

# Renewable energy: China's domestic and global power surge

**The manufacture and export of clean energy technologies continues to rise; and further challenges await foreign competitors in 2011 in the services and financing sectors**

**2**010 has been a year in which the most significant renewable energy developments in China resulted not from new legislation or policies, but from the cumulative, self-reinforcing and accelerating economic and technological effects of previous legislation and policies. These effects include newly visible market shares and influence of Chinese participants in domestic and global markets.

China's growing demand for energy appeared, about half a decade ago, not only to threaten rapid depletion of domestic and global supplies of non-renewable energy sources, but also to foreshadow (in clouds of coal-generated smoke) an even more rapid choking off of public health, agriculture and economic growth in China, in its neighbors and (through carbon emissions and climate change) in the entire world. But less than six years after the *PRC Renewable Energy Law* (中华人民共和国可再生能源法) created a legislative framework for renewable energy promotion, China has fundamentally changed its domestic trends, and now is substantially influencing global trends, towards increased usage of renewable energy. While filling in its legislative framework with a series of national and local legal, tax and financial regulations and policies during the intervening years, China has hosted and orchestrated substantial installation of renewable energy generating products and, more importantly, enormous investments in factories to manufacture them. These factories represent a large and growing constituency for increasing domestic and international installation of renewable energy generating products, and for increasing China's role not only in their manufacture, but also in related services.

## Laws and policies

Though China's renewable energy legislative calendar in 2010 was relatively quiet, after years of increasing promotion of renewable energy products manufacturing and installation, it did include new efforts to promote important related services. The most broadly influential new legislation, which had been formally adopted just before the start of 2010, was a set of amendments to the Renewable Energy Law. Key effects were to expand tax incentives and subsidies for the development of renewable energy technology, to update the subsidy framework for renewable energy purchases, to update grid operators' obligations to expand their grids' connections and "smart" capabilities, and to increase central-level planning, coordination, and supervision. Also influential will be the pending update of the Medium and Long-Term Development Plan for Renewable Energy, to be issued by the National Development and Reform Commission. A draft that was widely discussed in late 2010 reportedly calls for China's 2020 total power capacity, which is projected to be 1600 GW (gigawatts), to include 500 GW from renewable sources, including 300 GW of hydropower, 150 GW of wind power, and 30 GW of biomass power, along with 20 GW of solar photovoltaic (PV) power.



**China's energy saving service industries are also ripe for expansion, innovation and potential export**

There has not yet been much measurable impact on the energy saving service industry from a related State Council opinion issued in April 2010, the *Opinions on Expediting the Implementation of Energy Performance Contracting for Promoting Energy Saving Service Industry Development* (关于加快推行合同能源管理促进节能服务产业发展的意见). However, its implementing regulations are expected to flesh out incentives and support for the development of energy-saving retrofitting of existing facilities, and other related services, which will become increasingly important.

Other legislative changes adopted in 2009, and having their main impact in 2010, included solar PV installation investment subsidies, and inter-regional standardisation of wind farm feed-in tariffs. Building upon China's substantial domestic experience with wind farm tender projects, the levels of feed-in tariffs payable by grid operators to suppliers of wind power have been formally standardised within four geographical regions, at different levels that are intended to reflect the differing quality of wind resources available in each region. Attempting to boost the solar PV sector, in which domestic sales have been relatively slow to ramp up, the national government first offered subsidies for the installation of rooftop and building-integrated solar PV, and then broadened them to cover ground-mounted solar PV, through the highly-publicised "Golden Sun" program. Local governments (notably in Beijing and Jiangsu Province) also began to offer subsidies for solar PV installation.

The most influential (at least in the short term) 2010 new developments in government policies were those of foreign governments. European countries began to reduce their generous feed-in tariffs. The United States declined to make permanent, or to extend beyond

2010, the increased and accelerated renewable energy subsidies that had been included in its 2009 economic stimulus legislation. Most dramatically, the United States Office of the US Trade Representative announced that it will initiate an investigation of various China governmental policies affecting renewable energy markets. This investigation, which could result in a complaint to the World Trade Organization, responds to a petition filed (under domestic United States laws) by the United Steelworkers union, which highlighted the impact of China's policies on employment in the United States.



