆ The Standard for Vehicle Ethanol GB18351-2004
- ◆ The Trial Management Measure for the Special Fund of Renewable Energy Buildings; MOF Construction No. (2006) 460
- ◆ The Evaluation Measure for Renewable Energy Building Pilot Projects; MOF Construction No. (2006) 459
- ◆ The Management Regulations of Wind Power Project Construction by NDRC; NDRC Energy (2005) 1204
- ◆ The Trial Management Measures for Wind Power Project Land Occupation and Environmental Protection; NDRC No (2005) 1511
- ◆ The Technical Regulations for Solar Water Heater Building for Civil Use GB50364—2005
- ◆ The Technology Regulations of Wind Farm Integration into Power Grid by the State Grid Corporation (in trial); State Grid Development No. (2006) 779
- ◆ The Design Regulations for Wind Farm Integration System by the State Grid Corporation; State Grid Development No. (2006) 779
- ◆ The Mixed Bio-diesel for Diesel Engines GB/T20828-2007
- ◆ The Mid-Long Term Development Planning for Renewable Energy Development by NDRC in September 2007
- ◆ The Renewable Energy Development Planning during 11th Five Year Planning Period by NDRC in March 2008

- ♦ The Trial Management Measures for Tariff Return of Chinese Brand Equipment Purchase by Foreign Investment Projects; Tariff No. (2006) 111
- ♦ Import Tariff Adjustment for Large Wind Turbines, Key Components and Raw Materials by Ministry of Finance; MOF Tariff (2008) 36
- ♦ The Trial Management Measures for the Special Fund of Wind Power Equipment Localization; MOF Construction (2008) 476
- ♦ The Institutional Arrangements of State Council for Implementation and Supervision of Renewable Energy Law:

Overall Administration

- National Energy Administration
- National Development and Reform Commission
- Ministry of Finance
- Ministry of Science and Technology

Administrations by Sectors

- Ministry of Agriculture
- Ministry of Housing and Urban-Rural Development
- Ministry of Environmental Protection
- General Administration of Quality Supervision, Inspection and Quarantine
- State Forestry Administration
- China Meteorological Administration

Independent Supervision

- State Electricity Regulatory Commission

4. What agencies or bodies of government oversee the energy sector? What goals or mandates has the Chinese government set for electricity generation or fuels production from renewable sources?

The National Energy Commission: THE HIGHEST AUTHORITY

The National Energy Commission (NEC), headed by Premier Wen Jiabao, is the main agency responsible for overseeing national energy development. The NEC studies and formulates national energy development strategies, reviews energy security and development issues, and coordinates major programs of domestic energy exploitation and

international cooperation. The NEC is comprised of 21 ministers and directors from different departments including the National Development and Reform Commission (NDRC), the National Energy Administration (NEA), and the Central Bank.

The National Energy Administration: UNDERTAKING NEC'S DAILY WORK

The National Energy Administration (NEA) is under the supervision of NDRC. It replaced NDRC's Energy Bureau and handles NEC's daily affairs. NEA also absorbed other energy offices from NDRC, including the Office of the National Leading Group and the nuclear power administration of the Commission of Science, Technology, and Industry for National Defense (COSTIND). NEA has a broad mandate, which includes managing the country's energy industries, drafting energy plans and policies, negotiating with international energy agencies, and approving foreign energy investments.

National Development and Reform Commission (NDRC)

NDRC delegated authority to NEA to oversee energy production, international cooperation, and scientific research on energy but remains responsible for supervising the pricing of water, electricity, oil, and gas. Additionally, NDRC is responsible for energy efficiency programs and macro economy planning.

The departments below have the authority to implement regulations related to renewable energy in the sectors they oversee:

- ◆ Ministry of Science and Technology (MOST)
- ◆ Ministry of Finance (MOF)
- ◆ Ministry of Construction (MCon)
- ◆ State Environment Protection Agency (SEPA)

GOAL FOR GENERATION OF FUELS FROM RENEWABLE ENERGY

According to the Medium- and Long-Term Development Plan for Renewable Energy in China issued by NDRC in 2007, China aims to provide electricity to people in remote, off-grid areas and resolve fuel scarcity problems through the increased use of renewable energy. Increasing the use of renewable energy in these areas will be accomplished according to local conditions and with the goal of protecting the environment.

