



# *RELaw Assist* Renewable Energy Law in China – Issues Paper

June 2007



**Australian Government**

**Department of the Environment and Water Resources**

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renewable energy and international law



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# 1. Introduction

## 1.1 Importance of the Renewable Energy Law

### Impact in China and Australia

The Renewable Energy Law of the Peoples' Republic of China (**China**) came into effect on 1 January 2006 – a significant milestone not only for China, but for renewable energy industries in countries around the world.

The Chinese renewable energy market represents a significant opportunity for both Chinese and Australian businesses, given the enormous energy demand increases expected within China in the coming decades, and the leading renewable energy technologies that have been developed in Australia over the past decade. The Renewable Energy Law is an essential platform for diversifying China's energy mix. Australian industry, as a leader in a number of renewable energy technologies, is well placed to help China meet the additional demand for renewable energy as established by the Renewable Energy Law and the subsidiary regulations and regional initiatives that put this law into action.

The Renewable Energy Law itself is a brief umbrella document, which provides the provincial governments with a mandate to develop renewable energy feed in tariffs and quotas for the purchase of renewable energy within their locality. It is these detailed provincial government regulations that will impact directly on renewable energy project development in China and the investment analyses for Australian businesses. Awareness of the Renewable Energy Law needs to be promoted within provincial governments and the general public.

The Chinese Government is also interested in developing other mechanisms around the Renewable Energy Law, such as a greenhouse rating for buildings and the inclusion of remote renewable energy power systems. This provides further opportunities for Australian industry and government to share their experiences, and in turn increase awareness of the implementation of the Renewable Energy Law and the opportunities it presents.

### Why review the Renewable Energy Law?

China's Renewable Energy Law has now been in effect for over one and a half years, though not all detailed regulations have yet been drafted (let alone implemented).

The NDRC carried out the first official government review of the Renewable Energy Law in early 2007. The results of the review, including recommendations from Chinese industry stakeholders, were published on 20 April 2007. Section 3.3 sets out the details of this review.

The importance of the Renewable Energy Law has also recently been emphasised in China's National Climate Change Program. See section 1.4 below for more detail.

Given these recent developments and the importance of the Law, we considered that a detailed analysis would be of assistance to policy makers, industry bodies and other parties aiming to understand, implement, improve, and develop businesses under, the Renewable Energy Law.

## **Aims of RELaw Assist project**

The objectives of the *RELaw Assist* project are to:

- Accelerate the commencement of the renewable energy market in China by assisting the Chinese government, both at national and regional levels, to implement the detailed regulations under the Renewable Energy Law
- Partner Australian renewable energy businesses with Chinese counterparts to explore potential opportunities in the context of the implementation of the Renewable Energy Law and market in China
- Identify and promote business opportunities for the Australian renewable energy industry in China by providing and promoting Australian industry and market expertise, renewable energy technologies and experience within an operational renewable energy regulatory framework
- Examine the aspects of existing Chinese legislation or detailed regulations that may need elaboration or improvement based on the needs and practice of government and industry, and the experience of Australian renewable energy project developers in developing renewable energy projects in a more mature market.

## **Outline of this paper**

This paper considers renewable energy law and policy in China, including regulatory achievements, policy challenges and some future possibilities.

Chapter 1 provides some background on China's legal system, its energy industry and its environmental and climate change policies.

Chapter 2 examines the Renewable Energy Law in detail, illustrating the main principles of the law in China and providing examples of renewable energy laws in other countries.

Chapter 3 looks at future implementation and the gaps that remain in the regulation of renewable energy in China, and outlines the recommendations of the official review of the Renewable Energy Law.

Chapter 4 discusses the wider issues associated with implementing a project in China, including project approvals, project financing and structuring, projects under the Kyoto Protocol, and protection of intellectual property.

Chapter 5 summarises the recommendations arising from the review as a whole.

## 1.2 Background – China’s legal system and policies

### Division of government and legislative power in China

The Chinese system of government is based on unitary principles. All powers that are not delegated elsewhere are centrally exercised by the State Council, which is led by the Premier. The Premier puts forth laws from the National People’s Congress and Standing Committee. The National People’s Congress and its Standing Committee accordingly pass national laws, while the State Council enacts administrative rules and Local People’s Congresses make local regulations. Any administrative or local rules that breach national laws passed by the National People’s Congress are annulled. In this sense, China’s legislative system is far more prone to centralisation than a federal system in which provincial or local governments have legislative responsibility over certain subject-matter.

### Hierarchy of laws in China

China’s rule of law is based on two major sources, the Constitution of China and the Law on Legislation of China.

The Constitution is the foremost legal instrument, as it empowers the National People’s Congress and Standing Committee of the National People’s Congress to enact laws and to authorise other organs to enact laws. Accordingly, the Constitution provides for three other sources of law:

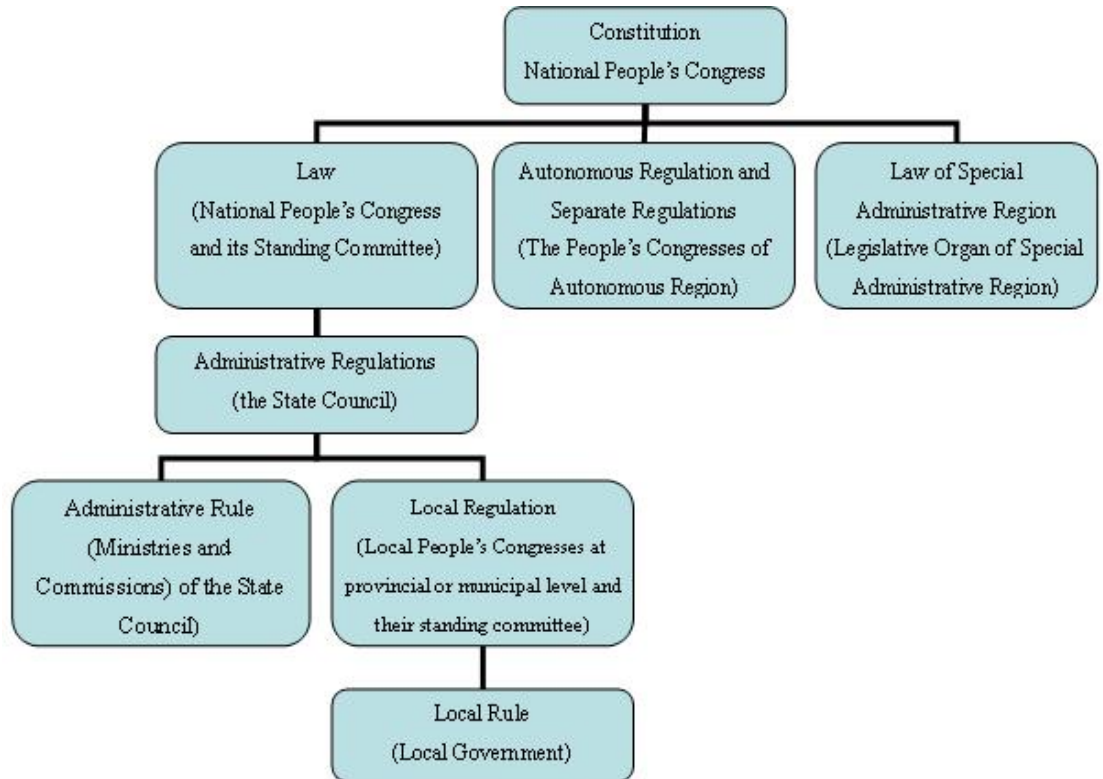
- laws of special administrative regions, which is enacted by the legislative organ of each administrative region;
- the autonomous regulations and separate regulations, enacted by the People’s Congresses of Autonomous Regions; and
- the laws enacted by the National People’s Congress and its Standing Committee, which allow the State Council, in turn, to enact Administrative Regulations.

At an administrative level, then, the State Council allows for two other sources of law:

- Administrative Rules by the Ministries and Commissions of the State Council; and
- Local Regulations by the Local People’s Congresses at Provincial or Municipal Level and their Standing Committee.

By way of local management, the Local People’s Congresses at Provincial or Municipal Level and their Standing Committee provides for the Local Government to make local rules.

This hierarchy of laws may be best viewed diagrammatically:



**FIGURE 1: HIERARCHY OF LAWS IN CHINA**

\* Source: Lingyan, S., "An Introduction to China's Legislative System", *King & Wood China Bulletin 2006 Special Issue*

(<[http://www.kingandwood.com/Bulletin/China%20Bulletin/Issue%20Oct%202006/bulletin\\_2006\\_10\\_en\\_shilingyan.htm](http://www.kingandwood.com/Bulletin/China%20Bulletin/Issue%20Oct%202006/bulletin_2006_10_en_shilingyan.htm)>) (date viewed: 6/12/2006)

## 1.3 Background – Energy in China

### China's current and projected coal consumption and GHG emissions

China's energy sector is in many ways unique, not least because of its high dependence on coal, which accounts for almost 70% of China's energy. (By way of comparison, the United States relies on coal for 52% of its electricity.) China's coal production has more than doubled since 1990, from one billion tonnes to approximately 2.16 billion tonnes in 2006, making it one of the world's largest coal-burners.

As foreseen, China has recently become the world's largest emitter of carbon dioxide. According to recent studies conducted by the Netherlands Environment Assessment Agency, China produced 6200 million tonnes of carbon dioxide in 2006, as compared to the United States of America which produced 5800 million tonnes (these figures include only carbon dioxide from fossil fuels and cement production).

Despite China's declining rate of emissions intensity (emissions per unit of GDP), the trend in total emissions growth is likely to continue, as official estimates predict that China's coal production will top 3 billion tonnes by 2020. By 2030 (or earlier) it is thought that China will account for 39% of the worldwide increase in carbon dioxide. (Note however that China's per capita emissions remain significantly lower than those of most developed countries.)

China's remaining exploitable reserves of petroleum and natural gas are respectively just 7.7% and 7.1% of world averages, while its coal reserves are 58.6% of the world's average. Its petroleum, natural gas and coal resources are expected to last 15, 30 and 80 years respectively.

### Energy market reforms

China's State Council approved the plan for structural reform of the power industry in April 2002 (*Reform Policy*). The main tasks identified in the Reform Policy include:

- separation of plant and grid;
- restructuring of power regulatory bodies and establishment of the State Electricity Reform Commission (*SERC*);
- establishment of a competitive electricity market;
- implementation of power tariff reform;
- formulation of environmental cost standards and surcharges for emissions; and
- formulation of a pilot program where generators directly supply power to large subscribers.

Before the Reform Policy period, the State Power Corporation (*SPC*) controlled 46% of China's electricity generation and 90% of China's grid operations, and all provincial and autonomous region power companies were affiliates of the SPC, with exception of the Guangdong Power Group, the Inner Mongolia Autonomous Region Group, and Hainan Province Power.

## Power generation companies

After the reform, the SPC was broken into 3 parts, which consisted of power generation assets, grid assets and service companies. The SPC's power generation assets were restructured into the following power generating companies, each of which is limited to no more than 20% of the generating capacity in each regional network: China Huaneng Group, China Datong Generation Group, China Huadian Group, China National Power Group, China Power Investment Group, and North China Power Group. Each of these generating companies has one or more China- or Hong Kong-listed companies. However, these companies remain ultimately controlled by the state.

## China's electricity grid

As a result of the separation of plant and grid under the Reform Policy, the SPC's grid assets were restructured into the State Grid Company (a wholly state-owned company) and the Southern Power Grid Company.

The State Grid Company has several subsidiaries, which span most north and central China – the North China Power Grid Company, the Northeast Power Grid Company, the East China Power Grid Company, the Central China Power Grid Company and the Northwest Power Grid Company. In contrast, the Southern Power Grid Company's scope covers south and southwestern China – Yunnan, Guizhou, Guangxi, Guangdong and Hainan provinces.

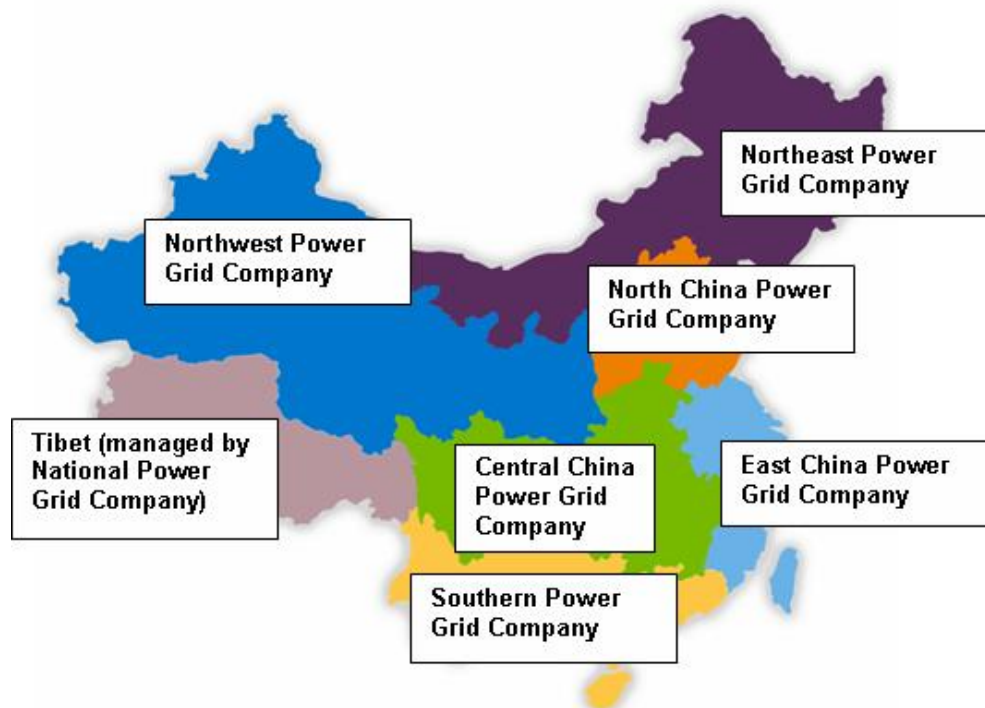


FIGURE 2: GRID COMPANY SUBSIDIARIES



## 1.4 Renewable energy and environment policies

### Renewable energy industry profile

China's renewable energy industry is growing. At present, renewable energy accounts for less than three percent of the country's total power generation (excluding power from large hydro projects and traditional biomass). China's target, however, is to increase renewable energy to 16% of its total energy production by 2020 – although some doubt has been expressed about its ability to meet this target. Of the US\$38 billion invested in renewable energy development worldwide, China contributed US\$6 billion, excluding its spending on large hydropower projects, making it a world leader. Such spending is largely pragmatic, since the country is becoming increasingly poor in many energy resources in per capita terms.

As well as satisfying pragmatic concerns relating to access to energy, China is also concerned about its international environmental image. Some of China's emissions have been transported to nearby South Korea and Japan by strong winds, which may foreseeably affect its relations with key trading partners. Indeed, China's "green" Olympics in 2008 are partly designed to showcase its willingness to adopt renewable energy.

The Renewable Energy Law is aimed at ensuring China's energy security while protecting the environment. Gu Xiulian, vice chairperson of the Standing Committee of the National People's Congress, has called for the development of renewable energy in accordance with the new law. As of the end of 2006, China proposed to build a 100 megawatt solar power station. China's annual growth rates in wind power have also been profound, with twelve provincial and autonomous power corporations being engaged in developing wind power and 19 wind farms recently established. By the end of 2005, China's 62 wind farms had a total installed capacity of 1,266 MW. The government has set a target of 5,000 MW for 2010 and 30,000 MW for 2020, by which time wind power will account for three percent of the country's total power needs.

