



**MARKET OPPORTUNITIES FOR DUTCH INDUSTRIES IN CHINA**  
A COMPREHENSIVE DESK RESEARCH ON WIND AND SOLAR ENERGY

A MARKETING RESEARCH REPORT

**Prepared For:**

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# 1. Introduction

## 1.1 Study Background

China is the fastest growing economy in the world and many enterprises and countries are looking at the enormous opportunities it offers. The current volume of exports from the Netherlands to China is comparatively modest in size and the Dutch consulate in Guangzhou has taken up the task to explore opportunity areas in the China market and to map the offerings that fit in with the distinctive product competencies of the Netherlands thus boosting the exports from the Netherlands.

The Netherlands Foreign Trade Agency (EVD) is currently exploring 24 sectors for their export potential to China in close cooperation with the branch organizations. These sectors will be benchmarked against similar sectors in competing countries and their interest and chances of exporting (successfully) to China. After this exploration, a selection process should bring the number of sectors to 6, in order to deliver a focused PR and marketing strategy in China. Ideally, the chosen sectors and offerings should have a common denominator. This denominator has to emphasize the fact that the Netherlands is a knowledge intensive country and its export products have a large 'knowledge component'.

## 1.2 Research Methodology

Most of the research for this report has been done by means of desk research and internet on Chinese, Dutch and 'international' (English) websites. In addition TNS used internal knowledge, collected from previous research<sup>1</sup>. Reference to the sites and literature used can be found in the appendix.

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### <sup>1</sup> Note to the Reader

This report is based on secondary research, whereby a wide variety of sources and statistics have been used. It is therefore important to consider that some of the statistics may be more up-to-date than others, while some are based on single sources which cannot therefore be verified for accuracy against alternative sources. China statistics do not always have the same degree of accuracy as statistics available in more developed countries, such as the Netherlands. However, while some figures have to be treated with caution this report provides a good introduction to China and can be used as one source of information with which to assess the China market.

## 2. Executive Summary

### 2.1 Key Findings

This report provides an overview of the renewable energy industry in China, focussing on the wind and solar energy sector. Key findings from this report are listed below.

1. With a population of 1.3 billion, China is the world's second largest energy consumer.
2. Economic growth of 7%-8% per year, with fast growing imports and exports.
3. Energy consumption growth of 10%-12% per year.
4. Substantial growth in both urban and rural (remote) areas with a need for local electricity supply generation.
5. Pollution is a major problem, and China needs to diversify from (dirty) coal as an energy source.
6. Development and utilization of renewable energy is an important option to realize sustainable development of the energy system.
7. Renewable energy is a fast growing (potential) source of energy, rich renewable energy resources (wind and sun) are abundant.
8. China's strategy is to strengthen international cooperation and to expand energy supply sources, as it needs to overcome barriers on technology, market mechanism and financing.
9. Currently cost of renewable energy exceeds cost of conventional energy.
10. There is a lack of systematic technical standards or any national quality norms, regulations and rules, and quality supervision system.
11. Solar energy has good potential in specific regimes, especially for water heaters and China has a sizeable local solar heating industry already.
12. Wind energy offers more potential, but is still (much) more expensive than conventional energy sources.
13. Apart from cost, other barriers include inconsistency in quality, lack of technical know-how and limited governmental support; a specific government agency would be very useful in further implementing renewable energy and synchronizing regulations.
14. Opportunities: the Chinese government is looking for joint venture partners and European/Dutch companies appear to be natural allies.
15. Gradually, more government investment is directed towards renewable energy industries, and the Kyoto Protocol is further enhancing these opportunities.

16. The Beijing Olympic games of 2008 offers huge opportunities to further stimulate and grow the renewable energy sector.
17. Major competition in the wind energy sector is coming from Denmark and Germany.
18. Germany is an aggressive investor in China, especially in technological sectors/products.
19. Market access: opportunities for Dutch companies when they apply to Chinese regulations, especially on joint venture rules and (new) WTO laws.
20. WTO offers fairer playing field for foreign companies, especially with regards to tariffs (vis-a-vis local competition).

## 2.2 SWOT Analysis

In this report TNS defines what China is looking for in the energy sector, the quantity they are (potentially) interested in, the parties they are looking for in terms of cooperation, the decision makers and the trends in the energy sector. This resulted in a SWOT analysis.

- Strengths: what elements do Dutch companies / sectors excel in?
- Weaknesses of these Dutch sectors.
- Opportunities: where is the best match between Chinese demand and Dutch offering?
- Threats: where is the main competition coming from?

In China, where the resources are rich, market demand is large, and costs are low, the crucial issue is how to effectively and rapidly commercialize the available renewable energy technologies and adapt them to fit the demand of the China market. That is why business development skills are very important.

Chinese renewable energy entrepreneurs today are facing various challenges for their future development. Common problems faced are:

- Limited knowledge of the state-of-the-art renewable energy technologies;
- Poor capability of business development, operation and management; and
- Limited expertise in market development, financing, and project evaluation.

### Strengths

- Dutch companies, with their high level of technical knowledge, high quality products and extensive experience in manufacturing, implementation and management of renewable

energy could enter the market by establishing joint ventures with local, possibly, internationally operating companies that are active in the renewable energy market.

