

# An over painted oriental arts: Evaluation of the development of the Chinese renewable energy market using the wind power market as a model

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## ABSTRACT

China is now the largest CO<sub>2</sub> polluter in the world. However, the renewable energy policies in China are controversial and one can easily draw the wrong conclusions that Chinese renewable energy development has taken off from a surface assessment of the policies. By investigating and summarizing the first-hand experiences of participation in the Chinese renewable market (mainly wind farm development) in the past five years, this paper provides another dimension of policy analysis and independent review of the current issues facing the market. An investigation of policy changes and consequences clearly demonstrates the transformation of the Chinese renewable market. The domestic manufacturing quality and unprofessional design of wind farms made most developers' financial returns unrealistic in the wind market. Despite the difficulties and inconsistency in the system, China is tackling environmental issues seriously and heading in the right direction. With centrally controlled management, the Chinese strategies do not have to be justified financially. It is envisioned by the authors that re-organizing over 70 existing Chinese wind turbine manufacturers is unavoidable. Establishment of an internal renewable market, such as Renewable Obligation Certificate (ROC) system in the UK whose effectiveness is another subject of debate, would be an effective means by which the Chinese government in their post-2012 strategy could make the wind market more financially viable.

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## 1. Introduction

### 1.1. The existing energy structure in China

China has become the world's second largest energy consumer, second only to the United States. Fossil fuel generation accounts for the majority of the electricity market, a fact that will likely remain unchanged for the foreseeable future, as shown in Table 1.

China is giving top priority to developing renewable energy at the moment. China's proven reserves of oil and coal should last 20 and 100 years, respectively, at current consumption rates (British Wind Energy Association, 2009). The surging crude oil price in the global market has provided increasing pressure on China's energy supply security. The utilization of renewable energy resources plays a significant role in increasing energy supply, improving the energy mix and helping environmental protection.

The Chinese government has set ambitious goals for renewable energy development in the future. Renewable energies are expected to account for 10% of China's total energy consumption

by 2010, and 15% in 2020, according to China's 11th Five-Year (2006–2010) Plan for renewable energy issued on March 18th, 2008 (Table 2, Fig. 1).

### 1.2. Current renewable energy policies and implementation

China passed the Renewable Energy Law in 2006 (Table 3). Development of renewable energy in China is being implemented according to five core principles: the total target via the government plan, priority in connecting to the grid, acquisition in full, unbundling and preferential price, and public sharing of costs (Rangor et al., 2008).

The current average coal-fired feed-in tariff is 0.35 Yuan/kWh (unit: Yuan per KiloWatt-hour. USD/RMB: 6.838 Yuan) in China. Most wind feed-in tariffs ranged from 0.51 to 0.61 Yuan/kWh from 2007 to 2008. The biomass feed-in tariff was set at 0.25 Yuan/kWh more than the coal-fired power price, and the solar feed-in tariff was priced at 4 Yuan/kWh.

Strong political policies, rising coal prices and improved technology have prompted a surge of investment in green energy, particularly wind power. Although wind power is facing many challenges, it is still one of the most economical and state-of-the-art renewable energy sources.

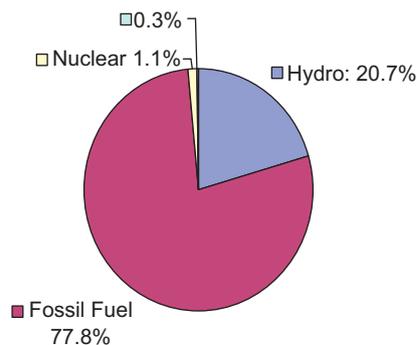
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**Table 1**  
Chinese Government energy structure targets.

Source	2007	2010	2020
Coal	70%	67%	60%
Renewable	8.5%	10%	15%
Others (oil, gas, etc.)	21.5%	23%	25%

**Table 2**  
Chinese power generation and its targets up to 2020 (source: CWEA).

Wind in power generation mix				
Source	Installed capacity		Electricity generation	
	GW	Share (%)	TWh	Share (%)
<i>2007</i>				
Coal	554	77.8	2700	82.9
Hydro	145	20.7	487	15
Nuclear	8.85	1.1	62.6	1.9
Wind	5.9	0.3	5.2	0.2
Total	714	100	3255	100
<i>Forecast for 2010</i>				
All	900	100	4000	100
wind	20	2.2	40	1
<i>Forecast for 2020</i>				
All	1500	100	7500	100
wind	100	6.7	200	2.7



**Fig. 1.** Existing structure of Chinese electricity market.

### 1.3. Wind power position

With its large land mass and long coastline, China is exceptionally rich in wind energy potential. The technical potential on land is 250 GW, with another 750 GW available offshore. In 2008, China added 6.3 GW of wind capacity, bringing the total to 12.2 GW. This was the fourth year in a row that capacity doubled (Fig. 2).