### Key government players in renewable energy

It is widely recognised that China's economic growth is linked to energy resources. Premier Wen Jiabao, China's Prime Minister, has indicated that energy supply will be one of the greatest possible inhibitors to the growth of GDP. Given that energy is such a priority, the State Council has appointed an energy co-ordination task force under the leadership of Premier Wen Jiabao, Vice Premiers Huang Ju and Zeng Peiyan. The State Energy Office, which operates at a ministerial-level, will report directly to the task force. This taskforce replaced the Ministry of Energy that was established in 1988.

The key environmental monitor is the Chinese State Environment Protection Agency, which is gaining strength, as demonstrated when it halted construction of several dams and power stations because their full environmental impacts had not been considered. Moreover, the vice chairperson of the Standing Committee of the National People's Congress, Gu Xiulian, has also expressed her strong encouragement of renewable energy.

## Introduction to government policy on environment and GHG emissions

While on one hand, several key figures have demonstrated a commitment to the environment, such a commitment is tempered by the realities of a soaring economy and GDP, which have increased energy usage exponentially. The Kyoto Protocol itself makes provision for the conflict between environmental objectives and the need to continue economic growth, since, as a developing nation, China is a signatory to the Protocol without being obliged to take on binding targets to reduce greenhouse gas emissions. China does, however, have institutional and reporting obligations under the Kyoto Protocol.

Nevertheless, China has made some tangible steps towards reducing its emissions. Tony Blair has commented that China is taking "a real lead" in combating global warming. In 1995, the US Department of Energy and the Chinese Government signed a Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Development and Utilisation. China signed Annex II to the Protocol the following year, which signalled its commitment to large-scale deployment of wind energy systems. Furthermore, while China's carbon dioxide emissions rose rapidly between 1978 and 1996, the rate of increase slowed between 1996 and 2000, although the Chinese economy grew by 36%. To ensure continued economic growth with decreasing emissions intensity, technology development to implement newer, less-polluting facilities is considered a high priority.

However, the experience of dams and power stations in operation in 2006 suggests that the environmental impact of constructing such facilities may need to be reviewed. In that year, China halted work on building 22 major dams and power stations because the Chinese State Environment Protection Agency stipulated that the projects, worth a total of US\$14.65 billion, could not proceed until their environmental effects had been considered.

## National Climate Change Program

In June 2007, China took a significant step forward in addressing the risks of climate change with the publication of a new National Climate Change Program (prepared by the National Development and Reform Commission, or *NDRC*).

The Program outlines steps that China will take to meet the previously-announced goals of improving energy efficiency by 20% in 2010 over 2005 levels, raising the proportion of renewable energy in the primary energy supply to 10% by 2010, actively promoting energy price reform and implementing institutional reforms in the energy sector. It also provides for education and public awareness on environmental issues. Public environmental awareness is becoming increasingly widespread and having a deepening impact on Government decision-making.

The Program contains several statements relating to the Renewable Energy Law. It states that the measures set out in the Program will assist in "vigorously developing renewable energy" (section 3.3.1). Section 4.1.1(1) of the Program states that China

will promulgate the Renewable Energy Law as early as possible, and implement it in a comprehensive manner, and in addition:

- *further intensify preferential policies to develop and utilize clean and low carbon energy*
- *[d]evelop supportive regulations and policies, prepare national and local programs for renewable energy development, identify development objectives and integrate renewable energy development into assessment indicator systems for the construction of resource-conservative and environmentally-friendly society*
- *[t]hrough legislation and other approaches, [guide and encourage] domestic and international economic entities ... to participate in renewable energy development and utilization.*

Furthermore, section 4.1.1(2) asserts that:

*A stable mechanism for [renewable energy] investment will be established through government investment, government concession and other measures. A sustainable and stably expanding market for renewable energy will be fostered, market environment for renewable energy will be improved and obligation of national electricity grids and petroleum sales enterprises under the Renewable Energy Law to purchase renewable energy products will be implemented.*

## **History of renewable energy measures**

The implementation of China's Renewable Energy Law has not been an overnight proposition. Beginning with State Council policies on rural energy in 1983, measures to support renewable energy have included guidelines for wind farm development (1994), the Electric Power and Energy Conservation Laws (1995), renewable portfolio standards models (2000), studies into feed-in tariffs, quotas and renewable portfolio standards (2002) and other measures implemented recently by the Standing Committee of the National People's Congress. The Renewable Energy Law is the first attempt to implement a national framework for the development of all sectors of the industry and to create targets for the share of the total electricity market held by renewable energy.

## **Pollution control**

In September 2006, the National Bureau of Statistics and the State Environmental Protection Administration jointly issued a report which was one of the first government reports publicly issued in China to address adjustments to GDP caused by environmental pollution. According to this report, the economic losses caused by environmental pollution in China in 2004 amount to 3.05% of China's GDP in 2004.

It is not surprising, then, that pollution control is one of the reasons for the Chinese government's current plan to substantially increase the percentage of high and new energy and renewable energy in its overall energy consumption. The Chinese Government's concerns about pollution control and further implementation of the Renewable Energy Law are likely to lead to more support and access to the relevant markets being provided to private companies in the renewable energy sector in China.



## 2. Renewable Energy Law

### 2.1 Aims of the Renewable Energy Law

There are a number of objectives which underpin China's Renewable Energy Law.

#### **Emphasising importance given by Government to RE sector**

A challenge to date has been the difficulty in attracting sufficient stakeholder interest in the renewable energy sector. The Chinese Government's active role in developing legislation aims to redress this by emphasising the Government's interest in this area. The Government has been active in developing legislation in such areas as power sector reform, investment and finance sector reform and environmental legislation. Policies providing economic incentives for renewable energy and the development of a strong commercial industry are also important aspects of the reform process.

#### **Removing market barriers to RE industry development**

The development of a renewable energy market is the basis for strong commercialisation and rapid development of a renewable energy industry. A sound market should complement the economic and political interests of the different stakeholders involved. For example, a feed-in tariff or tendering mechanism would reduce the barriers to grid connection and would need to balance the relationship between renewable energy power generation companies and other utilities. One method of addressing this balance might be a cost-sharing mechanism which can compensate the utilities' loss and encourage a positive attitude towards the renewable energy industry. Therefore, balancing the relationships between stakeholders is one basic objective of the legislation.

#### **Establishing a financing system to ensure RE development**

The cost of renewable energy is normally higher than conventional, fossil fuel-fired energy generation. As a result, some form of cost sharing system is usually necessary to remove the barriers to entry into the renewable energy market. This is addressed in China through specific funding arrangements for particular renewable energy applications, including renewable energy development in rural areas, electricity extension for remote areas, research and development, resource surveys and the establishing technical standards. The Ministry of Finance, together with other relevant Government authorities, is currently formulating regulations to guide the management of the cost sharing fund. As with the special funds themselves, these regulations are specific to particular renewable energy technologies and applications.

#### **Giving clear signals to the market**

To establish a sound environment for the renewable energy market, the legislation aims to provide a clear development roadmap and defined renewable energy targets. International experience indicates that unless a sound market environment for renewable energy is established, market players will not actively participate.

## **Establishing a self-sufficient industry system**

The Chinese Government's view is that commercialisation of various renewable energy technologies cannot be achieved without a self-sufficient manufacturing industry. National manufacturing development programs, such as the High-Tech Industry Development Program and Key Equipment Manufacturing Development Program, within the Ministry of Science and Technology, may therefore incorporate renewable energy strategies as part of the planning process. This, in turn, would guide and attract the participation of various entities, and would improve the research and development capability of the renewable energy manufacturing industry. The establishment of a renewable energy manufacturing industry should help to increase the competitiveness of the renewable energy sector.

## **Building knowledge and awareness around renewable energy**

In order to successfully develop and utilise renewable energy, it is necessary to improve public education and disseminate information on energy efficiency and environmental protection. Through legislation, Chinese government agencies are required to use renewable energy and large companies are encouraged to use renewable energy. The regulations implementing the Renewable Energy Law make provision for demonstration projects to guide local development of renewable energy. There is also a movement towards conducting volunteer programs around green energy and energy efficient consumption.

## 2.2 Rules comprising the Renewable Energy Law

### Division of responsibilities

Under the institutional framework of China, the central government is responsible for the formulation of the national regulations which guide individual provinces during the implementation process. Instructions regarding pricing, cost-sharing, taxation and the project approvals process are stipulated by the central government for the provincial government to follow. However, since there are great disparities between various provinces in terms of resource availability, industrial capacity and demand, in some cases provincial governments have needed to formulate their own detailed provisions for their area within the central government's general policy framework. These detailed provisions may include such issues as provincial management provisions for particular renewable energy technologies, financial support for pilot projects and preferential treatment in other areas such as land access.

The Renewable Energy Law requires the relevant central authority to be responsible for drafting these regulations. For example, the NDRC is responsible for energy pricing and planning issues, the Ministry of Finance (*MoF*) is responsible for economic incentive programs, and the Ministry of Agriculture is jointly responsible with the NDRC for rural biomass utilisation and rural energy development. Technical codes relating to renewable energy in buildings have been issued by the Ministry of Construction (*MoC*).

### Issued regulations

Under the Renewable Energy Law, implementing regulations are to be formulated that cover twelve key issues including pricing, grid-connection and incentive policies. To date, seven of these documents have been published. These are:

PROVISIONAL ADMINISTRATIVE MEASURES ON PRICING AND COST SHARING FOR RENEWABLE ENERGY POWER GENERATION (NDRC PRICE [2006] NO. 7)	Sets out the principles for renewable energy power pricing and cost sharing. In particular, it identifies the level of wind and biomass power pricing and clarifies all costs related to renewable energy power that will be covered by the renewable energy surcharge.
RENEWABLE ENERGY SURCHARGE LEVEL REGULATION (NDRC PRICE [2006] NO. 28-33)	Establishes the tax-exempt renewable energy surcharge (¥0.001 per kWh) payable by end users of electricity. This cost sharing arrangement mandates that end users pay a proportion of the higher cost of providing renewable energy, as well as the cost of connecting renewable energy facilities to the grid.
PROVISIONAL REGULATION ON RENEWABLE ENERGY SURCHARGE BALANCING (NDRC PRICE [2007] NO. 44)	Identifies the procedure for provincial power utilities to collect the renewable energy surcharge, the methodology for allocating this revenue amongst the provinces, and the role of the monitoring body in this process.

REGULATION ON THE ADMINISTRATION OF POWER GENERATION FROM RENEWABLE ENERGY (NDRC ENERGY [2006] NO. 13)	Sets out approval procedures for renewable energy projects and further identifies the responsibilities of utilities and power generators. Provides that utilities are obliged to allow renewable energy facilities to connect to the grid.
GUIDING CATALOGUE FOR DEVELOPMENT OF THE RENEWABLE ENERGY INDUSTRY (NDRC ENERGY [2005] NO. 2517)	Identifies the renewable energy technologies that will be supported by the government and identifies the economic policy instruments that will apply to these.
PROVISIONAL ADMINISTRATIVE MEASURES ON THE RENEWABLE ENERGY DEVELOPMENT FUND (MOF ECONOMIC AND CONSTRUCTION [2006] NO. 237)	Sets out the criteria for the use of the Renewable Energy Development Fund, identifies “priority areas”, and provides application and approval procedures.
REGULATION GOVERNING THE USE OF THE RENEWABLE ENERGY DEVELOPMENT FUND TO PROMOTE RENEWABLE ENERGY INTEGRATION IN BUILDINGS (MOF CONSTRUCTION [2006] NO. 460)	Together with the ‘Notice on the approach to appraisal of pilot projects for renewable energy integration in buildings’, sets out how the Renewable Energy Development Fund will be used to promote the integration of renewable energy in buildings, the application and approval procedures and the criteria for project selection.
REGULATION ON THE MANAGEMENT OF BIO-ETHANOL PROJECTS (MOF CONSTRUCTION [2006] NO. 460)	Sets out the policy for bio-ethanol development, imposes stricter market-entrance standards, project management and supervision requirements, and streamlines the administration system
REGULATION OF THE CONSTRUCTION AND MANAGEMENT OF WIND FARMS (NDRC ENERGY [2006] NO. 1204)	Obliges local government authorities to develop local wind energy development plans (for facilities smaller than 50MW) according to wind resource availability. The wind tariff is still determined by the State Council through a tender process.

## Forthcoming regulations

In addition to these, a number of regulations are close to publication, including:

RURAL ENERGY DEVELOPMENT PLAN	This regulation will require the Ministry of Agriculture to draft a rural energy plan, covering renewable and conventional energy use and energy efficiency measures in rural areas.
GRID CONNECTION AND POWER PURCHASING REGULATION	This regulation will require the national grid authority and national standards authority to draft grid connection and power purchase standards to ensure the safety of the grid when it receives electricity from renewable energy sources.  <b>Status:</b> draft completed by SERC and awaiting approval.

The NDRC has also jointly issued some other regulations with MoF to guide the development of specific renewable energy industries, including in relation to the management of bio-ethanol projects and the requirements to construct and manage wind farms.

## Policy guidance

Government authorities have jointly issued a number of guidance documents that further outline policy directions for particular industries and applications, including:

- Opinion on the use of the Renewable Energy Development Fund to promote the wind industry (issued by NDRC and MoF);
- Notice to promote the development of the biofuel industry through support for project construction (NDRC and MoF);
- Notice on the approach to appraisal of pilot projects for renewable energy integration in buildings (MoF and MoC); and
- Opinion on fiscal supporting measures to promote bio-energy and bio-chemical industry development (MoF).

## Technical standards

Several important technical standards and criteria have been issued by the Standardization Administration of China. These include:

- Wind power generation Part I: general technical qualification;
- Wind power generation Part II: general testing approach;
- Technical code for wind farms to connect to the grid;
- Technical code for the geothermal power plants to connect to the grid; and
- Technical code for solar photovoltaic power plants to connect to the grid.

The Ministry of Construction has also issued some technical codes relating to the energy systems within buildings, including for solar water heaters in civil buildings, and for soil-sourced heat pump projects.

## Local implementation

Many provincial governments have already implemented local regulations to implement the national framework law and regulations. Most of the coastal provinces and inland provinces with abundant wind resources have drafted their own wind development plans, including Inner Mongolia, JiangSu and ShanDong provinces.

Some provinces with large biomass resources, such as HeNan province and GuangXi province, are focusing on biomass development plans. ShangHai Municipality and YunNan province are drafting “Codes for Renewable Energy Development”. ShangHai has already issued the “White Book for Energy Policy”, highlighting the significance of renewable energy. HaiNan province, ShenZhou and TsingTao city have published



local regulations to compulsorily increase the integration of solar energy into new buildings.

It has been proposed (during the 20 April 2007 review of the Renewable Energy Law – see section 3.3) that local and provincial governments implement initiatives relating to resource assessment and data collection, and this is likely to be a focus of provincial level strategic planning in future.

**TABLE 1: REGULATIONS IMPLEMENTED AT A PROVINCIAL LEVEL TO DATE**

REGION NAME	REGULATIONS OR OTHER DOCUMENT	RESPONSIBLE OFFICE
Shanghai	White book for energy policy, which includes the renewable energy development plan	Local DRC
Hainan	Regulation to promote integration of solar hot water into buildings	Provincial construction bureau
Shenzhen	Regulation to promote integration of solar hot water into buildings	City construction bureau
Yunnan	Certification requirements for installation of solar systems into buildings	Provincial construction bureau
Beijing	Regulation for promoting solar systems in rural areas	Local DRC
Shandong	Measures for promoting biogas and renewable energy in rural areas	Provincial government
Hunan	Regulation for renewable energy development in rural areas	Provincial government
Guangdong	Measures for promoting solar energy development	Provincial government
Sichuan	Measures for promoting biogas development in rural areas	Provincial government

### Case study – Rural lighting project, Beijing municipality

This project, together with the rural heating and rural recycling projects, is one of three major projects undertaken by the Beijing Municipality Government in 2006 to implement the national New Rural Construction Program.