- Further to this they can either participate in building demonstration farms or initiate building them themselves.

### **Weaknesses**

- However, Dutch companies need to be aware of the complexity of the China market, local regulations and customers. These can perhaps be overcome by partnering with a local reputed manufacturer but having said that, many foreign companies have had bad experiences in partnering with local manufacturers as well. The key issues have been technology transfer, management of the company and operational transparency of the partnered company.

### **Opportunities**

- The Chinese government has stepped up efforts to develop and implement a renewable energy programme according to which the renewable energy base is set to grow tremendously.
- China's WTO access will provide more market opportunities and greater stability for foreign investment in China and a larger scope of economic and trade cooperation, as well as exerting a positive influence on future exploration and absorption of foreign capital.
- A substantial portion of wind projects in China have been funded by foreign governmental loans especially by Denmark, Germany and the US. International investment (such as by the World Bank and Asia Development Bank) in renewable projects is the second most important funding. In all these cases, the wind turbines supplier selection is influenced by vested interests and hence, there is no competition or limited competition (within the companies from the loan granting country).

### **Threats**

- Lack of commercial incentives to promote rapid commercialisation and market development / regulation policy from Chinese government is one of the key barriers.

To summarize:

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Technological knowledge</li> <li>• Quality of products (International)</li> <li>• International experience</li> <li>• Perception that the Netherlands is well-known in wind power</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Lack of market knowledge and awareness of local regulations</li> <li>• Relatively unexperienced in China market</li> <li>• No / little demo farms by Dutch companies</li> </ul>
<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Lack of government institutions with exclusive focus on renewable energy. Currently a couple of institution at central and state level involved leading to slower development of policy and regulations for renewable energy market</li> <li>• Bilateral loans are a substantial part of project investment wherein the wind turbine supplier selection is done keeping in loan provider's interests</li> <li>• International competition from German, Danish and American suppliers; some of them are well established</li> </ul>	<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Government policy to grow the renewable energy market substantially over the next 10-15 years</li> <li>• Increasing energy demand</li> <li>• Substantial potential for renewable energy especially Wind Power</li> <li>• WTO entry</li> </ul>

## 2.3 Implications and Recommendations

Since the development of major cities in the coastal areas, such as Shanghai, Tianjin and Guangzhou, the Chinese government has put in a lot of effort to develop the inland regions of China. It is foreseen that the growth and hence the energy demand, especially in the western regions will be very high in the coming years. TNS recommends that Dutch companies focus their investments of wind and solar energy in the western regions of China where sunshine and wind are abundant.

Despite the fact that the government has laid out the renewable energy industries development plan from 2000 to 2015, there is still no government institution with exclusive focus on renewable energy. Currently the energy market is regulated by the government both at central and state level. Dutch energy investors may have to satisfy both the central and state regulations to ensure that their projects are successful. TNS recommends that Dutch companies hire local law experts for the regulatory issues and at the same time, build a good working relationship with the local government which could facilitate easy negotiations on regulations.

For the export of technology and machinery to China, copyright is a serious issue. Copyright laws and their implementation are still immature in China. Foreign imported technology and machinery designs can be easily stolen by local companies. TNS recommends that Dutch companies work closely with the local government on copyright.

Business development should be focused on the business brought about by the Kyoto Protocol. Since most of the projects are short of cash, many will be financed by bank loans and more cooperation is expected between Dutch companies and foreign banks. It is recommended that Dutch companies should only participate in projects that involve foreign banks only. Local banks are of very poor finance management and their asset quality is not high. Non-payment risk is high for the projects solely financed by local banks.

Once the electricity market is open after WTO, the government will no longer interfere with the pricing of electricity. Dutch companies will have to compete with the numerous local electricity suppliers as well as the international players in China. TNS believes that China offers a huge opportunities but not without tough challenging environment and competition.

### **Ranking recommendation by TNS**

Each Dutch sector which has been subject to a SWOT analysis has ample opportunities to increase their export to China. While desk research only is not sufficient to provide a solid recommendation on which sector to be given priority in Dutch governmental export promotion, TNS has assessed five different sectors by means of a SWOT analysis and classified each of them on a scale from:

- A. Excellent choice for promotion, should have priority
- B. Very good choice for promotion, but not first priority
- C. Good choice for promotion, but better look at alternatives first



Notice that each classification is positive, as the opportunities in China for the coming decades are huge: it will be one of the largest economies in the world.

Based on the information gathered for this report and the SWOT made, TNS labels **Wind and solar industry as an A or a B, depending on the specific sub-sector, as wind for example offers differing opportunities for the Dutch than solar energy.**

## 3. China: Macro Trade Perspective

### 3.1 Major Economic Indicators

The table below gives an overview of the major China economic indicators of the first 5 months of 2003 compared to 2002.