Given the ambitious plans for wind farms, China is expected to surpass Germany and Spain to reach second place in terms of total wind power capacity in 2010. It is estimated that China will have met its 2020 target of 30 GW by 2010, ten years ahead of schedule (Mitchell and Connor, 2004; Martinot, 2008).

The growing wind power market in China has also encouraged domestic production of wind turbines and components, and the Chinese manufacturing industry is becoming increasingly mature, stretching over the entire supply chain. China, with annual production capacity of 10 GW by the end of 2009, will overtake the US as the world's biggest turbine manufacturer.

**Table 3**  
A clear transforming process: roadmap of policy-changes in the past three years.

Time	Benchmarks of legislation/policies/facts for Chinese wind generation market
January 2006	The Renewable Energy Law became effective, providing a legislative framework for developing renewable energy.
January 2006	The NDRC issued "Temporary Implementation Rules for Establishing a feed-in tariff for Renewable Energy Power and the Sharing of Expenses in Purchasing Electricity from Renewable Energy", encompassing the principle that the wind power on-line price should be approved by the relevant department of the State Council based on the price of the tender for concession projects. <b>By the end of 2006, the Chinese wind generation market saw the first rapid increase.</b>
April 2007	The NDRC made key progress on wind power pricing policy for different provinces. This pricing system lasted until the end of 2008.
December 2007	Chinese turbine manufacturers accounted of more than 50% of the domestic market for the first time.
January 2008	A new CIT Law came into effect: unifying the domestic/inbound investment CIT rates at 25% for both domestic and foreign invested enterprises; prior to this, foreign ventures/enterprises were enjoying 15% of the CIT rate.
August 2008	The revised electricity price of wind generation was kept unchanged on 15 August 2008 (at the same price prior to the Renewable Energy Law) despite wide speculation of an increase.
October 2008	The first phase of 10 GW wind power based in Gansu province was awarded to Chinese developers with a 3.8 GW installed capacity; Chinese turbine suppliers, including the leading three, Goldwind, Sinovel and Dongfang, scoured all the turbine orders.
December 2008	<b>BP, Shell and a few small overseas companies announced decisions to quit/suspend their involvement in the Chinese wind generation market.</b>
January 2009	China's new VAT reform plan came in effect. This preferential VAT policy, which provided a VAT refund for the input VAT incurred on the purchase of Chinese-made equipment for foreign-invested enterprises, was abolished on January 1, 2009. Under the new plan, instead of being refunded, the import tax on equipment purchase is deducted for all enterprises, as it is with raw material purchases. For the fourth consecutive month, the country sees a negative growth in power generation. Chinese Electricity Congress (CEC) statistics show that thermal power generation in October, November and December of 2008 fell 5.3%, 16.6% and 12.4% respectively. <b>Chinese companies are starting to enter the UK and Japanese markets and orders for 200 blades have already been placed. There are also ambitions for exploring the US market in the coming years.</b>
January 2009	

The wind power sector has gone through rapid development in recent years, and has entered a golden era of development. It is widely believed that wind power will be able to compete with coal generation as early as 2015 or 2020. The competitiveness with coal generation is significant in China, who by then will be the world's largest energy consumer. Wind power is expected to be the third largest source of electricity by 2020, following coal and hydro, and it may be the second biggest electricity supply in China by 2050. These projections are based on the assumptions that the market will respond with the same enthusiasm as the government and that the internal manufacturers are able to cater to the market with acceptable products in time.

The reality, however, is much more complicated. The Government, developers, turbine manufacturers, grid company and other stakeholders have made great efforts, but have many challenges. A consistent system, or synergy, will be essential to the success of the renewable energy market in such a large country.

Wind power, as a representative of new energy development, can provide very strong guidance for understanding the entire process of Chinese renewable energy development. As a result, the following sections will concentrate on wind power development in China.

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