The project is designed to find environmentally sound solutions to provide roadside lighting in sparse rural and sightseeing regions. It is intended to take advantage of the abundant local solar energy resources and install solar PV modules to meet energy demand in rural areas. The Municipality Government has created a special fund to support this project, and twenty solar PV enterprises have been selected through a public tendering process to install lamps.

By 2006, a total of 30,000 solar PV lamps had been installed in the 13 rural and regional counties in Beijing Municipality, of which 25,000 were installed in villages, and the remaining 5,000 were installed along roads. 400 villages and 33 special travel roads in rural regions have benefited from this program.

YanQing County Government, for example, has allocated 17.28 million RMB to this project, and in that county, there have been 1835 lamps installed along major rural roads and 585 lamps installed along the sightseeing rural roads.

## 2.3 Principles of the Renewable Energy Law

Four key principles were established as the basis for China's renewable energy legislation.

### **Combining government responsibility and citizens' obligations**

Internationally, governments have agreed that renewable energy must be part of the energy mix in order to solve the world's future energy problems. Developing a renewable energy industry is the responsibility of government. However, the cost of developing a renewable energy capability will be borne incrementally by the public. As such, a successful policy which achieves an equitable outcome will require cooperation between the government and the public.

The Chinese Government has clarified its responsibility to develop renewable energy in the Renewable Energy Law. At the same time, the Government has stated that both companies and individuals will be encouraged, and in some cases obliged, to use renewable energy. For example, the cost sharing system requires all power consumers to pay a surcharge to support the development of renewable energy, and regulations provide for the compulsory use of solar power in some buildings. The principle of combined responsibility lies at the core of the Renewable Energy Law and serves as the basis for all the regulations.

### **Combining government promotion and market guidance**

The Chinese Government recognises its role in building a market, establishing the market rules, and regulating the market. Once a market is established, market mechanisms will efficiently guide and encourage participants to explore renewable energy resources. The Renewable Energy Law contains detailed regulations on responsibilities for renewable energy resources surveys, planning, project construction, industrial development, and economic incentives. Regulations detailing the market rules and how market competition is to be maintained will also be established. These regulations are designed to assist in building the market, as well as encouraging the active involvement of market players in renewable energy development.

### **Combining actual demand and future development**

The government's aims for the Renewable Energy Law include, on the one hand, to satisfy existing energy demands, while on the other hand, balancing planning for future energy supply and demand. The Renewable Energy Law is intended to ensure that mature renewable energy technologies, solar, biomass, biogas and hydropower technologies, will be heavily promoted in an effort to solve rural energy access problems. It is also intended to ensure that research and development of future technologies will be strengthened. Economic incentives are intended to create market demand in new technologies.

## **Combining domestic practice with international experience**

The key provisions of the Renewable Energy Law have combined domestic practice with international practice. For instance, the overall target for renewable energy (discussed below) takes into account the domestic context, including the availability of particular resources, existing manufacturing capacity and the requirements of rural and urban areas. On the other hand, the pricing mechanism and cost sharing system have benefited from the lessons of international experience.

## 2.4 Systems established by Renewable Energy Law

In line with the principles discussed above, the Renewable Energy Law has provided the framework for some important legislative initiatives, designed to secure the strategic position and future development of renewable energy. These include:

- **Renewable energy targets**, including both economy-wide and technology-specific targets;
- **Compulsory grid connection** for renewable energy facilities to the State electricity grid;
- **Power pricing arrangements**, including feed-in tariffs and competitive tendering systems, to allow renewable energy to compete with traditional, fossil fuel-powered generation; and
- **Cost sharing arrangements** to divide the costs of renewable energy generation and grid connection equitably amongst utilities and electricity end users.

These systems are discussed in Sections 2.5 – 2.8 below.

## 2.5 Renewable energy targets

### Purpose of targets

Renewable energy targets have been set for both the medium- and long-term. These include overall targets for renewable energy in the national energy mix, as well as individual targets for each renewable energy technology (hydropower, solar power, wind power and biomass). These targets take into account actual resources, economic conditions and energy demand. The overall target is supported by detailed regulations for each sector, which are intended to ensure the achievement of the overall target.

The purpose of establishing these targets is to ensure that renewable energy is well-positioned in relation to China's energy development strategy and its national sustainable development strategy. This assists in guiding the size of the market as well as the direction of future investment and technology innovation. Targets are also provided for the scale of development, time schedules, lists of feasible technologies, and planning for cost evaluation and development deployment.

### Implementation – the legal underpinning

The implementation of these initiatives requires the joint participation of local governments and market entities. Chapter 1, Article 4 of the Renewable Energy Law provides that:

the Government lists the development of utilization of renewable energy as a priority area for energy development and promotes the establishment and development of the renewable energy market by establishing overall generation targets for renewable energy and taking corresponding measures.

Moreover, Chapter 2, Article 7 indicates that:

the energy authorities of the State Council set medium- and long-term overall targets for the development and utilisation of renewable energy at the national level, which will be implemented and released to the public after being approved by the State Council. Energy authorities of the State Council will, on the basis of the overall renewable energy target, as well as the economic context and availability of renewable energy resources, cooperate with the governments of provinces, autonomous regions and municipalities in establishing medium- and long-term targets and release them to the public.

In addition, Chapter 2, Article 9 states that:

the energy authorities of the State Council will, on the basis of the medium- and long-term overall renewable energy target throughout the country, prepare national renewable energy development and utilisation plans, which are to be implemented after being approved by the State Council

and that

energy authorities of the governments of provinces, autonomous regions and municipalities will, on the basis of the medium- and long-term target for the development and utilisation of renewable energy, cooperate with relevant authorities of the people's governments at their own level in preparing national renewable energy development and utilisation plans for their own administrative regions, which will be implemented after being approved by the governments at their own level.... The approved plan will be released to the public, with the exception of confidential content as stipulated by the government.

In this sense regulations combine the overall targets with the measures intended to achieve the targets.

### Details of the targets

The table below shows the overall and technology-specific targets for 2010 and 2020. If these targets are met, renewable energy would constitute approximately 16% of China's projected energy consumption in 2020.

**TABLE 2: RENEWABLE ENERGY TARGETS**

	2010	2020
Proportion of RE in national energy mix	10%	16%
Hydro	180 GW	300 GW
Biomass	5.5 GW	30 GW
Wind	5 GW	30 GW
Solar	500 MW	1.8 GW
Solar collectors	150 million m <sup>2</sup>	300 million m <sup>2</sup>
Biogas	15 billion m <sup>3</sup>	30 billion m <sup>3</sup>
Liquid fuel	2 million tonnes	10 million tonnes

### Utility-level targets?

The Chinese Government has stated that utility-level targets are considered too complicated and costly to be implemented in China, and has confirmed that obligations under a quota system will be placed on generators, rather than on utility companies.

However, if the renewable energy goals for each administrative region were stepped down to individual utilities in the form of a mandatory renewable energy target, there will be a further incentive to invest in renewable projects, since a certain level of market demand would be guaranteed.

Stepping down targets to individual utilities in this way – potentially by providing for a tradeable renewable energy certificate scheme to minimise the economic impact on the power sector – may also be necessary to ensure that overall targets are achieved. Under feed-in tariff arrangements alone, a disconnect arises between the establishment

of a renewable energy target and the mechanism adopted to achieve it, as feed-in tariffs may not guarantee a sufficient increase in demand to satisfy the target. Regular feedback and reporting from provincial level governments on progress towards the achievement of targets may be required (and the feed-in tariff level increased where targets are not being met) to overcome this, and to ensure that the uptake of renewable energy is in line with the overall target.

#### **Issues and recommendations**

- Consider the implementation of utility-level renewable energy targets and a tradeable certificate scheme to effectively link overall targets with chosen policy mechanisms.
- Alternatively, consider strict reporting arrangements to ensure that feed-in tariffs are sufficient to meet established overall renewable energy targets.



## 2.6 Compulsory grid connection

### History of grid connection policies

A compulsory grid connection mechanism first appeared in China in the early 1990s, when wind power was first adopted in China. Wind energy benefited directly from the “Regulation on wind farm grid connection management”, developed by the former Ministry of Electricity, which offered a favourable grid connection tariff for wind power. The incremental cost was borne by the power generators, which at that time were all state-owned. As a direct result of this regulation, the wind generation sector experienced rapid growth between 1995 and 1997.

During that period, the power sector, which was comprised of corporations and government authorities, was able to transfer the high cost of wind power to the public. Although not economically viable, the government-led power sector was active in developing wind power because it brought environmental and social benefits.

The government then focused its attention on developing clean energy through power sector reform, including providing for renewable energy grid connection. In 1998, the Ministry of Electricity was dismantled and the State Power Corporation was established. The main purpose behind the power sector reform was to break the power sector monopoly and create competition within the power market via the separation of power generators and utilities. The reforms also encouraged the power sector to commercialise and increase its efficiency. Since this time, the scale of renewable energy projects has increased, and there has been a significant diversification of investment in the power sector.

### Grid connection under the RE Law

The Renewable Energy Law provides for the compulsory connection of renewable energy generators to the grid, and a regulation has been enacted to give effect to this (NDRC Energy [2006] No.13). The regulation deals with general rules governing grid connection, project management requirements, utility company responsibilities and generator responsibilities. The regulation covers hydropower, wind power, biomass (including forest and agricultural residue, direct combustion and gasification, land fill gas power generation, biogas generation), solar power generation, geothermal power generation, and ocean energy. It emphasises that penalties will be imposed for violations.

There are two elements to the compulsory grid connection system in the Renewable Energy Law:

- all energy generated from renewable sources must be purchased; and
- utilities must provide grid-connection services (including constructing grid connections) and related technical support.

The Renewable Energy Law has also provided clear regulations for gas, heat and liquid fuel sourced from renewable energy. These forms of energy generation must be allowed to be connected to the grid if they satisfy the standards of grid connection.

National biofuels standards are currently under preparation. Oil companies (of which there are currently only two in China) must also incorporate biofuels that accord with these standards into their distribution systems. As special monopoly industries, these oil companies have a specific responsibility to renewable energy generators to facilitate their integration into the distribution systems.

### **Supporting policies: power purchase, network construction**

The Renewable Energy Law requires a power-grid enterprise to purchase all electricity generated from those renewable energy producers who are connected to that grid. Moreover, in areas not covered by a power grid, the Government will fund the construction of independent renewable energy electricity generation systems to provide electricity locally.

Other laws and regulations in China support the aims of the Renewable Energy Law. For instance, they provide that power grid enterprises at or above the provincial level will enact network construction plans for renewable energy electricity in accordance with the relevant provincial people's governments' development plans for renewable energy, and construct and re-construct their networks to ensure full connection to the grid by renewable energy generators.

### **Connection to State Grid Company**

In order to connect to China's national power grid, which is managed by the State Grid Company, a power generating company must consult with State Grid Company and/or its local or provincial designates, before the power generating company can obtain the required approvals from relevant governmental authorities.

The power generating company must engage a qualified designer to design its system for connecting to the power grid. The basic requirements set by the State Grid Company for a power generating company to be able connect to the power grid include:

- complying with the national electricity development plan and grid overall plan;
- having a clear electricity consumption direction or scope; and
- obtaining approval on its connection system design.

However, it has been suggested that the grid connection process for renewable energy facilities in China is more a matter of negotiation than process.<sup>1</sup> Particular problems include that transmission networks are not designed with large-scale renewable energy facilities in mind, and that there is limited training available to grid controllers on how to manage this form of power generation on the network.

#### **Issues and recommendations**

Large-scale efficient transmission networks need to be designed and implemented to deliver energy from renewable sources around China and allow the grid to support large-scale renewable energy projects.

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<sup>1</sup> B. O'Flynn, "A Study on the Pricing Policy of Wind Power in China: Airtricity Comments and Perspectives"

## 2.7 Price setting for renewable energy

### Importance of price setting for renewable energy

Price is the key barrier to the commercialization of renewable energy generation, as the cost for renewable energy power generation at its present stage of development is higher than conventional energy for all sources except large hydropower. (In part this may be traced to long-term subsidies given to fossil fuels.) Therefore, generators using renewable energy are not yet able to be connected to the grid competitively without some form of financial assistance. For some time yet, renewable energy will continue to depend on the price support mechanisms that have been established by China's central government. This system internalises the average social cost of different renewable energy technologies into prices for renewable power (wind, solar, biomass).

Since there are disparities between the production costs of renewable energy from different sources, only a variable price system can reasonably promote the development of different renewable energy technologies. This system is designed to encourage investors to participate in the market so that it expands and diversifies. Feed-in tariff systems, which provide fixed prices for power purchases, significantly reduce the time necessary to negotiate power purchase agreements and gain project approvals from Government authorities, thus decreasing transaction costs.

Where several potential investors all have an interest in one project, a tendering process can be adopted to choose the final investor. Prices established in this way can either be relatively fixed or regularly updated. The purpose of such a system is to simplify the project approval process, clarify the investment return, reduce project development costs and enable competition.

Under the Renewable Energy Law, renewable energy prices (or the mode by which they are established) are to be determined by the price authorities of the State Council in accordance with the principle set out in Chapter 5, Article 19:

being beneficial to the development and utilisation of renewable energy and being economic and reasonable, where timely adjustment will be made on the basis of the development of technology.

### Two methods to price renewable energy

The price that generators receive for the renewable energy they generate is a critical factor in the bankability of new renewable energy projects and investments.

What is the most effective and efficient way to price renewable energy so as to encourage its development? There are typically two different approaches: prices may be determined by the market (supplemented by regulation, such as the implementation of renewables portfolio standards or competitive tendering) or directly by regulation (through the use of feed-in tariffs).

**TABLE 3: COMPARISON OF FEED-IN TARIFFS AND COMPETITIVE TENDERING SCHEMES**

FEED-IN TARIFFS	TENDERING
A production subsidy. Energy utilities must allow renewable energy producers access to the grid, and must buy all energy they produce at a fixed price, set by government.	Government runs a bidding process for a contract to provide a specified amount of renewable energy. The contractor with the lowest price bid, and which can satisfy other requirements such as local content, will win the tender.

Both approaches are used in China. The Chinese Government has chosen to implement separate pricing laws for each type of renewable energy, using two primary methods: *feed-in tariffs* (“government-fixed pricing”) and *competitive tendering* (“government-guided pricing”). These laws and regulations aim to offer renewable energy generators a guaranteed power price, coupled with a purchase obligation on utilities, to stimulate the development of the market. So far, only wind, solar and biomass prices have been developed, although a framework methodology for wave hydro and geothermal power prices is set out in the Renewable Energy Law.

**TABLE 4: PRICING MECHANISMS FOR RENEWABLE ENERGY IN CHINA**

TYPE OF ENERGY	PRICE-SETTING METHOD	DETAILS
Biomass	Feed-in tariff	Price for coal plus 0.25 Yuan/kWh, decreasing by 2% per year from 2010
Solar PV and solar thermal	Feed-in tariff with government approval of projects	Government first needs to approve each solar power project. If a project is approved, the government will set an appropriate feed-in tariff, on a project-by-project basis. The tariff will be set based on the concept of a "reasonable price".
Wind	Tendering	Government will select potential investors through a competitive bidding process, with power price and domestic content the key criteria

### Feed-in tariffs – design issues

Feed-in tariffs can be a very effective way of promoting renewable energy. In Germany, for example, feed-in tariff laws have been instrumental in the development of the renewable energy industry (see below).

However, certain design issues are critical for success. Firstly, long-term price guarantees of at least 15-20 years, but with a phase-out date or gradual reduction to encourage efficiency, are required to create certainty for investors. Secondly, potential developers and investors also require guaranteed buyers for generated renewable power, with must-take or default contract terms. The Renewable Energy Law provides

for this, by obliging utility companies to purchase all energy generated from renewable sources.