**Table 3.1.1 Major economic indicators**

	Jan-May 2003		2002	
	Value	Growth	Value	Growth
Area (sq km, mn)	9.6		9.6	
Population			1,284.5	
Gross Domestic Product (RMB bn)	2,356.2*	9.9 <sup>1</sup>	10,239.8	8.0 <sup>1</sup>
Urban Per Capita Income (RMB)	2,355.0*	8.4 <sup>1</sup>	7,703.0	13.4 <sup>1</sup>
Rural Per Capita Income (RMB)	737.0*	7.5 <sup>1</sup>	2,476.0	4.8 <sup>1</sup>
Fixed-assets Investment <sup>2</sup> (RMB bn)	1,057.8	31.7	3,102.0	17.0
Added-Value of Industrial Output <sup>3</sup> (RMB bn)	1,473.0	15.7 <sup>1</sup>	3,148.2	12.6 <sup>1</sup>
Consumer Goods retail Sales (RMB bn)	1,797.9	8.0	4,091.1	8.8
Consumer Price Index		0.6		-0.8
Urban Employment Rate (%)	4.1*		4.0	
Exports (US\$ bn)	155.9	34.3	325.6	22.3
- by FIE's (US\$ bn)	83.9	40.4	169.9	27.6
Imports (US\$ bn)	153.5	45.5	295.2	21.2
- by FIE's (US\$ bn)	83.5	48.4	160.3	27.4
Trade Surplus (US\$ bn)	+2.4		30.4	
Foreign Direct Investment				
- number of new projects	15,175.0	29.0	34,171.0	30.7
- contracted amount (US\$ bn)	38.2	42.2	82.8	19.6
- utilized amount (US\$ bn)	23.3	48.2	52.7	12.5
Foreign Currency Reserves (US\$ bn)	316.0*	38.8	286.4	34.9

<sup>1</sup> Real growth

<sup>2</sup> Not including collective enterprises and individuals

<sup>3</sup> All state owned and other types of enterprises with annual sales over RMB5 million

\* Jan-Mar 2003

Fixed-asset investment, particularly by the state sector, is one of the major driving forces that boosted the economy. In 2002, fixed-asset investment (not including collective enterprises and individuals) grew by 17%. On entering 2003, fixed-asset investment surged by 31.7% in the first five months. Real estate development continued to grow rapidly at 32.9% while infrastructure development increased by 28.7%. After issuing RMB150 billion long-term bonds in 2002, the Chinese government is planning to issue another RMB140 billion bonds in 2003 to finance infrastructure projects, technology upgrades and development of the central and western regions. It is expected that fiscal expansion will remain a contributing factor to China's economic growth and fixed-asset investment is projected to grow by 12% in 2003.

Partly due to the state-owned enterprise (SOE) reforms, urban unemployment rate rose to 4% at the end of 2002. As SOE restructuring continues, unemployment is likely to rise further. The government is planning to create 8 million new jobs in urban area, but the unemployment rate is expected to edge up further to 4.5% in 2003. The Chinese government takes various measures like providing training to displaced workers and promoting development of the private sector to ease the unemployment pressure. Urban unemployment rate is targeted to maintain below 5% in the 10<sup>th</sup> Five-Year Plan period.

In 2002, added-value of industrial output (by state enterprises and large enterprises with annual sales exceeding RMB5 million) grew faster at 12.6% (up from 9.9% in 2001). Heavy industry grew slightly faster at 13.1% comparing to light industry at 12.1%. On entering 2003, added-value of industrial output grew faster at 15.9% in the first five months, mainly supported by growth in telecommunications equipment, computer and other electronics sectors, transportation equipments, chemicals and metal industries. Heavy industries grew faster at 17.5%, compared to light industries at 13.7%. The output of foreign-funded enterprises grew by 18.9% in the first five months of 2003 compared to 13.3% in 2002.

In recent years, there has been rapid expansion and healthy developments in China's non-state sector. The status and economic contribution of private enterprises received official recognition at the 9<sup>th</sup> National People's Congress held in March 1999. At the end of June 2002, there were more than 2.2 million private-owned enterprises (compared to 1.76 million at end-2000), employing a total of more than 29 million workers (compared to 20 million at end-2000).

## 3.2 Foreign Trade and Investment

In 2002, China was ranked fifth in the global economy, having achieved an external trade of US\$620.8 billion. In 2002, exports grew much faster at 22.3% while imports increased by 21.2%. On entering 2003, exports and imports surged by 34.3% and 45.5% respectively in Jan-May.

Export-processing trade continued to be the major form of external trade. In 2002, exports and imports related to processing trade grew faster at 22% and 30% respectively. In the first five months of 2003, exports and imports related to export processing trade increased by 32.5% and 32.2% respectively.

In 2002, exports of machinery, electrical and electronic products recorded a strong growth of 36.6% (US\$115.9 billion), while exports of other light consumer goods like garment (US\$36.6 billion, +12.8%) and shoes (US\$11.1 billion, 9.9%) also recorded high, but relatively slower growth. In the first five months of 2003, exports of machinery, electrical and electronic products continued to record 43.3% growth, while garment and footwear grew at 24.3% and 18.9%.

China's top ten trading partners were Japan, the US, the EU, Hong Kong, the ASEAN, South Korea, Taiwan, Australia, Russia and Canada. China's trade with these ten economies together amounted to US\$528.8 billion, i.e. 85% of China's total external trade in 2002.

In 2002, total external trade of foreign-invested enterprises (FIE's) increased by 27.4% to US\$330.2 billion, accounting for 53.2% of the national total. In the first five months of 2003, FIEs' exports and imports increased by 40.4% and 48.4% respectively.