**Services are also important for China, because further increasing its dominant position in manufacturing will not provide as much employment, energy efficiency, emissions reduction or profits as can be achieved by expanding investments into related services**

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#### **Manufacturing for domestic and export markets**

The most rapid and important changes in 2010 were the accelerating increases in capacity, sales and installation of China-manufactured renewable energy generating products. China solidified its recently acquired position as the world's largest manufacturer of power-generating wind turbines and solar PV modules, as well as its longstanding position as the largest manufacturer of solar water heaters and compact fluorescent light bulbs. Each of these products is already, or will soon be, exported by China in large quantities. The political sensitivity of exports is indicated by the following summary offered by the United States petitioners: "These practices have enabled China to emerge as a dominant supplier of certain green technologies. They also have facilitated the transfer of manufacturing and R&D investment from the US to China, cost American workers the high-skilled green jobs of the future, and increased the US trade deficit."

#### **Solar PV modules**

China's manufacturing of solar PV modules had ramped up quickly in recent years mainly to supply export markets, most notably European utility scale solar PV farms, which have been subsidised by generous feed-in tariffs. These tariffs, and sales to such solar PV farms, having peaked in 2009 and 2010, will soon decline, creating a need for China's solar PV manufacturers to find other markets. This trend in Europe, along with the trade friction highlighted by the United States petition, demonstrate the necessity of China's recent increase in efforts to subsidise domestic solar PV installations, and the supplemental efforts being made by leading PV-manufacturing regions such as Jiangsu Province. Manufacturing capacity is likely to continue increasing, because many regions continue to subsidise local investment in it.

#### **Wind turbines**

China's manufacturing of medium and large wind turbines, in contrast, was developed initially to supply China's domestic boom in wind farm installations. China's domestic content requirements in

wind farm-tendering procedures have supported the rapid expansion of domestic turbine manufacturing capacity. Domestic manufacturers, even while mainly supplying the domestic market, using both imported and self-developed components and technology, have been gradually increasing their manufacturing efficiency and their turbine size and reliability. By 2010, they were able to compete actively in export markets, and the government was happy to relax its domestic content requirements.

#### **Solar water heaters**

In solar water heaters, China has built upon the demand from its world-leading domestic market to become a world leader in manufacturing, and has recently begun increasing its attention to export opportunities. China's success, in using this efficient form of solar energy to reduce demand (especially in rural areas) for electricity generation, transmission and distribution, is a potential model for many countries. Exports are likely to be mainly

to third world countries, while even exports to the United States or the European Union are unlikely to spark much friction, because of the relatively small demand in those markets, and because China's water heaters predominantly use China-origin technology.

#### **Railway and automobile electrification**

In contrast to the humble water heater, exports of higher profile products are more likely to cause friction, especially if using technologies that were substantially created before China's recent push into research and development. The export potential of China's rapidly expanding electricity-powered high-speed rail network, which achieved new prominence in 2010, and which is a potential model of how to reduce consumption of jet fuel and resulting emissions, is likely to be substantially constrained by objections of its foreign technology licensors and their governments. But no such objections are likely to be possible in respect of the emerging industry of batteries for automobile drive trains, because dominance in related manufacturing makes China the logical location to complete the final stages of developing many new battery technologies.

#### **Fluorescent to LED lighting**

China's manufacturing of energy-efficient compact fluorescent light bulbs has been relatively balanced between the domestic market, where fluorescent lighting has always had relatively high market share, and export markets, where the EU and the United States have been legislating a gradual transition away from the previously customary filament lighting. China's labour cost advantage, along with its economies of scale, have facilitated China's emergence as the dominant manufacturer. Looking forward, China is well-positioned to become a major manufacturer, and participant in design and development, of white light LED (light emitting diode) lighting products, which achieved new prominence in 2010. These are likely to replace many fluorescent light bulbs, and to be the 'next big thing' in energy-saving lighting products and in appliances that contain them.

China manufacturers of the above products are gradually decreasing their dependence on foreign designs and technology. This

trend results in part from the pressure put on foreign companies to share their technology in return for access to China's manufacturing capacity and markets. This trend also results from China's increasing incentives and subsidies for domestic and foreign investment into research and development activities located in China. These pressures, and many of these incentives and subsidies, are targeted by the United States petition and investigation.