Thirdly, potential developers require the guarantee of a commercially viable price, which offers a reasonable rate of return for the energy producer. Some countries (such as India) have found it helpful to consult industry when determining these prices. The prices established under feed-in tariff laws should also be differentiated according to the renewable energy source, since different technologies will require different levels of support depending on their maturity and cost. Finally, it is important that feed-in tariffs are integrated with other energy market policies, such as favourable tax treatment for renewable energy or low-interest loans.

If the feed-in price is set too low, only inexperienced developers or utilities might seek to undertake renewable energy projects in China. This means China could miss out on the benefit of technology transfer from experienced operators. Further, inexperienced operators or developers who are able to undertake projects at very low prices might not use the best available renewable technologies or materials, so the project might not be viable or successful over the long term.

#### **Case study – Feed-in tariffs in Germany**

Germany has had great success with its feed-in tariff laws. A feed-in law was enacted in 1990, amended in 1998 and replaced with a new law in 2000 – thus the current feed-in tariff law has drawn on previous experience in setting feed-in prices. Features include:

- different tariffs for different renewable technologies, based on the cost of producing energy from each source – determined with assistance from scientists and the relevant renewable energy industry;
- tariffs fixed for 20 years from commissioning of the energy installation, but each year the tariff paid to an installation commencing production in that year is approximately 2% less than the tariff paid to an installation commencing production in the previous year;
- tariffs reviewed every two years; and
- prices ultimately passed down to energy consumers.

Starting from virtually no renewable energy industry in 1990, Germany is now a renewable energy leader. Wind capacity increased more than 200-fold between 1991 and 2002, and photovoltaic capacity increased over 60-fold in a similar time frame. Costs of wind and photovoltaic systems have reduced by approximately 40% in that time. The multi-billion dollar industry provides thousands of jobs.

Sources: UNDP World energy assessment overview – 2004 update; JL Sawin National policy instruments: policy lessons for the advancement and diffusion of renewable energy technologies around the world 2004

#### **Biomass – feed-in tariff**

The price for biomass energy is calculated based on the 2005 desulphurised coal power price in each province, plus a subsidy amount. At present, the standard subsidy is

RMB 0.25 per kWh. From 2010, the subsidy will decrease by 2% each year and it will be cancelled completely after 15 years. If conventional energy sources supply more than 20% of the power generated by a multi-fuel biomass project, the project is not eligible for the subsidy.

The key issue that has emerged in the implementation of the biomass feed-in tariffs is the need for differentiated treatment based on energy source. Under the current arrangements, all biofuels are treated identically, but the economics of different biofuels mean that different treatment may be required to support the development of all industry sectors.

China's National Climate Change Program (section 4.1.1(3)) aims to:

- "[v]igorously promote biomass energy development and utilization by attaching significant importance to bio-energy based power generation"; and
- "put forward economic policies and preferential measures in favour of bio-ethanol and other biomass fuels to promote biomass energy development and utilization".

However, no specific measures are identified.

### **Solar power – feed-in tariff**

After a solar power is approved by government, the feed-in tariff price for power from that project is determined by the pricing department of the State Council, based on the principle of reasonable production cost plus reasonable profit.

It may be observed that this approach does not necessarily give certainty to investors, as they will be uncertain firstly as to whether a project will be approved and, secondly, if a project is approved whether it will receive a feed-in price allowing it to become profitable.

The reason given for adopting this approach (rather than a guaranteed-margin price with the market determining project uptake, as with biomass projects) is that solar power remains too expensive to support through a set feed-in price along, as it is only in the stage of demonstration instead of large-scale commercial use in China, and so will require additional financial support through other related measures such as government funding for research, development and commercialisation, or tax incentives. (China does however have a significant industry of solar panel manufacturing, the products of which are predominantly exported.)

### **Case study – Incentives for solar energy in Australia**

In Australia, renewable energy targets are one of a suite of measures designed to encourage the deployment of solar hot water heaters. The Mandatory Renewable Energy Target (MRET), implemented by the federal government, requires the generation of an additional 9,500GWh of renewable energy per year by 2010 (a 2% target). MRET is a compliance-based system, with the primary obligations placed on electricity retailers and wholesale electricity buyers. The scheme involves the creation, transfer and surrender of renewable energy certificates (RECs), which each correspond to 1 MWh of electricity generated from renewable sources, and imposes

penalties on liable entities for not surrendering sufficient RECs at the end of a compliance period. The government has decided not to increase the target or continue the scheme beyond 2010, leading to a significant decline in renewable energy investment in Australia.

Solar hot water heaters are eligible to create tradeable RECs under MRET. For the installation of a solar hot water to be eligible, it must displace the use of non-renewable electricity to heat water. Accordingly, it must:

- be the first installation of a hot water system in an existing building;
- replace an existing electric hot water system;
- replace an electric-boosted SWH or heat pump water heater; or
- be installed in a new building.

For solar hot water, the number of RECs that can be generated varies depending on brand and model of SWH, its installation date and the location.

Three Australian states have implemented or proposed mandatory RE targets, generally with similar compliance and tradeable RECs systems to MRET.

Cash rebates from the government are also available to householders, owners of community-use buildings and housing estate developers who install grid-connected or stand-alone photovoltaic systems. The rebate is a per-watt amount, with a cap.

## Competitive tendering

As a means of encouraging renewable energy, competitive tendering has been trialled in many countries, with mixed results (see the case studies below). As with feed-in tariffs, certain policy issues are critical to the success of competitive tendering programs. Firstly, tendering schemes need to be tied to a resource planning and portfolio management process, as well as quality management systems or standards. This ensures that the schemes are integrated into the overall energy policy mix and are directed towards achieving a renewable energy target.

Secondly, methodologies need the flexibility to be modified over time, to respond to changes in the economics of various technologies. As technological advances make particular renewable energy sources more competitive with fossil fuel-fired generation, policy mechanisms may need to be realigned away from those technologies and towards more expensive, but more efficient emerging sources.

Even with these policy safeguards, competitive tendering systems may still encounter difficulties. For example, intense price competition may favour large, incumbent renewable energy developers and suppliers (particularly state-owned corporations without profit motives) who can reduce costs and therefore submit lower bids, a result that may do little to stimulate development of a diverse market with multiple independent power producers.

A small number of large players may also result in “gaming” of bid prices, where companies bid very low prices to block out competitors without intending to actually develop projects. Problems such as these were encountered with the United

Kingdom's tendering regime. This generally leads to a low contract implementation rate, and consequently could adversely affect the development of the renewable energy sector in China.

In a similar vein, State-owned enterprises, which are not constrained by a profit-seeking objective, can commit to unreasonably low prices in order to win contracts. While these projects are in fact implemented, their lack of profitability means that the government is in effect subsidising these projects (because they are not self-sufficient) and no income tax contribution is made to local economies.

Finally, a competitive tendering process based heavily on price means that chosen companies tendering low prices might be inexperienced in the renewable energy field. A company might not know how expensive the project will be to implement, might not be using tested technology, or might be using inferior materials to meet the lower price.

#### **Case study – Tendering systems in the UK and India**

The competitive tendering scheme in the United Kingdom was abandoned after it failed to successfully stimulate renewable energy market development. This was primarily due to the intermittency of the tenders and the resulting uncertainty in the market, as well as the complexity of the procedures involved. In addition, solicitations made under the scheme led to unrealistically low bids, thereby committing funds to projects that did not materialise. A floor price would prevent these unrealistic bids from jeopardising the tendering process.

In India, the competitive tendering process and a lack of turbine standards or production requirements meant that several early projects performed poorly, despite significant technology advances. In 2003, however, certification of design and performance became mandatory, greatly reducing concerns about substandard technology and implementation. The key lesson from the Indian experience is that competitive tendering must be accompanied by robust technological standards to avoid downward pricing pressure leading to poor quality projects.

#### **Wind power – competitive tendering**

Under the competitive tendering arrangements in place for the wind power sector, renewable energy developers must submit proposals for large-scale renewable energy projects of 100MW and above. The government will select potential investors through a competitive bidding process, taking power price and domestic content as the key criteria.

The government will guarantee the purchase of all electricity from the project through long-term power purchase agreements. The price will be that set during bidding for the first 30,000 MWh, and the average market power price for the remainder of the period (25 years total). The evaluation criteria for wind concession projects in 2006, based on a 100-point system, are briefly summarised in the table below.



**TABLE 5: CRITERIA FOR EVALUATING POTENTIAL WIND PROJECTS**

CRITERION	WEIGHTING
Power purchasing agreement value	25 points
Local content Satisfaction of the 70% local content requirement Proven capability and technological advantages of chosen wind turbine generator	35 points
Investment and financing ability	10 points
Financing plan	10 points
Technical plan 10% feasibility study report 12% wind resource analysis 13% wind turbine generator type, layout and estimated power output 15% electrical works 10% civil work 10% construction organisation design 15% project investment budget 4% project acceptance standard 4% project operation plan 3% disassembly standard 4% quality assurance and quality control plans	20 points

### Results of wind power tendering so far

As noted above, competitive tendering schemes are often difficult to implement successfully. In China, gaming of the tendering process through the submission of artificially low bids has been common, leading to extremely low prices (eg. 3.8 euro cents per kWh). Low or non-existent projected returns have consequently led to a low contract implementation rate, hampering industry development and reducing economic development through taxation revenue. Where projects have been implemented, low prices have led to the use of low quality equipment during construction, which increases operational risks.

The graph below shows how the wind price in China compares to the rest of the world.

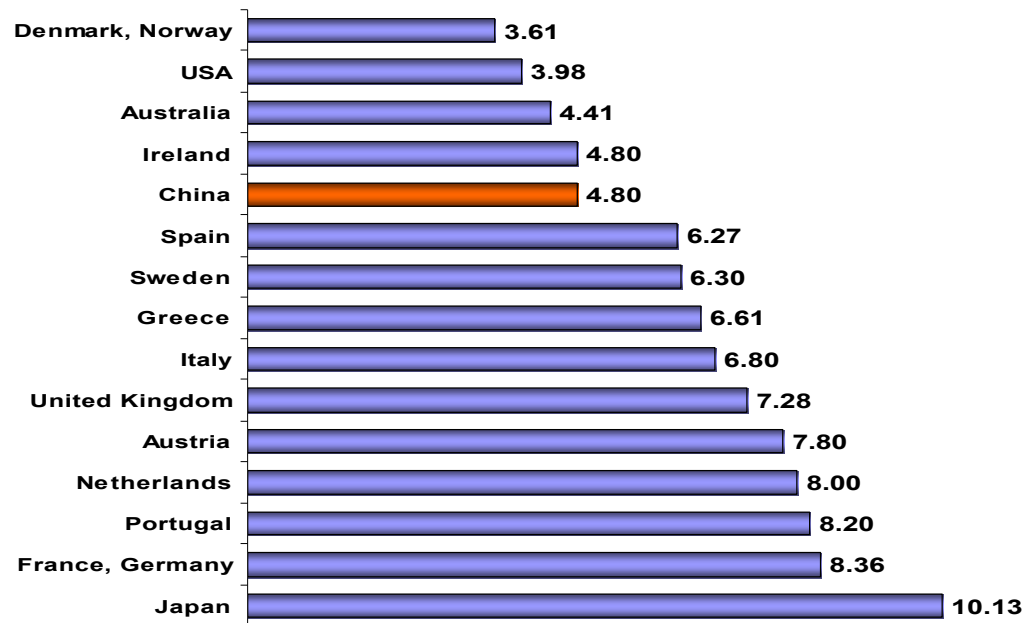


FIGURE 3: INTERNATIONAL WIND PRICES (US\$)

### Options to consider for wind power pricing

Feed-in tariffs may represent a viable alternative for the wind energy industry. For example, the feed-in price for wind could be calculated at RMB 0.25 per kWh more than the desulphurised coal price, as for biomass. This type of feed-in tariff arrangement may provide a more certain and stable framework than the current competitive tendering process.

The reason that the standard feed-in tariff model (indexed to the coal price) was not originally chosen for the wind industry was that the government believed that under the feed-in model, the wind power tariff in the southern coastal areas would be almost double those in the western regions (because of the higher coal price in those areas), despite the fact that much of the wind resources is located in the western provinces. Therefore, adopting a feed-in tariff would create an incentive to develop wind generation capacity in suboptimal geographical areas – an outcome that was not beneficial for the country’s sustainable development objectives. However, in priority areas for wind development a first-in, first-served fixed feed-in tariff, not based on the national price of coal, might be one way to encourage wind power development (until the required capacity is met) if the take-up has not yet been good.

One market participant has proposed that the following wind power support program be adopted:<sup>2</sup>

- Implement an ambitious long-term national target for wind power (around 10% of total power consumed by 2020 to 2025);

<sup>2</sup> B. O’Flynn, “A Study on the Pricing Policy of Wind Power in China: Airtricity Comments and Perspectives”

- Implement a fixed feed-in tariff of 0.55 yuan for good wind areas, 0.60 yuan for medium areas and 0.65 for low wind areas (all excluding VAT), with area classification determined on a provincial, regional or county basis;
- Increase tariffs annually in accordance with inflation (1-2% per annum);
- Implement a tariff support period of at least 15 years for all power generated by the project, after which the tariff is the local wholesale tariff;
- Allow all projects to obtain CDM registration, regardless of ownership;
- Allow all projects to obtain 80% debt financing and equal treatment; and
- Implement efficient and streamlined grid connection and project approval procedures.

If competitive tendering is retained, key safeguards need to be implemented to avoid the problems noted above. Already, the government has reduced the weighting of the bid price in the tender assessment process, in the hope that this would prevent the irrational bidding that could endanger project quality and investor returns. This could be coupled with a mechanism to hold bidders accountable for the implementation of projects, robust quality standards for design and construction, and a floor price to prevent artificially low bids.

### Other forms of renewable energy

It is expected that power pricing regimes for other forms of renewable energy, including geothermal energy and wave hydropower, will be developed in the near future.

The National Climate Change Program notes (in section 4.1.1(3)) that power generated from coal-bed methane and coal-mine methane should attract the preferential policies of the Renewable Energy Law, and that prices for power from those sources should not be lower than the price of natural gas with the same calorific value. This may indicate that a feed-in tariff will be adopted for power from coal-seam and coal-bed methane.

Pricing for traditional fossil-fuel power projects is determined on a case-by-case basis and is therefore relatively unconnected to the Renewable Energy Law framework.

#### Issues and recommendations

- When the **solar power industry** is considered sufficiently developed (or to assist in its development), separate government approvals should not be required for solar projects and a predictable and sufficient feed-in tariff should be introduced. Alternatively other forms of support such as tax incentives and/or seed funding could be provided.
- A feed-in tariff regime for the **wind power industry** could be investigated in consultation with industry.
- Alternatively, competitive tendering schemes could be combined with **robust technical standards** and a **floor price** to prevent gaming, low contract implementation rates and poor quality projects.

## 2.8 Cost sharing – who pays the extra costs?

Most of China's renewable energy industries are at the initial development stages. These industries are generally limited in the technology they use due to the high costs compared to conventional power. Large hydropower is an exception to this rule, since it is able to compete in terms of price with conventional power. A further issue is that renewable energy resources are not distributed evenly across China. For instance, wind power generation is mainly located in the northwest, northeast, and northern China, as well as the south east coastlines.

If local companies and consumers are required to bear the higher costs of renewable energy, it is unlikely that renewable energy will flourish locally. Therefore, a cost sharing system has been established, which aims to require all consumers to collectively share the extra costs resulting from the development of renewable energy.

The Renewable Energy Law frames it in the following terms:

“The difference between the price of renewable energy power (as determined in Article 19) and the average price of conventional power will be shared through the sale price. Price authorities of the State Council will prepare specific methods for cost sharing.

Grid connection expenses incurred by grid enterprises in order to purchase renewable power and other reasonable expenses may be included in the power transmission cost and retrieved through the sale price.”

The objective is to remove the cost barriers to the purchase of renewable power by grid companies and utilities so as to encourage a greater uptake of renewable energy.