By the end of 2002, the central government approved 6,960 outward non-financial investment projects with cumulative contracted investment of US\$13.8 billion (of which capital contributed by the Chinese partners amounted to US\$9.3 billion).

### 3.2.1 European import/export

In the first quarter of 2003 the European Union (EU) overall ranked second (after Japan) among the countries/regions from which China imports. The EU accounts for 12.8% of the total China import.

**Table 3.2.1.1 Top 10 sources of import (2003/01-05)**

Unit: US\$100 million

Rank	Country/Region	Jan.-May 2003	Jan.-May 2002	Growth Jan.-May 2002	±%	Change ±%
	Total Value	1534.9	1054.9	+45.5%	100.0	-
1	Japan	279.1	188.3	+48.2%	18.2	0.3
2	EU	199.7	144.5	+38.2%	13.0	-0.7
3	Taiwan	179.8	138.9	+29.4%	11.7	-1.5
4	ASEAN	168.8	108.7	+55.3%	11.0	0.7
5	South Korea	155.6	101.1	+53.9%	10.1	0.5
6	USA	139.8	101.4	+37.9%	9.1	-0.5
7	Hong Kong	44.5	39.7	+12.2%	2.9	-0.9
8	Russia	38.4	34.7	+10.7%	2.5	-0.8
9	Australia	28.0	22.0	+27.5%	1.8	-0.3
10	Saudi Arabia	21.3	11.1	+91.5%	1.4	0.3
<b>Total top 10</b>		<b>1,255.0</b>	<b>890.4</b>		<b>81.7</b>	

**Same period last year:** shows what percentage the 2003 amount accounted for in the same period last year. Fe: from Jan. – May 2003, China imported US\$27.91 billion from Japan which is 48.2% more compared to the same period last year.

±: percentage of the total import.

The total top 10 of China's import sources make up for more than 80% of the total China import.

**Table 3.2.1.2 Top 10 European import and export countries (2003/01-01)**

Unit: US\$100 million

Rank	Country	Jan.-Aug. 2003		
		Imp & Exp	Imp	Exp
1	Germany	17,143	10,338	6,805
2	Russia	7,639	5,645	1,994
3	The Netherlands	6,459	977	5,482
4	Britain	7,211	2,253	4,958
5	Italy	5,901	2,844	3,057
6	France	5,326	2,729	2,597
7	Belgium	3,119	1,309	1,809
8	Spain	2,248	583	1,665
9	Sweden	1,749	1,173	576
10	Switzerland	1,667	1,233	433

On the top 10 list of China's import and export with major European countries during Jan. 2003 the Netherlands ranks third, behind Germany and Russia.

Among the countries having a trade surplus with China, the Netherlands ranked third. Overall, the trade surplus has grown in the first quarter of 2003 vs. the first quarter of 2002. (Table 3.2.1.3).

**Table 3.2.1.3 Top 10 sources of trade surplus (2003/01-05)**

Unit: US\$100 million

Rank	Country/Region	Jan.-May 2003	Jan.-May 2002	±%
1	Hong Kong	223.2	169.5	31.7
2	USA	184.5	139.9	31.9
3	The Netherlands	38.4	26.9	42.8
4	UK	22.4	14.7	52.4
5	United Arab Emirates	14.1	10.5	34.3
6	Spain	9.0	6.3	42.9
7	Vietnam	7.3	2.3	217.4
8	Hungary	7.1	4.2	69.0
9	Italy	6.3	2.6	142.3
10	Nigeria	5.8	3.5	65.7

China has become one of the most important trade partners of the Netherlands. After the US and Japan, China is the third largest trade partner of the Netherlands outside the European Union. The trade in goods between China and the Netherlands has risen sharply in the last five years. However the imports from China far exceed the exports to China from the Netherlands. The trade deficit with China rose to more than €7.5 billion in 2001.