Some specific goals are set as follows:

Hydropower

China's installed hydropower capacity was set to reach 190 GW by 2010 and 300 GW by 2020 (data for 2010 not yet available).

Biomass Energy

Priorities for biomass energy development will be biomass power generation, biogas, biomass pellets (used directly as fuel), and liquid bio-fuels. Targets for 2010 were to have a biomass power installed capacity of 5.5 GW with annual use of biomass pellets for fuel at 1 million tons, annual use of biogas at 19 billion cubic meters, use of non-food-grain fuel bio-ethanol at 2 million tons, and annual use of bio-diesel at 200,000 tons.

By 2020, the installed capacity of biomass power is set to reach 30 GW. The annual use of biomass pellets is projected to increase to 50 million tons, annual use of biogas will increase to 44 billion cubic meters, annual use of bio-ethanol fuel will increase to 10 million tons, and annual use of bio-diesel will increase to 2 million tons.

Wind Power

The 2010 target for installed grid-connected wind capacity in China was 5 GW (neither governmental nor media data has yet been disclosed). Up to 30 100-MW-scale wind farms were to be established, located mainly in the eastern coastal areas and "Sanbei Region" ("Three Norths Region"). Projects in this region included building three 1-GW-scale wind farms in Jiangsu, Hebei, and Inner Mongolia. In addition, one or two pilot offshore wind projects will each have a 100-MW-scale capacity.

By 2020, the total installed grid-connected wind capacity in China is projected to increase to 30 GW. Rich wind energy resources in provinces such as Guangdong, Fujian, Jiangsu, Shandong, Hebei, Inner Mongolia, Liaoning, and Jilin will be exploited in adjacent swaths. This will establish a "backbone" of major wind provinces with over 2 GW of installed capacity in each province. Six wind farm bases (Dabancheng in Xinjiang, Yumen in Gansu, the eastern coastal area around Jiangsu and Shanghai, Huitengxile in Inner Mongolia, the Zhangbei Region of Hebei, and Baicheng in Jilin) will be developed, each with an installed capacity of at least 1 GW.

Solar Power

The 2010 target for installing solar PV power was 100 MW with an accumulated capacity of solar PV for remote areas at 150 MW. This would

supply up to one million agricultural and husbandry households in remote areas. By 2020, the capacity will be increased to 300 MW.

China aims to promote grid-connected building-integrated PV (BIPV) in economically developed large- and mid-sized cities. The 2010 target for BIPV capacity was 50 MW. By 2020, China aims to increase capacity for BIPV to 1 GW.

China aims to build relatively large solar PV and solar thermal power stations. By 2010, the grid-connected capacity was expected to be 20 MW (neither governmental nor media data have yet been disclosed).

5. What are the opportunities for private ownership (vs. public ownership) in clean energy development and technologies?

According to NDRC, both government- and privately-owned companies shall enjoy equal treatment in the development of renewable energy.

In practice, the government-owned companies have an advantage, especially because of their size. However, private companies in the fields of small hydro plants, solar module manufacturing, and turbine manufacturing are encouraged to invest in energy development and technologies.

Small Hydro Plants

The government, to some extent, encourages private investment in small hydro plants. Although large hydro plants can generate huge amounts of energy, the current electricity transmission systems prevent efficient transmission to rural countryside villages. As a result, the Chinese government fosters the development of small hydro plants in rural areas through tax incentives and relaxed constraints on bank loans. This regulatory and economic environment encourages private companies to invest in the construction of small hydro plants.

Solar Module Manufacturing

According to leading Chinese research institutes, solar remains one of the most promising areas of clean energy for investors. A reflection of this high potential is the fact that 10 Chinese solar module manufacturers have been listed on public stock markets. These companies have experienced much financial success. Beginning with Suntech's IPO on the NYSE in December 2005, China has seen a series of global market IPOs for module

manufacturers, including Trina Solar in 2006 and Yingli Green in 2007. Experts predict that private investment in solar manufacturing will continue to remain strong.

Turbine Manufacturing

State-owned enterprises are driving the growth of wind generation capacity and the turbine-manufacturing sector is currently experiencing a boom. Major foreign and JV manufacturers dominate the wind-power equipment-manufacturing sector, although local firms are growing steadily in this market. These local firms are expected develop a competitive quality product with a 10-20 percent lower price compared to the foreign products. The current Chinese policy aims for 70 percent of China's wind turbines to be produced locally. Therefore, China-based turbine manufacturers remain one of the most attractive investment opportunities in renewable energy.