Therefore, under China's cost sharing arrangements, end users of electricity will be required to pay a tax-exempt surcharge to cover part of the difference between the price of grid-connected renewable energy and local desulphurised coal power, as well as the cost of grid extensions to connect renewable energy power facilities to the grid, and operation and maintenance of off-grid renewable power facilities.

The surcharge is set by the pricing department of the State Council, and calculated according to a formula in the pricing guidelines. The current surcharge is 0.001 Yuan/kWh (on top of the 0.4-0.6 Yuan/kWh charged for residential electricity), collected by grid corporations.

The other component of the excess cost is shared by all energy utility companies nationwide and cannot be passed down to consumers. There is not yet any detailed formula to calculate the proportions of the costs to be paid by consumers and utilities respectively.

### Recommendations

The details of how the cost-sharing revenue will be divided among the 31 provinces, and how the additional costs will be borne by energy utilities, need to be clarified.

## 2.9 Investment incentives for renewable energy

### Introduction

The regulations under the Renewable Energy Law will establish incentives to invest in renewable energy in China. The incentive schemes currently being drafted include preferential tax treatment, low-interest loans, and preferential tariffs. The exact forms that these schemes will take and the level of incentives which will be provided are not yet known, although the Renewable Energy Law states that they will apply to renewable energy development and utilisation projects. The reference to utilisation projects (such as energy efficiency and other demand-side abatement projects) as well as energy development projects potentially provides quite a wide scope of application.

The firming investment landscape for renewable energy in China has already resulted in some observable changes, as discussed below. China has reached 6<sup>th</sup> place in Ernst & Young's Alternative Energy Country Attractiveness Index (Quarter 1 2007). This index evaluates the package of domestic support mechanisms available for renewable energy projects in each country around the world.

### Expanding scale of investment

The expanding scale of investment is evident in the increasing capacity of the projects which the Chinese Government has approved. During 2006, the central government approved more than 1 GW capacity of wind projects, with local governments extending approval to additional projects. It is expected that by 2010, there will be 5 GW of installed capacity in wind projects alone.

The enthusiasm for biofuels has also been strong. Projects amounting to 1 million tonnes in capacity have already been submitted for approval. The rapid growth of investment in renewable energy therefore signals the need for clear incentives and regulation from government.

### Diversification of investment in renewable energy

The NDRC and the Ministry of Commerce have jointly issued the "Guiding Industry Catalogue for Foreign Investment" [2004] No. 24. This catalogue identifies where industries fall within a spectrum of "encouraged" to "prohibited" in terms of foreign investment. It is noted that constructing and operating renewable energy projects are identified as "encouraged industries" for foreign investment. As such, the Chinese Government is aiming to lower barriers to entry into the renewable energy market in order to diversify the investment market. More information on foreign investment approvals is set out in Section 4.2. (Certain hidden barriers remain, such as the competitive advantage of state-owned corporations which are supported by government subsidies, allowing them to put in lower bids for tendered projects than would be feasible for foreign, profit-oriented companies.)

## Renewable Energy Development Fund

To facilitate the implementation of the Renewable Energy Law, the Ministry of Finance issued in June 2006 a regulation concerning a special fund for renewable energy development. Companies (including domestic and foreign-invested enterprises) and individuals may apply to this fund for free financial aid or loan interest discounts. Currently, such funds are available mainly for the development of bio fuels (such as ethanol and diesel oil), the promotion and application of solar energy and geothermal energy in construction and building, and the promotion and application of power generation from wind power, solar energy and marine energy.

## Preferential tax treatment

Tax incentives are a flexible mechanism and can be designed to target, among other things, different entity types, industries, geographical areas, or stages of the investment, production and utilisation cycle. Whether or not they are targeted directly at investment, tax incentives often result in an increase in the after-tax cash flow and earnings of renewable energy projects, and therefore encourage investment in such projects.

When making investment decisions in relation to renewable energy projects in China, the effect of tax incentives should be considered in conjunction with the Government's other measures to promote renewable energy, particularly the feed-in pricing schemes. Tax incentives alone will not affect investment decisions unless the tax savings cover the additional costs of producing renewable energy (compared to fossil fuels).

Tax incentives will tend to be more attractive to companies with significant Chinese tax burdens, which can take the most benefit from tax reductions or credits, rather than enterprises with smaller tax liabilities in China. Allowing companies to carry forward the tax benefit to future years when they may have higher earnings and higher tax liabilities will help solve this issue.

## What kinds of tax incentives might be used?

Although it is currently unclear what specific tax incentives the Chinese Government is considering or may consider for renewable energy projects, several are possible.

**TABLE 6: TAX INCENTIVES FOR RENEWABLE ENERGY**

<b>INVESTMENT TAX INCENTIVES</b>	tax deductions or offsets for investment in renewable energy installations – rewarding the building of facilities, but not the production of energy from those facilities
<b>ACCELERATED DEPRECIATION RATES</b>	for plant and equipment used to produce renewable energy – as with investment tax incentives (which have a similar effect), this approach should be chosen only if technical and productivity standards are set for renewable energy equipment, to avoid the problem of spurring fast development without corresponding care for the quality of the equipment or its long-term performance
<b>PRODUCTION TAX</b>	tax deductions or offsets paid at a rate per kilowatt hour, encouraging

<b>INCENTIVES</b>	efficient production
<b>VALUE-ADDED TAX REDUCTIONS</b>	for renewable energy producers – particularly helpful if VAT is levied on capital equipment, as renewable energy technology is often capital-intensive
<b>REDUCTIONS ON IMPORT DUTY</b>	for equipment used to produce renewable energy – although, in the long-term, this will conflict with the government’s desire to promote local manufacturing
<b>PROPERTY TAX EXEMPTIONS</b>	for users of land on which renewable energy facilities are situated
<b>TAX REDUCTIONS</b>	for purchasers of renewable energy or related equipment
<b>TAX HOLIDAYS</b>	for targeted entities with exemptions from certain taxes for a limited time
<b>R&amp;D TAX CREDITS</b>	for money a company invests in developing renewable energy technologies

### Case study – US tax incentives

The US has established various tax incentives for renewable energy. The results of two are discussed below, illustrating the features needed for effective incentives.

1. A production tax credit was established in 1992 for the wind industry. It has been successful in spurring new wind power installations but as it has expired and been renewed several times, there has been a “boom and bust” cycle of development. Each crash caused upheaval in the industry and a loss of technical leadership. Lesson: long-term, consistent policies are required.
2. Production tax credits are also available for biomass systems, but have not led to the development of a significant biomass industry because biomass generation cost more than wind to establish. Lesson: incentives for a particular renewable technology should be designed to cover the additional costs of that form of renewable energy. One incentive will not encourage development of all forms of renewable energy.

Source: International Energy Agency Renewable energy: market & policy trends in IEA countries 2004; REN21 Changing Climates: the role of renewable energy in a carbon-constrained world 2006

### Preferential low-interest loans

The Renewable Energy Law refers to preferential loans with subsidised interest rates being made available for renewable energy projects. This will make it easier and cheaper for renewable energy project developers to obtain finance, and will help to overcome the difficulties (and higher prices for finance) caused by financiers’ reluctance to invest in the perceived higher-risk area of renewable energy projects, particularly in developing countries.

Studies have shown that a “financing gap” exists in the project development phase of renewable energy projects, and that there is a lack of risk management instruments

which can affect the financial structuring of the full project (REN21 *Changing Climates: the role of renewable energy in a carbon-constrained world 2006*). Cheaper loans may assist with the first issue; government guarantees may help with the second.

To be most effective, loans for renewable energy projects should:

- be available both for large developments which will feed into the grid, and for small projects in remote communities which are not currently linked to the grid;
- be for long timeframes, as energy installations take some time to build and longer to recoup the costs of construction;
- provide for substantial draw-down over the preparatory and development phases of the project; and
- include quality standards or inspections as a condition of the loan.

To date, however, there has been little action on the development of the loan scheme for renewable energy in China.

### **Other investment incentives**

Many other forms of investment incentive also exist which the Chinese Government may consider now or at a later stage if the proposed forms of incentive are not sufficient to achieve its renewable energy targets.

One effective incentive to increase electricity generation from renewable energy is to impose increased taxes on fossil fuels, or reduce or remove fossil fuel subsidies (including less obvious subsidies, such as government spending on centralised transmission infrastructure or coal-fired plant), thus lowering the price differential between traditional and renewable energy. Although efficient, this solution is politically difficult to implement.

#### **Recommendations**

- Slowly remove incentives and subsidies for fossil fuels, including government spending on coal-fired plant, and provide retraining for displaced workers
- Consider international best practice for effective tax incentives, loans and funding for renewable energy projects, including tying assistance to technical standards and project lifetime output goals
- Ensure that the process for applying for and the criteria for receiving such incentives are clear and easily available, in several languages



## 2.10 Other features of the law

### Local content requirements

The 70% local content requirement was originally proposed in relation to wind concession farms in China, but was extended to include ordinary wind farm projects in 2005. This requirement means that wind power projects must have over 70% of their wind turbine component locally made, and the wind turbine generator (*WTG*) must be assembled in China. The aim of this requirement is to encourage China's technology and manufacturing industry for wind turbines.

However, international experience has shown that localisation of content occurs naturally in any market where there are suitably strong incentives for industry. Forcing localisation, by contrast, can result in sub-optimal pricing and inefficiencies.<sup>3</sup>

In practice, though, the 70% local content requirement has not impeded foreign companies setting up joint venture arrangements in China which manufacture locally but compete with local manufacturers. Indeed, foreign manufacturers such as Gamesa, Vestas, Suzlon, Acciona, GE, and Nordex have set up successful joint venture and wholly foreign owned companies in China in recent years. The tables set out below demonstrate that the manufacturing capacity of foreign manufacturers in the wind power industry is on par with local manufacturers, despite the local content requirement. It should be noted that since local content requirements are imposed at a local level, levels of enforcement differ as not all local authorities require compliance.

**TABLE 7: CAPACITY OF DOMESTIC MANUFACTURING COMPANIES**

MANUFACTURER	NATURE	EQUIPMENT	LICENCE	ANNUAL PRODUCTION CAPACITY
Goldwind	SOE	600kW/750kW, 1.5MW developing	Jacos, REpower, Vensvs	530MW
Zhejiang Yunda Windey	SOE (CECIC)	WT 49750 kW WT 54800 kW WT 771,500 kW	REpower Self dev Self dev	Not known
Dalian Heavy Machinery	SOE	FL1500 1.500 kW	Furlander	300 WTG/400MW
Dongfang Electric Group	SOE	MD70/77 1,500 kW	REpower	200 WTG/300MW
SEC	SOE	Developing a 1250 kW Agreement for 2,000 kW	Dewind Aerodyn	200 WTG/300MW

<sup>3</sup> B. O'Flynn, "A Study on the Pricing Policy of Wind Power in China: Airtricity Comments and Perspectives"

MANUFACTURER	NATURE	EQUIPMENT	LICENCE	ANNUAL PRODUCTION CAPACITY
Mingyang	SOE	MY1.5 se 1,500 kW	Aerodyn	Not known
Baoting Huiteng	SOE	FL1000 1,000 kW	Furlander	Not known
Xiangtan	SOE	Z72 2,000 kW	Lagerway	Not known

SOE: State-Owned Enterprise

CECIC: China Energy Conservation Investment Corporation

**TABLE 8: CAPACITY OF FOREIGN MANUFACTURING COMPANIES**

MANUFACTURER	NATURE	LOCATION	EQUIPMENT	ANNUAL PRODUCTION CAPACITY
Gamesa	WOFE	Tjianjin	G52/G58 850 kW Future G80 2,000 kW	Nacelle assembly/blade manufacture 400 MW (up to 700 MW) Planning generator factory (700 MW)
Vestas	WOFE	Tianjin	V80 2,000 kW Future V90 1,800/2,000 kW	Nacelle assembly/blade manufacture Generator (future) 350WTG/700MW
Suzlon	WOFE	Tianjin	S64/S66 1,250 kW S82 1,500 kW (2007)	Nacelle assembly/blade manufacture Nacelle cover/nose cone Control panels/generators 580 WTG/900MW
GE	WOFE	Shenyang	GE1.5 1,500 kW Se/s/sle/sl/xle	Nacelle assembly 200 WTG/300 MW Potential to increase by 50%
Acciona	JV		AW70/77 1,500 kW	Nacelle assembly 400WTG/600MW

MANUFACTURER	NATURE	LOCATION	EQUIPMENT	ANNUAL PRODUCTION CAPACITY
Nordex	JV (1)		N43 600 kW	Nacelle assembl/blade Mnf
	JV (2)		N60 1,300 kW	Blade Mnf
	JV (3)		S70/77 1,500 kW	Nacelle assembly, up to 200MW
	JV (4)		S70/77 1,500 kW	Nacelle assembly/blade Mnf 75WTG/110MW
REpower	JV		MM70 2,000 kW	Nacelle assembly (2008)
			MM82 2,000 kW	100WGT (up to 400 in 2010)
GE	JV		GE1.5 1,500 kW	Gear box development

WOFE: Wholly Owned Foreign Enterprise  
JV: Joint Venture

## Project scale

There is no particular requirement for a minimum or maximum scale of renewable energy projects. However, upon application for approval the relevant authority will request an economic feasibility study for the project, which will be assessed on whether the scale of the project will allow it to practically meet its operational targets consistently with its social development goals. It should be noted that social development goals differ across different jurisdictions in China.

## Government approvals

According to the “Regulation of the Renewable Energy Power Generation”, the NDRC is responsible for approval of:

- hydro power projects built on major rivers;
- all hydro power projects over 250MW; and
- wind projects over 50MW.

Market participants have noted that national approvals often take longer and result in a lower tariff (and hence less economically viable project) than regional approvals. This discourages the development of large-scale projects which are crucial to meeting targets.

Other projects can be approved by the provincial government, but are to be notified to the NDRC.

In addition, the NDRC will oversee the application for government policy or funding support for the following types of projects:

- biomass power generation;
- geothermal power generation;
- ocean energy power generation; and
- solar photovoltaic power generation.

Renewable energy projects seeking government approval are required to comply with the national and provincial renewable energy plan, and with environmental assessment laws. Environmental certification from the State Environment Protection Agency (national or local) is required when making an application for approval of hydro and wind farm projects.

In addition to the renewable energy-related approvals, specific approval procedures apply to projects financed using foreign investment (see Section 4.2). Projects satisfying national and provincial renewable energy plans are also eligible for special funding from the NDRC, through the Renewable Energy Development Fund (see Section 2.9).

#### **Recommendations**

- Clarify and streamline the overlap between the renewable energy approvals process and the foreign investment approvals process.
- Clarify the role of each level of government in the approvals process.



## 3. Future implementation

### 3.1 What is not yet covered?

A number of issues which are expected to play a significant role in developing a renewable energy industry have not yet been fully formulated. The Law on Renewable Energy only provides a general framework for renewable energy governance, while the more detailed implementing regulations will facilitate practical implementation and provide the detail not found in the Renewable Energy Law. For example, the issue of who bears responsibility for the accuracy of resource assessments and data can have a considerable impact on the willingness of foreign companies to invest in China. If an investor bears all the risk that data could be wrong, the detail of these regulations can be important.

In addition, there are a number of key domestic law issues that lie outside the central renewable energy framework, but are nonetheless crucial to the successful implementation of a renewable energy project in China. These include such issues as:

- land usage and land ownership rights;
- technology transfer and intellectual property protection;
- general government approval procedures;
- environmental approvals and protection requirements; and
- resource assessment and data availability.

Moreover, there are as yet no quantitative and definite timelines (for instance, in relation to setting power prices and implementing the cost share methodology) in the Renewable Energy Law, creating uncertainty during the planning and development phases of projects.

All these factors, to varying extents, have presented challenges for the implementation of the Renewable Energy Law, as discussed further in the next sections of this paper.