**Figure 3.2.1.4 Dutch import and export with China 1996 - early 2003**

Units €1,000

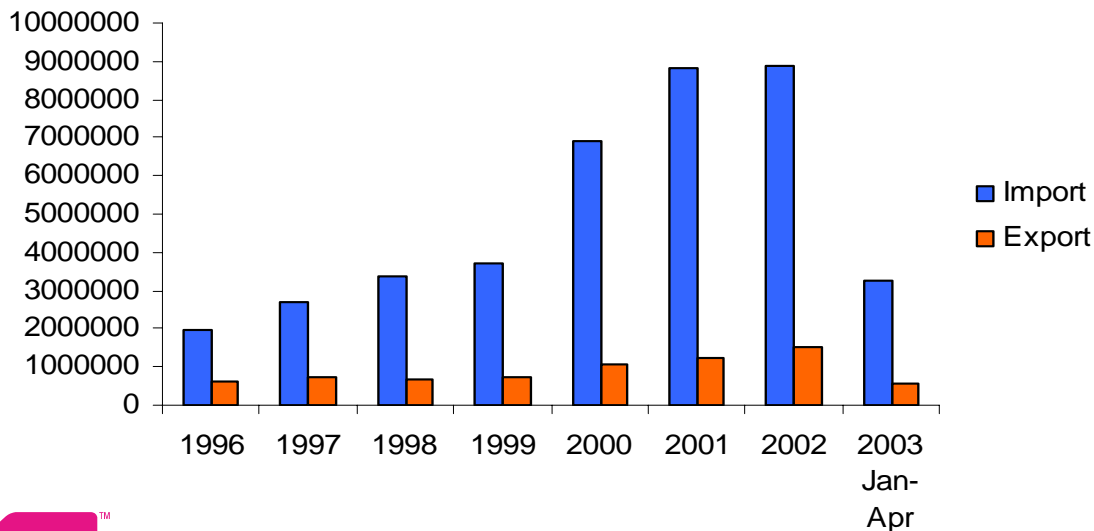
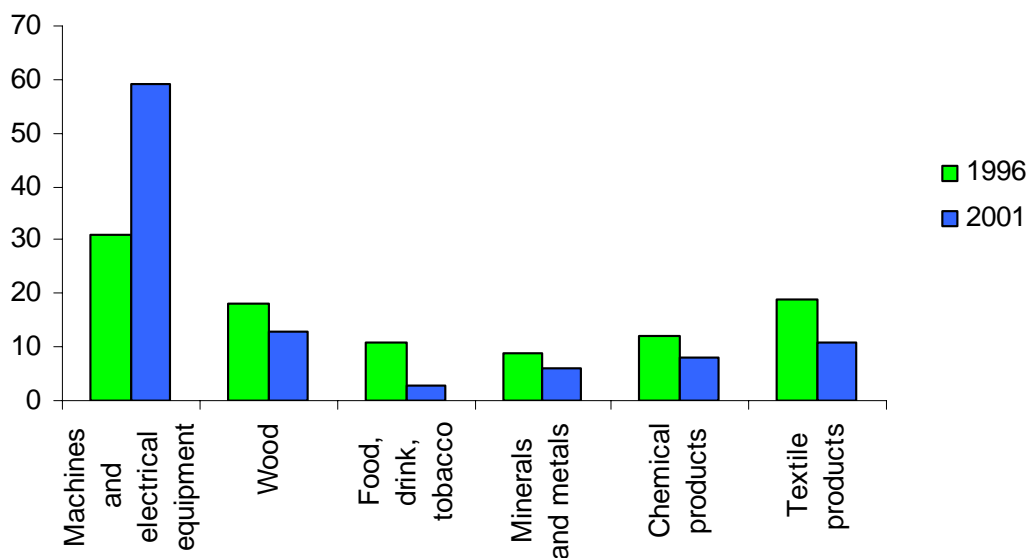


Figure 3.2.1.4 gives an overview of the trend of the Netherlands' trade with China in the past 7 years. The explosive growth of trade with China was mainly due to imports from China.

### 3.2.2 Imports from China

Figure 3.2.2.1 provides an overview of the shifts in composition of imports between 1996 and 2001, showing a shift to more added value products. Machinery and electrical equipment have grown substantially between 1996 and 2001, mainly aided by product categories: computers, computer components, telecommunications equipment, consumer electronics and other office equipment.

**Figure 3.2.2.1 Imports from China 1996 - 2001**



Among the categories that have decreased are textile, agricultural products, minerals and chemicals. The share of the traditionally strong textile sector was nearly halved in this period, similarly, agricultural products were also drastically reduced in great proportions.

**Table 3.2.2.2 Import & export by foreign investment enterprises for 1998-2000**

Unit: US\$100 million

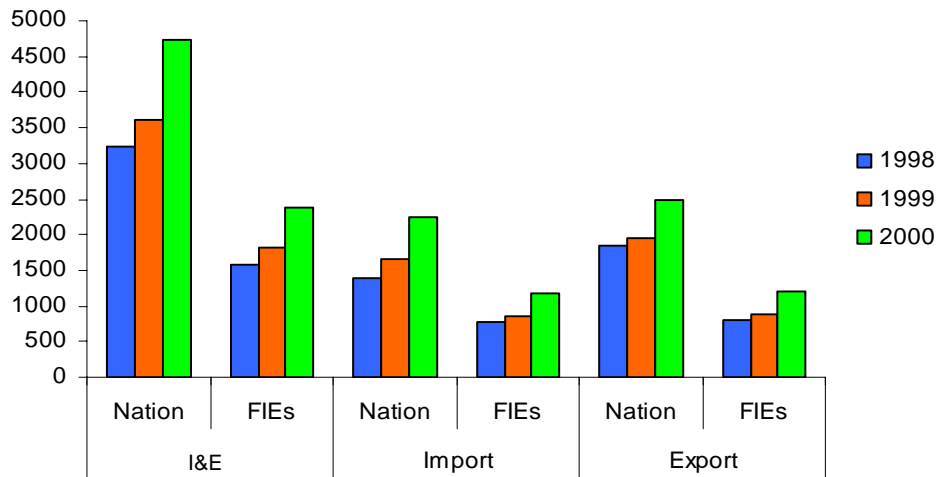


Table 3.2.2.2 show that the imports and exports by Foreign Investment Enterprises (FIE) increased during 1998-2000, increase from 1999 to 2000 is substantial: both on nation and FIE level, the increase was nearly 30%.