6. What is the level of government investment or what incentives are in place to support these goals and targets?

Under the Renewable Energy Law, the central government has authority to establish the Renewable Energy Development Fund. The scale of investment in the fund is determined according to the Renewable Energy Law's requirements for developing renewable energy and the financial strength of the nation. At the local level, the Renewable Energy Law requires that financial sources should, when appropriate, allocate the necessary funds to support renewable energy development. Funds are utilized for economic incentive programs for investment and implementation of renewable energy projects.

The government has also implemented preferential tax policies to support the development and deployment of renewable energy and provides tax breaks for industries in the research and development of renewable energy technologies and equipment manufacturing. For example, in 2010, the Financial Ministry introduced incentives to accelerate the implementation of solar PV building applications. The Financial Ministry is expected to issue incentive programs and fiscal support measures for other renewable energy sources soon.

7. What kind of emphasis is placed on researching and developing renewable energy technologies versus looking to outside energy resources?

China prioritizes developing its own wind, solar, and biomass energy technologies.

Currently, most renewable energy technologies of China are licensed from abroad, which limits prospects for the long-term development of China's renewable energy industries. Fortunately, China has come to realize the importance of developing its own renewable energy technologies. The Chinese government attaches great importance to improving local research and technical innovation capabilities.

Among all the renewable energy technologies, China places the greatest emphasis on wind energy, solar energy, and biomass energy. During the period of the 10th Five-Year Plan, China established a fund to support the research and development of renewable energy technologies. Most of this fund is invested into wind-energy technologies, with 40 percent of the total fund being devoted to this sector. Funding for solar energy accounts for about 32 percent of the total fund. Funding for biomass energy accounts for about 25 percent of the total fund. Thus, funding for wind, solar, and biomass energy accounts for 97 percent of the total research and development fund. The remaining three percent is devoted to research and development of tidal and geothermal energy.

8. Is China on track to be a clean energy importer or exporter from the standpoint of power production supply and manufacturing?

China is the world's leading manufacturer of photovoltaic panels, 95 percent of which are exported. China is also a major exporter of solar-related equipment and Chinese enterprises are increasingly looking to export hydro-related equipment.

Certain products, such as wind-power dynamotor products, are predominately imported. Vestas, GE Wind, and Gamesa dominate the domestic market for wind-power dynamotor products and make up almost three-quarters of the market share.

China depends on importing technology, equipment, and services in other core areas as well.

9. How developed is China's workforce to support innovation, development and the production of renewable energy?

According to the government-backed Chinese Renewable Energy Industries Association, renewable energy companies are rapidly adding jobs. Employment in the renewable energy sector reached 1.12 million jobs in 2008 and has been climbing by 100,000 new jobs per year.

According to some analysts in the Chinese energy sector, the deployment of new technologies, like wind and solar energy, has the potential to support 20 million jobs by 2030 representing trillions of dollars in revenue.

10. What are the key barriers to increasing renewable energy as a part of China's energy mix?

Compared with the developed countries, the average skill level of China's renewable energy workforce is low and the cost of training is high. This weakens China's competitiveness and slows down the development of a large-scale renewable energy industry.

The regulatory approach and incentives for the renewable energy sector are unfinished, which causes the renewable energy industry to develop more slowly than it would otherwise. For example, certain links in the renewable energy industry supply chain are incomplete, and the upstream industry and the downstream industry cannot meet the needs of each other.

There are also fundamental transmission problems. For example, most of the best areas for renewable energy (such as the wind farms) lie in the north and northwest, far away from the bulk of the population. Transporting the energy to those industrial centers requires a large transmission network, which is not complete. The government needs to invest more in transmission infrastructure.

Unfortunately, production capacity of renewable energy is at a surplus in some local areas. This is due to some local governments and enterprises blindly following the trend to promote renewable energy, which created a redundant renewable energy infrastructure. This has caused an imbalance between the local renewable energy supply and demand.

GRANDFIELD LAW OFFICES

Grandfield Law Offices is among the top 50 law firms in China. Founded in 1994, the firm is headquartered in Beijing, with an office in Xi'an. Grandfield provides a full range of legal services, with a focus on finance, securities, international trade and investment, mergers and acquisitions, and intellectual property.

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