## 3.2 Where to from here?

To support the framework Renewable Energy Law, implementing regulations need to be drafted and issued by the relevant authorities of the State Council. A number of major issues still need to be addressed to give full effect to the intent of the Renewable Energy Law.

### Hydropower and the Renewable Energy Law

The Renewable Energy Law presently includes hydropower projects. However, it also states that whether hydropower projects fall under the ambit of the Renewable Energy Law is subject to determination by the energy authority (in practice, the Energy Bureau of the NDRC) and approval by the State Council.

The NDRC has issued the Renewable Energy Power Management Regulation, which indicates that hydro power projects must comply with the existing hydropower policies. Therefore, the pricing and cost-sharing arrangements for hydropower projects remain to be determined on a case-by-case basis, based on financing arrangements, resource availability, geographical features and regulatory and flood control functions. Therefore, for the foreseeable future, the systems established by the Renewable Energy Law will have no significant impact on hydropower projects.

#### Recommendations

- Favourable grid connection and pricing regulations for small hydropower projects, which are usually rejected by power grids, need to be developed.
- Environmental protection regulations for large hydropower projects need to be clarified, although this is outside the ambit of the Renewable Energy Law.

### National renewable energy target and planning

An overall target for renewable energy development and a National Renewable Energy Development Plan have been completed by the NDRC and approved by the National Energy Leadership Group Office (an office of the NDRC). The Plan has been sent to the State Council for final approval. However, since the overall target has been public for some time, most of the components of the Plan (including measures to achieve the target) have been implemented already, without the guidance of the Plan.

#### Recommendations

The National Renewable Energy Development Plan should be published as soon as possible, to guide the development of the renewable energy industry and create certainty for investors.

## Economic incentives

As noted, regulations and guidance documents for some economic incentive programs have already been issued (including, for example, in relation to the use of the Renewable Energy Development Fund).

However, a number of incentive programs and fiscal support measures remain to be clarified. In particular, the financial incentives for solar photovoltaic power generation and bio-fuels, as well as other renewable energy sources, are expected to be issued soon.

### Recommendations

- Clarify the details of financial incentive programs for solar photovoltaic power generation and biofuels, as well as the tax and loan arrangements.
- Clarify any existing feed-in tariffs and other support mechanisms at a provincial level and specify how these will be affected by the implementation of the Renewable Energy Law and regulations.

## Technical standards

The Renewable Energy Law requires the formulation of technical standards regarding grid connection and integration of solar energy use within buildings. In addition, biomass utilisation standards, especially biofuels standards, are required. Already, some standards have been issued for the integration of solar energy into buildings and technical specifications for wind farms have been established. Others remain to be drafted and a series of technical standards are expected to be released by various Government agencies in 2007.

Further, requiring manufacturing and consultant companies to provide warranties to government authorities that products meet technical standards, as well as independent verification of estimates and designs, will put commercial pressure on companies to deliver high-quality products.

### Recommendations

- Implement further technical standards to build China's renewable energy in light of the limited experience of some potential developers or investors (e.g. standards for bio-fuel production to allow for larger scale application). Australian technical bodies and consultants may be able to assist with developing appropriate standards.
- Require manufacturing and consultant companies to provide warranties to government authorities that products meet technical standards, and require independent verification of estimates and designs, to put commercial pressure on companies to deliver high-quality products.

## Technology support, education and training

The Renewable Energy Law requires strengthening of technology research and development, education and training programs. Support for research and development programs has been identified in the National Science and Technology development plan as a key focus. The national arrangements for education and training are yet to be finalised. However, some education and training programs have been established already, including several training courses for renewable energy in universities and technical schools.

## Resource assessment and availability of data

### Importance of resource assessment

Electricity generation from renewable sources can be very sensitive to small changes in the renewable resource. For example, for wind farms a small decrease in average wind speed over the life of a project can significantly decrease the electricity produced. This can make the difference between a viable and unprofitable project.

If renewable energy generators are being established in remote areas (which is likely), there may not be sufficient data for investors to be able to make reasonable assessments on the viability of a project or the risk that they are willing to bear in terms of resource availability, including delivery risk under a power purchase agreement. It is not yet clear whether concessions under China's Renewable Energy Law will take account of resource uncertainty in seeking to make projects attractive for developers.

### Who bears the resource risk?

Investment decisions are made based on available resource data, whether that be wind, sunlight, water flow or available biomass fuel. If there is no opportunity or time to verify data provided by local sources, an investor could commit to an investment based on a price for the resource that is not sufficient if the generation capacity of the project is lower than expected. This could arise, for example, if there is not enough sunlight or wind to operate a renewable energy facility in the manner expected.

### Recommendations

- Implement a national approach to resource assessment decrease uncertainty for investors.
- Investors, developers and electricity utilities purchasing the power could share the risks and costs associated with resource assessment and data.

## Other implementation issues

As per the Renewable Energy Law, resource survey and assessment, provincial planning and some other policies need to be completed. The NDRC has taken the lead in cooperating with Ministry of Finance, China Meteorology Administration and local governments to work on these issues.



Some renewable energy technologies encounter unique challenges. For example, development of the wind energy industry relies on resource assessment and data availability, grid extension policies and domestic wind manufacturing capacity, all of which need to be strengthened. Pricing for solar photovoltaic cells remains uncompetitive, and the domestic market is still too small to generate price reductions. Farming the raw materials needed for the production of biofuels requires agricultural land, which may not be available in a sufficient amount to support the development of the industry.

Finally, as China only has recent experience in developing renewable energy policy, the formulation and implementation of appropriate regulations will take time. Implementation of these regulations will also need to take account of existing support measures at a provincial level, and how the implementation of a national framework law will affect their continued operation.

#### **Recommendations**

Establish a mechanism to enable sharing of experience and knowledge between local and provincial governments across the country to maximise learning and avoid repeating mistakes.

#### **Which measures are likely to be adopted, and when?**

The medium- and long-term renewable energy plan has been completed and is due to be published in the near future. The plan contains the overall national targets for renewable energy development.

The first step requires investigating the renewable energy resources available. The NDRC has jointly worked with the China Meteorology Administration to map the wind resources with higher resolution. Experts are also working on the methodology for biomass resource investigation via “3-S” technology with the financial support of the World Bank. However, this investigation is expected to take more than two years.

The second step will involve ensuring that economic incentives play a significant role in fostering the renewable energy industry and building up the renewable energy market. The MoF, in conjunction with the Ministry of Commerce and the NDRC, issued measures allocating portions of the Earmarked Fund for Renewable Energy Development to solar energy-equipped buildings and the wind industry respectively. It is estimated that the Earmarked Fund for biomass utilisation and renewable energy application in rural regions will be completed in 2007.

It should be noted, however, that some renewable energy-related enterprises have not benefited from any favourable tax or credit policies. Addressing this will be a focus for MoF and the NDRC in 2007 in terms of drafting specific policies for economic incentives.

In addition, the national rural energy work meeting is expected to be held in mid 2007. In keeping with the national 11th Five-Year Plan, regulations on how to develop rural energy in accordance with the New Rural Village Construction Program may be completed soon after this meeting.

Finally, as discussed above, detailed regulations on renewable energy grid connection and power purchase activities, as well as biomass utilisation, are currently being drafted and are due to be completed in 2007.

### Will these measures be adequate to effectively implement the Renewable Energy Law?

The entry into force of the Renewable Energy Law on 1 January 2006 was an important symbolic event in China. During that year, many renewable energy industries grew rapidly, as set out in the table below.

**TABLE 9: GROWTH IN RENEWABLE ENERGY IN CHINA IN 2006**

TYPE OF RE	GROWTH IN 2006
<b>Hydro</b>	Installed capacity of hydro power broke through 10 million kW per annum for the first time
<b>Wind</b>	Wind industry grew by 270% to a total capacity of 1.332 GW per annum
<b>Solar photovoltaic</b>	Solar photovoltaic industry achieved 300 MW installed capacity (double the previous year's capacity and equal to 10% of the world's total installed capacity)
<b>Solar hot water</b>	With 18 million m <sup>2</sup> growth in 2006 alone, solar hot water capacity reached 100 million m <sup>2</sup> (a growth of more than 2 million m <sup>2</sup> more than the previous year)
<b>Biogas</b>	Biogas consumption exceeded 9 billion m <sup>3</sup> (through a total installed capacity of 19 million household biogas digesters and 2000 large and medium-sized biogas facilities)
<b>Total RE</b>	Total annual consumption of renewable energy (excluding traditional biomass) was equivalent to the energy generated by 200 million tonnes of standard coal, or 8% of China's total primary energy consumption

However, while renewable energy targets were on track in 2006, the energy efficiency and pollution control elements of the eleventh Five Year Plan were not reached in 2006.

To continue the achievements of the Renewable Energy Law, it will be necessary to improve training, education and outreach work. This could occur at a provincial and local level, targeting government officers, power utilities, investors and banks.

In general, systems may be necessary to provide for regular reporting and feedback from industry and individual provinces to ensure that targets and tariffs are complied with. This system would allow compliance failures to be detected and regulations to be revised and modified where they are no longer effective.

#### Recommendations

- Implement training, education and outreach programs at a provincial and local level, targeting government officers, power utilities, investors and banks, to

ensure the Renewable Energy Law is adequately implemented.

- Monitor the effectiveness of existing regulations and revise them based on feedback from industry.
- Consider a system to ensure that targets and tariffs are complied with, including penalties for breach.
- Establish a dedicated renewable energy office in each province to share information with the NDRC, with annual reporting requirements.

### 3.3 Official review of the Renewable Energy Law

The NDRC carried out the first official government review of the Renewable Energy Law in early 2007. The results of the review, including recommendations from Chinese industry stakeholders, were published on 20 April 2007.

#### Recommendations arising from the review

To strengthen the implementation of the Law, the review suggested the following policy measures:

1. Improve the **pricing mechanisms** for wind projects. The existing mechanism provides that the pricing authority of the State Council is to set prices according to tenders submitted, and a bidding process is undertaken by the Government for every project (at a significant cost to both the Government and investors). The review recommended that tender process be conducted only for large-scale wind projects greater than 100 MW, and that small- and medium-scale projects adopt the prices set for large-scale projects operating in the same region or nearby.
2. Implement a **renewable portfolio standard** as soon as possible to increase market confidence about prices.
3. Accelerate the formulation of **preferential tax and other fiscal policy**. In particular, it was proposed that VAT on wind energy facilities be reduced to within a reasonable range to facilitate a reduction in the wind tariffs and maintain local government enthusiasm for wind power development. Implement measures to support research and development into the development of large wind turbines and provide subsidies on domestic turbine procurement and preferential loans (from state-controlled commercial banks). For the solar hot water industry, recommendations include eligibility for preferential tax policies currently available for high-tech, renewable energy and home appliance industries.
4. Modify the current **duty free arrangements** for whole wind turbine imports, so that duty free status is only available to those turbine components that cannot be produced domestically, in order to accelerate the development of the Chinese wind turbine manufacturing industry. Furthermore, it is proposed to more strictly apply the **local content requirement** for developers tendering for large-scale wind projects, and to adopt preferential treatment for the wind power equipment manufacturing sector.
5. Accelerate the formulation and publication of **national renewable energy targets** and the **long-term plan** for renewable energy, and formulate and publish specific plans for wind energy, biomass, solar energy and other technologies. The purpose of the plan is to provide a ‘road map’ for development of all sectors in the renewable energy industry. Align policy mechanisms with long-term targets.
6. Clarify **responsibilities** for implementation of renewable energy strategies and policies, both nationally and within each province.

7. Bring forward development timelines for **large-scale wind projects** where possible to increase the predictability of the wind energy market.
8. Clarify responsibilities for **resource assessment** and initiate data collection projects as soon as possible (with wind and biomass as a priority). Assessment of wind resources is to be funded by the NDRC, the National Meteorological Bureau and other departments; biomass resource assessment by the NDRC, the Ministry of Agriculture, the State Forestry Bureau and other departments. The results of the projects should be published as soon as possible to reduce market uncertainty.
9. Increase funding for **research and development** into high-tech and industrial equipment technology projects in the renewable energy sector.
10. Establish a **disclosure system** to enhance public access to project planning information (including approval status, pricing data etc) and information on progress in the implementation of the Renewable Energy Law.
11. Create a **centralised energy management department** within the national government, with responsibility for energy industry strategy and policy development.
12. Reform the administrative approvals system to **simplify approval procedures** for non-hydro projects and to maximise public safety, resource efficiency and environmental protection.
13. Create **special funds** for agencies to support the development of intellectual property rights.
14. Promote the development of **industry associations** and other non-governmental organisations and encourage their participation in renewable energy policymaking.
15. Implement projects to **raise public awareness** of renewable energy, including developing renewable energy demonstration projects in public buildings.
16. Create voluntary **green energy purchase schemes** and corporate ‘green logos’ and environmental ratings.

### Comparison to recommendations arising from this paper

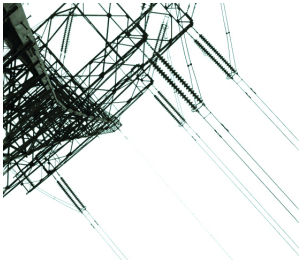
Many of the recommendations put forward by Chinese industry and officials in the NDRC review are similar to those identified by Australian industry in the consultations undertaken for this report. In particular, both Australian and Chinese industry highlighted:

- The importance of effective **pricing policy** in the wind and solar energy sectors to provide adequate incentives for new project development (including a possible reform of existing competitive tendering and feed-in arrangements);
- The role of **complementary measures** in supporting industry development, including, for example, a renewables portfolio standard, green energy purchase schemes and clear **taxation and financial incentives**;

- The importance of a **streamlined government approvals process** to minimise the administrative burden of new project development on project participants;
- The need to **clarify long-term renewable energy targets** and align policy mechanisms with these targets to provide a 'road map' for the achievement of wind, solar and biomass development objectives;
- The need to implement **technical standards** and supporting technical regulations as soon as possible to ensure the quality of new renewable energy developments and minimum safety standards;
- The importance of conducting **resource assessment** and providing data to project developers as soon as possible.

These priority areas may provide opportunities for the Australian Government to assist the Chinese Government in its implementation of the Renewable Energy Law.

The full set of recommendations from this report is contained in Chapter 5.



## 4. Undertaking a project in China – the broader issues

### 4.1 Corporate structuring

#### Possible investment structures

Foreign investors keen to enter the renewable energy market in China may, under current Chinese laws and regulations, only do so under a joint venture (*JV*) arrangement in China and not as a wholly foreign owned enterprise (except in certain encouraged industries), or under an arrangement which combines both structures. Determining which JV investment structure will be adopted and being alert to the advantages and disadvantages of each will be essential to effectively manage business and legal risk.

China has a number of national laws relevant to JV foreign investment and the renewable energy industry. The types of corporate structure available to foreign investors in China are:

- Representative office (*RO*);
- Equity joint venture (*EJV*);
- Contractual joint venture (*CJV*); and
- Wholly foreign-owned enterprise (*WFOE*).

#### JV structure – distributing profit

The different features and requirements that apply to EJVs and CJVs are significant for investors seeking to undertake renewable energy projects in China. CJVs may provide a flexible structure via which investors might make their contributions to registered capital, manage the JV, and distribute its profits. By contrast, EJVs are typically viewed as less flexible than CJVs. For instance, management control and profit distribution are typically proportionate to each party's respective contribution to the EJV's total registered capital.

For both CJVs and EJVs, however, central government regulations may influence and/or determine significant factors, such as the amounts of the parties' capital contributions to the JV, the types of foreign investors that are permitted to invest in certain types of projects, and the type of JV structure which might be used for foreign investment in certain sectors. For instance, in CDM projects, the percentage of foreign shareholding is restricted and, currently, only EJV structures can be used.