### 3.3 Foreign Direct Investment from The Netherlands

Since implementing reforms and opening its economy, China has become one of the countries that have attracted the most foreign investments. Up until the end of September 2002, China had ratified an accumulative total of 414,796 foreign-invested enterprises with a contracted investment of US\$814 billion of which US\$435 billion had been put into use.

Foreign direct investment (FDI) grew at a faster pace in 2002. The number of newly approved foreign-invested projects increased by 30.7% to 34,171, while contracted and utilized foreign direct investment increased by 19.6% and 12.5% to US\$82.8 billion and US\$52.7 billion respectively. In the first five months of 2003, contracted and utilised amount of FDI grew markedly by 42.2% and 48.2% respectively.

In the past three years the total number of FDI projects from the Netherlands has been showing an upward trend.



**Table 3.3.1 Foreign direct investments (FDI) by countries / regions for 2002/2001/2000**

Units US\$100 million

	2002		2001		2000	
	No. of Projects	Realized FDI Value	No. of Projects	Realized FDI Value	No. of Projects	Realized FDI Value
Total	34,171	527.0	26,140	468.7	22,532	407.7
10 Asian countries/region	24,626	324.0	18,819	294.8	15,792	264.6
Total for the EU	1,486	37.0	1,214	41.8	1,112	47.0
The Netherlands	127	5.7	114	7.7	99	7.5
Total for North America	4,071	60.0	3,149	48.7	2,977	46.5
Total for some freeport*	2,691	81.7	2,039	66.0	1,451	44.0
Others	1,959	24.0	1,458	17.0	1,200	5.0

\* Virgin Island, Cayman Islands and West Samoa

By the end of 2002, China approved a cumulative of 423,720 foreign investment projects, with contracted and actual utilized overseas FDI amounting to US\$827.8 billion and US\$446.3 billion. The leading sources of investment included Hong Kong, Japan, the US, Taiwan, Singapore and South Korea. China has been the largest recipient of foreign direct investment within all developing countries for seven consecutive years since 1993.

## 4. China: Energy Market

The People's Republic of China (China) is the world's most populous country and in absolute numbers the second largest energy consumer (after the US). China's economy and associated energy demand have grown rapidly since the 1970s, despite a decline in 1998 that was partly attributed to the Asian financial crisis. Energy demand has doubled since 1980 and could triple between now and 2020, representing 25% of the increase in the total world energy demand.

The demand for electricity for domestic consumption has been increasing substantially. During the past decade, the domestic electricity consumption has been increasing at the rate of 11.4% per annum and by 2020, personal domestic electricity consumption is expected to reach 600 kWh. Guangdong, Shandong and Jiangsu are the top provinces accounting for most of the electricity consumption.

### 4.1 Situation in Rural Areas

The energy industry has developed rapidly in rural areas. In 2000, the total electricity consumption in rural areas accounted for approximately 30% of the national electricity consumption. However, there is still room for growth. The average domestic electricity consumption in rural areas is only 77 kWh per person annually, while that in urban area is 213.2 kWh per person annually.

According to the electricity development plan, by 2005 there should be 100% electricity access at village level and the number of non-electricity households should be reduced significantly. The government aims at 99.9% electricity access at household level by 2015.

China's population has reached 1.3 billion. The development and utilization of renewable energy is becoming an important option to realize sustainable development of the energy system.

China will need to mobilize investments valued at US\$1 trillion over the next twenty years for its expected energy expansion. At least 20% of this total will have to come from foreign investment. As a result, commercial opportunities in China's energy sector are tremendous for companies committed to a long-term strategy.

For the coming decades China's economy is expected to retain an annual growth rate of 6%-7%. Therefore the requirements for China's future energy strategy are clear:

- Increase energy supply, improve energy efficiency and clean usage of fossil energy.
- Change energy structure, by gradually decreasing the proportion generated by coal and increasing the supply of alternative energy.
- Strengthen international cooperation and expand energy supply sources.
- Protect environment to realize sustainable development.

Renewable energy has been growing very fast in China in recent years. China now ranks top in the world's production of solar thermal collectors/heaters, twelfth in geothermal power generation, and eighth in wind power generation. As one of the substitutes for coal, renewable energy is expected to contribute as much as 6% of the country's energy supplies and 8% of its power supply by the year 2020.

Renewable energy will be a major option to ensure implementation of the above energy strategy. Furthermore, China is endowed with rich energy resources and has the technical foundation to develop and utilize renewable energy resources on a large scale.

China suffers from major energy related environmental problems. According to a report by the WHO, seven of the world's ten most polluted cities are in China. Extreme air pollution will require investment in cleaner and more efficient power generation plants and equipment. Sixty to eighty million people in rural areas are without access to electricity suggesting a market for smaller-scale renewable power projects for those areas without access to an improved grid.

China's energy strategy is designed to address the above challenges by diversifying from coal, strengthening petroleum exploration and development, enhancing efficiency and environmental protection, increasing development of hydropower and nuclear electricity, and developing rural electrification and renewable energy sources.