The above manufacturing capacity expansion and cost reduction, which has forced foreign competitors to quit manufacturing many of the above products, has also put great competitive pressure on the prices that can be charged by China manufacturers. They are responding with ever-lower prices, which appear insufficient to recover China's investments in these sectors, but have the benefit of encouraging faster purchasing and installation by energy generators and consumers both inside and outside China. While global and many national markets continue to be heavily influenced by constituencies that resist rapid replacement of traditional energy systems, these Chinese manufacturers, and their employees, investors, lenders and host local governments, constitute a large and growing countervailing constituency. Moreover, the more they reduce their prices, the more customers and consumers they can add to the constituencies favouring renewable energy.

### Services and finance

Now more than ever before, renewable energy service sectors fully merit the increased attention that they are receiving from China and foreign governmental agencies and market participants as the most accessible source of additional efficiencies, higher profits, and sustainable employment.

Services are especially important for American and European companies that can no longer compete with China in manufacturing of low-cost renewable energy products, and that are also starting to lose their historical dominance in design and development, and in manufacturing certain high-end products. Services are also important for China, because further increasing its dominant position in manufacturing will not provide as much employment, energy efficiency, emissions reduction or profits as can be achieved by expanding investments into related services. Although technology is being developed to increase the intelligence of, and to automate the operation of, grids, energy-generating facilities and energy-using appliances, there is much room for human involvement in designing, installing, monitoring and maintaining all of them, and in increasing the same services in connection with the more mature products discussed above.

Financing of renewable energy projects, both domestically and internationally, is also an area of increasing activity by China. Indeed, China financial institutions' government-supported access to low-cost capital, and ability to provide low interest rates to favoured borrowers, are among the preferences that have been criticised as unfair trade practices. A newer advantage of China's financial institutions is the substantial experience that they have acquired in the cross-border financing of European renewable energy projects in recent years, especially during the credit crunch that afflicted European financial institutions after the 2008 financial crisis. They

will certainly continue building on this experience by seeking further involvement in foreign projects. From the perspective of China's financial regulators, interests in overseas renewable energy projects, held by China's state-supported banks, are a healthy diversification of China's recycling of its large and growing foreign currency reserves.

In comparison with manufacturing, an attraction of many service sectors is that they are less susceptible to standardisation, commoditisation, price competition and squeezed profitability. But a certain level of standardisation may be necessary in order to achieve 'lift-off' growth in certain sectors, and China is well-equipped to leapfrog Western regulatory regimes in promoting this growth.

China's increasing focus on energy-saving retrofitting of existing facilities, and other related services, is demonstrated by the 2010 State Council opinion on the energy saving service industry. Moreover, the opinion expressly seeks to promote the type of large-scale companies that will be able to address the particular challenges of the retrofitting sector. Such companies should ideally combine sufficient diagnostic and technical ability to coordinate simultaneous retrofitting of multiple aspects of a facility's energy consumption, sufficient personnel to quickly retrofit large facilities, and sufficient size and financial sophistication and credibility to package related tangible and financial assets into financial instruments that are acceptable to conservative (low-return) lenders and/or investors. This type of financing has long been envisioned in the United States, but has been slow to evolve because of limited governmental support. If China is first to provide that support in its domestic market, and succeeds in developing national champions with experience in this sector, then they are likely to join the parade of Chinese companies targeting export markets.

### Exports of higher profile products are more likely to cause friction, especially if using technologies that were substantially created before China's recent push into research and development

#### Conclusion

China's rapid progress in the renewable energy sector has drawn on many of its virtues, including those that can be seen as vices. This may soon result in another major trade dispute with the United States, which may find it easier to achieve domestic consensus on criticising China than on matching China's support for renewable energy. While foreign governments and labour movements struggle to respond to China's conquest of yet another manufacturing sector, the resulting reduction in global prices for renewable energy products offers some solace to consumers of these products, and to other beneficiaries of cleaner air and slower climate change.

The key technical and economic challenges in 2011 and beyond will be to deploy those products efficiently, and to determine who will handle the highest value-added services. Foreign companies and policymakers will need to respond more decisively to these challenges, because there can be little doubt about China's intention and ability to build on its recent success.

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