## **JV structure – managing joint ventures**

Foreign parties should be aware of certain management issues associated with a JV structure. For example, under relevant laws and regulations in China, changes to the JV's amount of registered capital, as well as changes to the articles of association and JV Contract, may be made only with unanimous consent of the JV's board of directors. These requirements might pose a problem in a situation where, for example, one investor wishes to add capital to the JV and the other partner does not.

An advantage of a CJV is that, subject to approval by the relevant government authorities, it may be possible for the foreign investor to achieve early recoupment of the capital that it has invested. In an EJV, on the other hand, investors usually cannot recover their capital, except in certain circumstances, which might include liquidation of the JV, transfer of their equity interest in the registered capital of the JV, which would require government approval and is subject to the other JV partners' pre-emptive rights, or reduction of the JV's registered capital, which is subject to approval by the relevant government authorities (such approval is often difficult to obtain).

## **WFOE structure**

Foreign investment in the construction and operation of power stations using new sources of energy (including solar energy, wind energy, magnetic energy, geothermal energy, tidal energy, biomass energy and so on) is encouraged by China's foreign investment policies, and the establishment of WFOEs in such industries is permitted.

A WFOE can be a limited liability company or, upon approval by the relevant Chinese government authorities, may take another form. Currently, most WFOEs in China are established by a single foreign investor, although the relevant regulations allow two or more foreign investors to apply jointly to establish a WFOE.

Foreign investors often prefer WFOEs, since, unlike for an EJV or a CJV, there is no requirement for the investor to partner with a Chinese party. Thus, the WFOE provides foreign investors with the opportunity to completely control and manage the daily operations of the entity.

## **Acquire shares or assets?**

A JV could result from a foreign investor buying into an existing domestic Chinese enterprise by acquiring an equity interest in the registered capital of that enterprise. Alternatively, the foreign investor and the investors in the Chinese enterprise could agree to jointly establish a new EJV or CJV.

If the parties opt for a buy-in by the foreign investor, the equity acquisition should be structured to address hidden liabilities. Such hidden liabilities might include the tax liabilities arising from the enterprise's operation prior to the buy-in, and the feasibility of the effective assignment of all business contracts, government permits and concessions.

Regardless of whether a foreign investor opts to establish a new enterprise in China or to acquire interests in or assets of an existing enterprise in China, it will be subject to



approval by the relevant Chinese government authorities and to applicable requirements under relevant laws and regulations in China concerning limits on foreign investor shareholding, permissible shareholding structures, required registered capital amounts, and anti-trust filing requirements. In addition, it will be important for the foreign investor to know if the transaction involves any state-owned assets, since the sale of state-owned assets is subject to a special regulatory regime in China.

## Taxation

For JVs and WFOEs (collectively, foreign investment enterprises or *FIEs*) that were approved and established before 16 March 2007, the following tax principles apply:

An FIE is subject to 30% national income tax rate, plus a 3% local income tax rate. Manufacturing FIEs with a term of 10 years or more are eligible for a 100% tax exemption for the initial two profit-making years and a 50% reduction during the subsequent three years. Longer tax holidays are available to export-oriented enterprises and technologically advanced enterprises. Even more preferential tax incentives are available in certain development zones and for special industries.

No withholding tax is levied on dividends remitted to the foreign investor outside of China. A 10% withholding tax applies to royalties, rental and interest income. FIEs are also subject to other taxes, including value added tax, business tax, real estate tax, land value added tax, customs duties, stamp tax and vehicle and vessel license tax. Whether a particular FIE will be subject to all or some of these taxes depends on the nature of its activities.

## Foreign exchange controls

There are limits on the amount of foreign exchange that an FIE may borrow. These limits will vary and will depend primarily on the particular financial, total investment, and registered capital circumstances of the FIE.

FIEs are subject to “debt-equity” ratio requirements which regulate the percentage of registered capital which must be paid in by the investors in WFOEs and JVs. For example, where the total investment for an FIE is more than US\$3 million but less than or equal to US\$10 million, at least 50% of the total investment must be in the form of registered capital (which must be paid in to the FIE by its investors).

Investors’ capital contributions to FIEs can take the form of cash, machinery, equipment, industrial property, proprietary technology or, upon approval, Renminbi profits derived from their other investments in China. It will be important to ensure that the non-cash contributions are appropriately valued.

One of the reasons many investors consider utilizing a CJV instead of an EJV is that the investors are able to make their contributions to the JV in forms other than those typically allowed for an EJV. For example, the Chinese party to a CJV might, as part of its contribution to the registered capital of the CJV, locate and pay for the local labour required by the CJV.

## **Debt financing restrictions for foreign companies**

Currently, foreign companies are limited to a maximum of 66% debt financing of the capital cost of a project (compared to domestic projects which are permitted 80% debt financing), a restriction which automatically results in a lower return on investment for foreign companies over the life of the project. It has been reported that lower than anticipated leveraged rates of return for development, construction and operation of projects is adversely affecting foreign investment in new renewable energy facilities.

## 4.2 Project approvals

In China, different categories of projects (encouraged, permitted, restricted or prohibited) are subject to different government approval requirements. The table below summarises these requirements.

**TABLE 10: FOREIGN INVESTMENT CATEGORIES AND APPROVAL REQUIREMENTS**

FOREIGN INVESTMENT CATEGORIES		TOTAL INVESTMENT (INCL. ANY CAPITAL INCREASE)	VERIFICATION AND APPROVAL AUTHORITY
1	Encouraged or permitted	US\$500 million or above	State Council
	Restricted	US\$100 million or above	
2	Encouraged or permitted	US\$100 million – US\$500 million	NDRC and Ministry of Commerce at the central level
	Restricted	US\$50 million – US\$100 million	
3	Other foreign investment projects		Local counterparts of NDRC and Ministry of Commerce

The effect of these categorisations is to streamline the approval requirements for, and thereby encourage, those projects that are seen as high priority projects for Chinese development (in encouraged, and to a lesser extent, permitted categories). Renewable energy projects can benefit from these distinctions, since for the most part such projects are encouraged and therefore subject to less stringent requirements.

The category of ‘encouraged’ projects includes the following project types:

- Construction and operation of power stations using technology for clean burning of coal;
- Construction and operation of thermo-electric cogeneration power stations;
- Construction and operation of hydroelectric power stations; and
- Construction and operation of power stations using new sources of energy (including solar energy, wind energy, magnetic energy, geothermal energy, tidal energy, biomass energy etc).

### Recommendations

Clarify and streamline the overlap between the renewable energy approvals process and the foreign investment approvals process.

## 4.3 Clean Development Mechanism (CDM)

### Introduction

The CDM is intended to be, among other things, a vehicle for investment and technology transfer between developed countries and developing countries including China. However, the international rules concerning the CDM as well as China's domestic CDM legislation have resulted in some barriers which must be overcome if the CDM is to be a meaningful driver for significant market growth in the renewable energy sector. Renewable energy investors in China seeking to develop renewables projects under the CDM should also be aware of some practical issues and difficulties that should be considered early in the project cycle, as well as some specific corporate structuring requirements for CDM projects in China.

### International CDM rules

*Additionality* is a key eligibility criterion, and must be proved using the “additionality tool” provided by CDM Executive Board. Chinese policies encouraging renewable energy (e.g. the Renewable Energy Law) are not to be taken into account when assessing baseline (type E- under CDM rules). This benefits developers in China because it is easier to meet the requirement of additionality. Developers should consider additionality early and document the decision-making process to enable them to substantiate additionality arguments later.

However, Chinese policies and regulations encouraging renewable energy are not to be taken into account when calculating the baseline scenario (this is known as ‘Type E-additionality’). The baseline is calculated as the hypothetical scenario without the regulations being implemented. This benefits developers in China because it is easier to meet the requirement of this additionality.

Developers should consider additionality early and document the decision-making process to enable them to substantiate additionality arguments later.

Host Countries (i.e. the Chinese Designated National Authority) must issue approvals of potential CDM projects confirming their contribution to the country's “sustainable development”. Entities wishing to receive certified emissions reductions (*CERs*) directly must also obtain authorisation from a developed country that is party to the Kyoto Protocol.

### Chinese CDM rules

CDM regulations in China impose a number of specific requirements on renewable energy projects conducted as CDM projects.

### Corporate structuring

In relation to corporate structuring, the Chinese CDM rules impose restrictions on the involvement of foreign companies in Chinese projects. Specifically, the rules state that only enterprises in China which are wholly Chinese-owned or those in which the

Chinese party or parties hold a controlling interest (i.e. at least a 51% stake) may undertake CDM projects with foreign parties. This is understood to mean that the Project Entity must be a Chinese individual or entity or controlled by a Chinese individual or entity.

It has been reported that this restriction is resulting in a number of projects not being developed, as many investors are unwilling to cede control of a project to an unknown or inexperienced domestic partner. This is particularly the case for large projects which need strong operational skills and experience to ensure profitability.<sup>4</sup>

The CDM rules also impose restrictions on the form of joint ventures that can be used for CDM projects in China. Currently, only equity joint ventures will be approved by Chinese Government authorities; cooperative joint ventures cannot be used at this time.

### **Recommendations**

Consider removing the foreign ownership restrictions for renewable energy projects conducted under the CDM.

### Terms of emissions reduction purchase agreement (ERPA)

In addition, the Chinese CDM rules provide that Chinese government authorities, principally the NDRC, must review and approve the terms on which CERs are sold and the contents of the CER sale agreement. This review includes approval of the specific buyer and the specific price at which CERs are sold under the ERPA or other CER sales agreement.

In its implementation of the CDM Measures, the Chinese government has effectively set a “minimum floor price” for the sale of CERs in China, which is currently €8.00 or US\$10.00 (where the ERPA refers to US dollars). The Chinese Government has stated that in conducting its mandatory review of the terms of CER sale agreements, it will not approve CDM projects with a CER price lower than these floor price amounts. Moreover, since the NDRC generally takes the unit price agreed under an ERPA as the minimum unit price to be paid by a buyer of CERs generating by the project covered by that ERPA, the Government may not be willing to approve ERPAs which contain provisions where under an agreed unit price could be reduced.

While these provisions appear to limit the ability of CDM project participants to determine prices, in practice the Chinese Government has allowed some flexibility where justified by the particular contractual arrangements. For example, where the buyer’s contribution to the CDM project is comprised both of payments for CERs and technology or consulting services, the Government may approve a purchase price that is lower than the established floor price.

### Preferential tax treatment

Finally, the Chinese CDM rules also provide for preferential tax treatment for renewable energy projects. The tax on renewable energy projects is just 2% of total

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<sup>4</sup> B. O’Flynn, “A Study on the Pricing Policy of Wind Power in China: Airtricity Comments and Perspectives”

CER benefits, while revenues from HFC-23 (industrial gas) projects, which have a lower sustainable development benefit, are taxed at 65%. The funds collected from these taxes are contributed to a fund used to finance sustainable development in China.

## **Renewable energy and the CDM – what are the issues?**

Despite the favourable tax treatment of renewable energy-derived CER revenues in China and the ever-expanding opportunities for carbon financing, renewable energy projects still face some unique hurdles that should be considered by project proponents.

### **Lower emissions reduction potential of renewable energy projects**

Firstly, due to the differentiated global warming potentials of greenhouse gases (carbon dioxide, which is displaced by renewable energy, being the least “potent” in terms of its global warming effect), the volume of emission reductions from renewable energy projects is much smaller per unit of output than the volumes created by projects which abate other greenhouse gases such as nitrous oxide, HFC or methane. Conversely, the equipment cost of most renewable energy projects is significantly higher per emission reduction than the cost of other types of potential CDM projects, such as agricultural methane flaring projects. The overall contribution of the revenue stream from CERs is therefore comparatively smaller for renewable energy projects than for other types of potential CDM projects.

As the CDM is essentially a market, CDM project equity investors will tend to go to where “manufacturing costs” are cheapest, and purchasers will tend to seek out a plentiful supply of CERs for minimum transaction costs. Renewable energy projects are therefore at a comparative disadvantage in the CDM compared to projects which reduce other types of greenhouse gases.

### **Long lifespan of renewable energy plant / short commitment period**

In addition, renewable energy projects such as wind farms have a long operation life, which (for projects being constructed today) will extend far beyond the Kyoto Protocol’s first commitment period. Until very recently, there was a significant amount of uncertainty as to whether the Kyoto Protocol would be continued beyond its first commitment period (i.e. 2012). CER purchasers have therefore been reluctant to make binding commitments to purchase CERs post-2012, such that the financial incentive created by CERs has in many cases been insufficient to support renewable energy projects for their entire operational life.

## **Effect of these issues on renewable energy projects**

As a result of the issues discussed above, many renewable energy projects which may be eligible under the CDM have had difficulty attracting project finance to support the projects. CER purchasers have tended to restrict their involvement in CDM projects to a commitment to pay for CERs upon delivery, rather than provide financial support for the underlying project. Registration as a CDM project does not necessarily mean that a renewable energy project will achieve project finance and become operational. Issues such as perceived regulatory and political risk in developing countries and the higher

level of technology risk involved in renewable energy projects (as opposed, for example, to traditional fossil fuel projects) have meant that those renewable energy projects which have achieved external finance have tended to be smaller scale projects, rather than projects to create the optimum number of CERs.

Therefore, the transaction costs of developing projects as CDM projects (including the costs of external auditors, registration fees, consultants' fees and legal fees for the negotiation of CER purchase agreements and power purchase agreements) may be prohibitively high compared to the volume of CERs expected to be generated by the projects.

Some local host country regulations (such as grid connection, distribution or electricity tariff arrangements) may not provide renewable energy projects with the priority or support needed to make them feasible in the existing electricity market. In China, however, additional policy support for renewables provides unique double financing opportunities and other avenues of financial support.

## **How these issues are being addressed**

A number of important steps have already been taken which should mitigate some of these barriers.

### Taxation measures

One of the most innovative steps is China's differential tax treatment of renewable energy projects as compared to other projects that are less beneficial for sustainable development – a system that is the first of its kind in domestic CDM regulation worldwide.

### Bundling CDM projects

The international CDM rules now explicitly allow the “bundling” of large-scale projects (not just small-scale projects) to further reduce transaction costs. This additional flexibility in the CDM rules should reduce transaction costs for renewable energy projects.

### Programmatic CDM

Programmatic CDM projects have the potential to assist in overcoming some of the barriers to renewable energy projects carried out under the CDM. Although local, national or regional policies and standards cannot be registered as CDM projects, small greenhouse gas reduction activities carried out under a formal program of activities can be collectively registered as a single CDM project activity. This facility is known as “programmatic CDM”.

Programmatic CDM involves the aggregation of a number of small greenhouse gas reduction activities into a larger program, which is then submitted to the CDM Executive Board as a single activity (using one baseline and monitoring methodology). The facility is designed to overcome the cost barriers identified above, which are

particularly prohibitive for small renewable energy projects, and which might otherwise prevent small projects from being implemented.

Small renewable energy projects which are implemented as part of a "program of activities" (e.g. the installation of solar lighting in a community or the financing of a number of biomass plants in rural areas) can now be eligible under the CDM as a single project.

As another example, the costs of a CDM project involving the conversion of a small number of vehicles to biofuels would only generate a small number of CERs, and so would not be economically viable even with the generation of additional carbon revenue. If, however, the project could be expanded to involve the conversion of multiple fleets of public transport vehicles, the number of CERs generated may be sufficient to offset the costs of the project and enable it to be implemented.

The international rules on programmatic CDM projects – particularly the methodologies to be used for these projects – are yet to be finalised.



## 4.4 Protecting intellectual property

### Introduction

A major concern for many companies entering China is ensuring adequate protection of intellectual property (*IP*). In fact, it is a common misconception that there is no IP law in China. However, China introduced its first IP laws in the mid-1980s and has since updated them in conformity with its international obligations under the World Trade Organisation (to which it acceded in 1994) and the Madrid Protocol (to which it became a party in 1995). China has comprehensive legislation in place dealing with trademarks, copyright and patents, with the latter covering design patents (often called industrial designs), invention patents and utility patents. Despite the promising content of the black-letter law, enforcement difficulties remain the principal issue for IP owners.