China has rich resources of new and renewable energies, which are dispersed widely in the nation. Major types are: solar energy, wind power, biogenetic power, terrestrial heat power, oceanic power and hydropower. New technologies and materials are applied in developing and exploiting the new energies and renewable resources, which are almost exhaustible and not harmful to the environment.

However, despite the rich renewable energy resources, huge market potential and current rapid development China still need to get rid of some barriers on technology, market mechanism and financing.

## 4.2 Technical Issues

Compared with more developed countries, the technical level of most renewable energy industries in China is rather backward, the quality of products poorer and the production scale of enterprises smaller. China still can't manufacture wind turbines of 600 kW or above independently. Hence, following the policies of the Wind Plan by State Development and Planning Commission (SDPC)<sup>2</sup>, China No. 1 Tractor Group Ltd. cooperated with Spain MADE, and Xian Aero Engine Co. cooperated with German Nordex. The joint ventures produced 660 kW and 600 kW turbines respectively.

Some raw materials have to be imported, thus preventing increased levels of localization in domestic production. All these factors increase the production cost of renewable energy so that it cannot compete with conventional energy at this stage. Important measures adopted by the Chinese government were:

- enhancing the import of foreign technologies
- enhancing domestic R&D of new techniques and new products
- promoting mechanisms for technology creation and innovation
- providing support for organizations engaging in renewable energy R&D
- building demonstration projects
- supporting technical renovation and expansion of production scale in key sectors and a batch of renewable energy backbone enterprises
- accelerating localization and commercialization in the process of production.

Due to the technical problems, the costs of renewable energy equipment are high, thus resulting in much higher cost of renewable energy than the cost of conventional energy. To compare, until 2000 the price of wind power is RMB0.60-RMB0.70/kWh, while that of conventional energy is RMB0.20-RMB0.30/kWh.

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<sup>2</sup> See more details in paragraph 4.4

### 4.3 Financing Issues

Most renewable energy projects rely on soft loans from foreign governments. Investments made by the China government are still small. Local banks are not willing to offer loans, especially long-term loans (over 15 years) to manufacturers. In other countries, the loan period for renewable energy projects is usually 20 to 30 years and the interest rate is 1%. However, in China the loan period is maximum 7 years at an interest rate of 3.6%.

### 4.4 Organisational Issues

As a whole, renewable energy products have no systematic technical standard or any national quality norms, corresponding regulations and rules, and quality supervision system. The whole market is so unregulated that it impedes the development and expansion of the market. Furthermore, though renewable energy projects have very good market potential, it does not create an effective demand due to lack of information and advertisements about renewable energy.

Classified by energy type, the management of most renewable energy products is subordinated to different government sectors or departments. For example, the authority and leadership for renewable energy has fallen within the competence of the State Development and Planning Commission (SDPC), State Economic and Trade Commission (SETC), Ministry of Science and Technology (MoST), Ministry of Agriculture (MoA), Chinese Ministry of Electric Power (MOEP), Department of Energy Conservation and Resources Utilization, to name a few. Therefore it is very difficult to reach an agreement on development planning, policy and implementation of projects because different agencies show divergent thinking. Such institutional systems not only have very high social costs, but also cannot adapt to the requirements of a market economy, hence it is very difficult to form unified policies and measures.

An effective way to further enhance the sector would be to establish a special government agency that is responsible for all aspects of management and decision-making related to renewable energy development. For example, India has set up a similar agency, namely the Ministry of Non-conventional Energy Resources (MNES). However, China did form several agencies in 1998, but had then reduced its size. It did not set up such an agency with a special responsibility for management of renewable energy. Therefore a more feasible solution may be to consolidate the

renewable energy management under the current agency system, and to clarify the function and authority of all related agencies, especially their authority and obligations for policy formulation.

## **4.5 Alternative Energy Sources: Solar Energy**

In recent years China has conducted a great deal of research into the use of solar energy for both the production of electricity and heating of water. In China, solar energy is predominantly used for heating, such as in passively heated solar houses, solar heated agricultural greenhouses, and solar water heaters. Passive solar heating of houses is most popular in the western areas of China due to high solar radiation levels. Solar water heaters are also becoming very popular in China - there are over 1,000 solar water heater manufactures.

Today more than 12 million homes in China use solar water heaters. Solar water heating is becoming a major force in the "energy saving" market. The majority of water heaters are evacuated tube type, as this type is the most reliable, efficient and cost effective. Evacuated tube solar water heaters can be used in cold regions where flat-plate style solar water heaters are prone to freezing.

China currently has about 500 solar thermal manufacturers and more than 100 solar PV distributors. Compared with the traditional state-owned enterprises, they are small in capital investment and in production scale, but very flexible in business development and management. The small enterprises are leading the commercialization of renewable technology.

## **4.6 Alternative Energy Sources: Wind Energy**

Wind is abundant in China and it has been using wind energy for more than 1700 years. The wind energy reserve in China is ranked third in the world. Areas rich in wind energy resources are mainly located in the grasslands or the Gobi desert of northwest, north and northeast China, as well as coastal area and islands in east and southeast China, which usually experience a lack of coal and other conventional energy resources. Regions such as Xinjiang, Gansu, Inner Mongolia, Jilin, Heilongjiang, Liaoning, Shandong, Xiangsu, Zhejiang, Fujian, Guangdong and Hainan contain the essential resources to build wind power plants. Strong winds occur in winter and spring, the seasons with little rain fall, whereas in the summer, although the wind is not so strong

but there is heavy rain fall, so the wind and hydropower are good seasonal mutually compensatory power source.