### Obtaining protection: trademarks

Trademarks are primarily governed by the *Trademark Law of the PRC*, as amended in 2001. The responsible government agency is the China Trademark Office. Registration of trademarks is vital since China adopts a “first-to-file” system. This means that the person who gets their trademark application in first is entitled to register it. In comparison, the person who uses a trademark first is entitled to register in Australia.

A mark is *prima facie* registrable in China if it is a visually perceptible sign capable of distinguishing the goods of one natural person, legal person or other organisation from those of another. In order to file a trademark application, a Chinese government-approved trademark agency must act on your behalf and can only do so with a signed power of attorney. Furthermore, the applicant must provide its name and address in Chinese. It typically takes up to two years to obtain a trademark registration in China, with protection generally effective on the date of registration, rather than retroactive to the filing date (as is the case in Australia and many other countries). Once registered, protection is afforded for ten years and can be renewed for successive ten year periods.

Registration confers upon the owner the exclusive right to use and exploit a trademark in relation to the goods or services in respect of which use of the mark is approved. The law permits trademark owners to licence others to use the mark or to transfer ownership of the mark. Where a licensing arrangement is entered into, it is important to remember that the owner of a trademark is responsible for the quality of the goods on which the mark appears.

### Obtaining protection: patents

The main legislation dealing with patents is the *Patent Law of the PRC*. Local patent administrative offices are responsible for processing patent applications and enforcing patents, while the State Intellectual Property Office issues all final approvals. Patents are granted on a “first-to-file” basis rather than a “first-to-invent” basis.

There are three types of patents in China:

- *design patents* are used to register a new design of a shape or pattern;
- *invention patents* are used to register new technical solutions for a product or process; and
- *utility patents* are used to register new technical solutions related to shape or structure.

Invention patents are likely to be most relevant in a renewable energy context. For eligibility, these patents require novelty, inventiveness and practical applicability.

As is the case with trademark applications, patents can only be obtained via a state-approved patent agent. Although only a preliminary examination by the patent administrative office is required for design and utility patents, a supplementary substantive examination is conducted for invention patents. Patent registration can be obtained for design and utility patents within as little as twelve to eighteen months and is valid for ten years. It can take up to three years for registration of invention patents, which remain valid for twenty years. Notably, protection is afforded from the application filing date, provided that annual maintenance fees are paid.

A patent owner has the exclusive right to make, use, offer for sale, sell or import the patented product or process. Patents and the right to apply for a patent are assignable. A licence is required for third party use of a Chinese registered patent in China and must be registered with the State Intellectual Property Office.

If registration is not obtained, control over overseas patents in China must be exercised through contractual provisions. Registration is highly recommended, however, since contractual provisions do not provide the same degree of protection or possible remedies.

## **Obtaining protection: copyright**

The *Copyright Law of the PRC* governs copyright protection in China and the responsible government agency is the National Copyright Association. Works attracting copyright protection include written works, oral works, graphic works such as drawing of engineering designs and product designs, schematic drawings, model works, and computer software.

Registration is not required for copyright protection, although it may be desirable for enforcement purposes. Copyright automatically vests in works of Chinese citizens, legal persons and other organisations. Since China is party to the Berne Convention, works originating in Australia (which is also a party) are given at least the same level of protection in China as that given to works created by Chinese citizens.

Copyright is generally owned by the author of a work. However, where the creation of a work is sponsored by, represents the will of, and is the responsibility of a legal person or other organisation, that legal person or other organisation is deemed to be the author. A citizen's rights in respect of his or her work – which include publication, reproduction, distribution and sale – are protected for the life of the author plus fifty

years. Works of legal persons or other organisations are protected for fifty years from first publication.

Copyright is capable of being assigned or licensed. It is not a legal requirement that licences be registered, although it is often considered prudent to do so.

## **Enforcement issues**

IP enforcement remains an issue in China despite improvements in the legal regime. In particular, there may be concerns about the adequacy of remedies, the ability and willingness of the relevant authorities to control ongoing infringements and local protectionism. The Chinese Government at higher levels widely and openly recognises the problems associated with local protectionism. Its occurrence is nonetheless often reported and is facilitated in part by the fact that most administrative enforcement authorities are funded by local governments rather than national authorities.

In China, IP rights can be enforced through administrative agencies, through the civil courts or via criminal action. Administrative enforcement procedures tend to be most effective for prompt and inexpensive action against small infringers. However, there is normally not financial compensation for losses and fines are generally very low, meaning that deterrence is not always achieved.

Civil litigation, on the other hand, is a useful method to take action against large, well-organised infringers. Possible remedies include compensation and an injunction. The court system's handling of IP disputes has improved dramatically, although there continue to be problems with inconsistency and the lack of judicial training in technical issues. Foreign plaintiffs also encounter difficulties and high costs in fulfilling procedural requirements imposed by the courts (e.g. translation of all foreign-sourced evidence). There have also been complaints about the lack of discovery and other valuable means for gathering evidence.

Criminal action may be taken by requesting the police to investigate. Counterfeiting a patent and infringing business secrets are crimes punishable by up to seven years' imprisonment. Again, however, there may be issues with bias and lack of training in the judiciary.

## **Techniques to maximise protection**

IP rights are generally territorial, meaning that registration of a trademark or patent in, say, Australia, does not automatically result in protection in China. It is important to note that China, Hong Kong, Macau and Taiwan are separate jurisdictions for the purpose of IP protection and therefore have separate systems of registration. Here we focus on China's system.

For maximum protection, trademark and patent applications should be filed as early as possible, and preferably well before entering the Chinese market. Although it is not legally necessary, trademark owners should register and actively use a Chinese-language counterpart for English language trademarks since Chinese consumers tend to refer to the Chinese versions of foreign brands.

Regular due diligence is required to ensure that registrations are in place for all relevant pieces of IP and have not lapsed. Rather than solely relying on the authorities to deal with potential infringements, IP owners should actively monitor their rights. IP owners are normally advised to send a strong message from the start by taking “zero-tolerance” approach to IP infringements.

The theft of trade secrets – including both patented and non-patented technology and other valuable business information – is of particular concern where a foreign company has established a joint venture or licensing relationship with a Chinese partner. Business partners and employees should be selected carefully and practical steps may be taken to maintain confidentiality. Such steps could include teaching employees about IP rights and utilising physical security measures. It is particularly important to ensure that contracts with business partners and employees are stringently drafted in order to deter theft of IP and to ensure maximum protection under local law.

China is making concerted efforts to address IP enforcement issues through raising public awareness, establishing the necessary institutions, educating personnel and imposing harsher penalties. The attitude at the top levels of the Chinese Government is encouraging, with a definite realisation that stringent protection of IP rights is vital to encourage foreign investor confidence. Nonetheless, the full implementation of China’s relatively comprehensive IP laws will require a great deal of effort and expenditure.

#### **Recommendations**

- Strengthen intellectual property rights enforcement at the provincial/local government level.
- Develop a code of practice for renewable energy technology transfer.

## 4.5 Project planning and implementation

### Introduction

Practical issues associated with the implementation of a project can be the difference between a viable project and an unprofitable one. The availability of the necessary renewable resources, a site for the project with appropriate land tenure, obtaining necessary project approvals and having arrangements in place to ensure the project outputs can be sold at the right price, are all essential factors in any renewable energy project. Having partners with local knowledge in China and in investing in existing project proposals implemented at a local level can help. Ultimately, as is the case for projects undertaken in jurisdictions outside of China, sheer commercial will, good local advice, and early planning, can help to ensure that projects in China overcome the practical and regulatory issues arising when implementing a project.

### Land use rights

In China, there are two types of land ownership – state ownership and collective ownership. Historically, there has been no “private” land ownership in China. State land ownership means the relevant land is owned by the Chinese Government, while collective land ownership means the relevant land is under the control of a local “rural collective of peasants”. Basically, land in urban areas is under state ownership, whereas land in rural and sub-urban areas is under collective ownership. The Chinese Government may acquire and convert collective land in rural and sub-urban areas into state land pursuant to a statutory “land requisition procedure”.

Commercially speaking, “land use rights” rather than “land ownership” is the relevant legal concept. China’s land laws and regulations permit the Chinese government (acting through its local land bureaus) and other land owners to transact “use rights” in their land. Generally, there are four different types of land use rights in China, namely:

- granted land use rights;
- leased land use rights;
- allocated land use rights; and
- collective land use rights.

Granted land use rights are freely transferable – they have a limited duration and require payment of a fee which is normally paid in one lump sum prior to any transfer of the land use rights. Allocated land use rights are not transferable, and may be taken back by the Chinese government without compensation.

Once the type of land use right is known, investors can determine how best to structure the legal arrangements for the planned project.

For construction, the land administration department reviews a feasibility study and issues a pre-certification report. If acceptable, rights to use the land are issued and a land use rights contract is entered into, usually by and between the enterprise controlling the project and the relevant land administration bureau.

On 16 March 2007, the National People's Congress approved the new Property Rights Law, which strengthens legal protections for privately owned land. The new law creates a registration system for real property ownership and transfer, provides a mechanism for creating securities over property and sets out clearer provisions for enforcement of private property rights. It represents China's first comprehensive national framework for the protection of property. It remains to be seen, however, what effect the new law will have on China's renewable energy sector.

#### Recommendations

- Clarify ownership rights to renewable energy facilities (e.g. wind turbines) built on land that is the subject of a government concession, particularly in light of the new Property Rights Law.
- Clarify who is responsible for decommissioning facilities at the end of the project life.

### Environmental approvals process

Key environmental laws in China are enacted at the national level, with most enforcement and implementation occurring at the local level. As a result, environmental protection laws can be enforced differently in different provinces or municipalities. Local regulations are also allowed to be more stringent than national regulations.

Projects could be impacted by a range of different laws and regulations, including those which govern conservation, pollution, contamination, and employee health and safety. Enforcement of these laws and regulations is undertaken by the relevant government authority and remedies may include warnings, fines, administrative sanctions, civil compensation for losses, restraints on construction or operation, or criminal prosecution.

Generally, environmental laws in China adopt a “polluter pays” approach. However, pursuant to other laws and regulations, liability for pollution on the land can extend to others, especially in cases when the polluter cannot be located or cannot be clearly determined. For instance, companies which acquire or merge with another company that holds land use rights can be held responsible for environmental harm connected with that land – that is, “buyer beware” principles can apply.

Depending on the type and size of the project, environmental assessments are approved by either the State Environmental Protection Administration (**SEPA**) or Environmental Protection Bureaus (**EPBs**) at the provincial or municipal levels.

Since environmental laws are enforced by EPBs at the provincial/municipal level, it can be important to engage local authority support for the project (sometimes this is made easier where the project involves local companies and/or where the project generates local benefits). However, SEPA may suspend approvals for new projects if local governments do not comply with the applicable requirements under environmental laws and regulations, so risks remain even if a project has broad local support.

The diagram below shows the environmental approvals process for projects in China:



FIGURE 4: ENVIRONMENTAL APPROVALS PROCESS IN CHINA

### **Power purchasing agreement / concession contract**

It is important to secure a buyer for the energy output and any CERs on terms that take account of regulatory, market or resource risks, as well as meeting any prerequisites for favourable tax treatment, tariffs or other concessions.

Buyers will generally be seeking a renewable energy supply that will comply with regulatory obligations or consumer demand. Therefore, they will want terms that limit or compensate for compliance risks and ensure the buyer will not have financial commitments for energy supply that fall short of expectations. Project proponents (and their financiers) will ordinarily seek to see a secure and constant revenue stream (with tolerable variation for resource, market or regulatory risks).



## 5. Recommendations

Drawing on the recommendations provided in the official April 2007 review of the Renewable Energy Law, and the issues identified by Australian and Chinese industry in the workshops and consultations we have undertaken, this report makes the following recommendations:

### Targets

- Consider the implementation of utility-level renewable energy targets and a tradeable certificate scheme to effectively link overall targets with chosen policy mechanisms.
- Alternatively, consider strict reporting arrangements to ensure that feed-in tariffs are sufficient to meet established overall renewable energy targets.
- A quota system that requires major power generators to develop a certain number of renewable energy projects could be developed and implemented.

### Pricing policy

- A feed-in tariff regime for the wind energy industry should be reintroduced in consultation with industry.
- Competitive tendering schemes should be combined with robust technical standards and a floor price to prevent gaming, low contract implementation rates and poor quality projects.
- When the solar power industry is considered sufficiently developed (or to assist in its development), separate government approvals should not be required for solar projects and a predictable and sufficient feed-in tariff should be introduced. Alternatively other forms of support such as tax incentives and/or seed funding could be provided.
- Clarify any existing feed-in tariffs and other support mechanisms at a provincial level and specify how these will be affected by the implementation of the Renewable Energy Law and regulations.
- Favourable grid connection and pricing regulations for small hydropower projects, which are usually rejected by power grids, need to be developed.
- The details of how the cost-sharing revenue will be divided among the 31 provinces, and how the additional costs will be borne by energy utilities, need to be clarified.

### Approvals process

- Clarify the responsibilities of each level of government in the approvals process.
- Clarify and streamline the overlap between the renewable energy approvals process and the foreign investment approvals process.



## Financial incentives

- Clarify the details of financial incentive programs for solar photovoltaic power generation and biofuels, as well as the tax and loan arrangements.
- Consider international best practice for effective tax incentives, loans and funding for renewable energy projects, including tying assistance to technical standards and project lifetime output goals.
- Ensure that the process for applying for and the criteria for receiving such incentives are clear and easily available, in several languages.

## System design and support issues

- Establish a mechanism to enable sharing of experience and knowledge between local and provincial government across the country to maximise learning and avoid repeating mistakes.
- Implement training, education and outreach programs at a provincial and local level, targeting government officers, power utilities, investors and banks, to ensure the Renewable Energy Law is adequately implemented. Australian Government and industry could assist in the implementation of these programs by sharing its experience in policy formulation and implementation, project financing and development, and other issues.
- Monitor the effectiveness of existing regulations and revise them based on feedback from industry.
- Consider a system to ensure that targets and tariffs are complied with, including penalties for breach.
- Establish a dedicated renewable energy office in each province to share information with the NDRC, with annual reporting requirements.

## Technical issues

- Design and implement large-scale efficient transmission networks to deliver energy from renewable sources around China and allow the grid to support large-scale renewable energy projects.
- Implement further technical standards to build China's renewable energy in light of its limited experience (e.g. standards for the bio-fuel productions to allow for larger scale application). Australian technical bodies and consultants may be able to assist with developing appropriate standards.
- Require manufacturing and consultant companies to provide warranties to government authorities that products meet technical standards, and require independent verification of estimates and designs, to put commercial pressure on companies to deliver high-quality products.
- Implement a national approach to resource assessment such as wind mapping. Conduct training in resource assessment and make methods and results available to developers.

## **Intellectual property rights**

- Strengthen enforcement of intellectual property rights at the provincial/local government level.
- Develop a code of practice for renewable energy technology transfer.

## **Other issues requiring clarification**

- The National Renewable Energy Development Plan should be published as soon as possible, to guide the development of the renewable energy industry and create certainty for investors.
- Environmental protection regulations for large hydropower projects need to be clarified.
- Clarify the foreign ownership restrictions for renewable energy projects conducted under the CDM.
- Clarify ownership rights to renewable energy facilities (e.g. wind turbines) built on land that is the subject of a government concession.
- Clarify who is responsible for decommissioning facilities at the end of the project life.

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**Sydney**

Level 27, AMP Centre  
50 Bridge Street  
Sydney NSW 2000  
Australia  
Tel: +61 2 9225 0200  
Fax: +61 2 9225 1595

**Contact:**

**Paul Curnow**

**Partner**

[paul.curnow@bakernet.com](mailto:paul.curnow@bakernet.com)