The construction of wind farms<sup>3</sup> in China started from the 7<sup>th</sup> Five-Year Plan. The investment from the Chinese government in wind energy was RMB3 million in the 7<sup>th</sup> Five-Year Plan, RMB7 million in the 8<sup>th</sup> Five-Year Plan and RMB20 million in the 9<sup>th</sup> Five-Year Plan.

Along with the development of technologies, the cost of wind power will continue to drop. The currently cost is RMB0.60-RMB0.90/kWh. But in China, the present tariff for wind electricity (17% value-added tax) is higher than that of coal fired power. Even if this is the cost of environmental protection, it would have negative results for the local economy to develop large scale wind farms in those provinces or autonomous regions where economies are not well developed, with only small electric grids and low purchasing power of consumers.

Ways of reducing the cost of wind power include careful site selection, development at a certain scale, optimizing the wind farm design and correct selection of equipment supplier via a tendering process.

Another important way is reducing the cost of wind turbines, since the equipment costs account for 60%-70% of the initial investment of wind power projects. If more components can be made locally and the cost can be cut down by 15% while keeping the same quality as imported ones, the gap between wind and coal tariffs will be significantly reduced.

Most of the completed wind farms in China have been financed by loans with subsidized interest provided by State Economic and Trade Commission (SETC) for technical innovation projects, and soft loans provided by foreign governments. Due to low interest rates and longer payback period, these loans resulted in lower wind power tariffs during the payback period. In the future, the soft loans will decrease while the commercial bank loans with higher interest rate and shorter payback period will increase, resulting in higher wind tariffs during the payback period, which is a barrier for large scale wind farm development.

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<sup>3</sup> See appendix 1 for an overview of major wind farms since 1998

## 4.7 Ongoing Projects

### 4.7.1 China “wind plan”

The State Development Planning Commission (SDPC) launched “Wind Plan” in March 1996. The main purpose is to develop the wind power turbine manufacturing industry in China. The targets of this plan are:

- 1) import the advanced technologies via joint ventures, which results in the localization level of the turbines made in China reaching 60% in 2000. The plan focuses on two types of products, 300 kW and 600 kW.
- 2) SDPC will take the lead in the wind power technology research projects in the 9<sup>th</sup> Five-Year Plan. Grasp the technology of developing large turbines. As a result of this plan, Xian Aero Group made a joint venture with German Nordex, and No. 1 Tractor Group made a joint venture with Spain MADE. In 1999, SDPC funded RMB7.5 million to this plan for setting up localized turbine demonstration site and QC system. The plan is extended to the 10<sup>th</sup> Five-Year Plan.

### 4.7.2 China and Germany co-operate in wind power project

With financial support from the German Ministry of Economic Cooperation and Development, a three-year study of the feasibility of a wind power project in Lichuan has resulted in plans for the construction of a medium-sized 20 MW wind power project. The site has potential to expand to 50 MW capacity in terms of the wind resource and the local grid capacity.

The wind power project will be constructed in the Qiyue Mountain area in Lichuan County, 720 kilometres west of the provincial capital, Wuhan. Lichuan is a national level poverty county, and there are still villages that are not covered by the local electricity grid. The 20 MW wind power project is being carried out in co-operation with the German government under the Clean Development Mechanism of the Kyoto Protocol.

As the most populous developing nation in the world, China is co-operating with many foreign countries and international institutions to seek feasible ways of implementing CDM projects. The utilisation of renewable energy, including wind power, has top priority. However, there are considerable difficulties for Chinese companies and government agencies in processing CDM



projects because understanding of the CER's and the processing procedure for the CDM in China is still very basic.

#### **4.7.3 World Bank/GEF China renewable energy development project**

The Project Management Office (PMO) of the World Bank/GEF REDP is preparing a project activity for the development of a consumer credit financing service. This activity aims to design a programme of pilot efforts that will lead to an increase in the availability of consumer financing for PV systems in the REDP areas. The design of the pilot efforts will be based on a clear pathway to sustainable, commercially-based finance for PV system consumers.

#### **4.7.4 UNDP/GEF capacity building for rapid China renewable energy commercialisation project; Bagasse cogeneration workshop**

The Project Management Office of the UNDP/GEF project will work with Guangzhou Design Institute of Light Industry and Sustainable Energy Development Authority, Australia, to hold a workshop in Guangzhou in June 2003. The workshop aims to introduce the Australian Bagasse Cogeneration Technologies to the sugar production industry in Southern China in preparation for the UNDP-funded bagasse cogeneration pilot projects in Guangdong and Guangxi provinces in China.

#### **4.7.5 UNF solar water heater integrated building project**

The UNF Solar Water Heater Integrated Building Project will sponsor a study tour in Europe from 19–30 June 2003. The study tour, called *Expansion and Improvement of Solar Water Heater Technology in China*, is composed of 25 members from the Chinese solar water heater industry, building societies and related government agencies. The study tour will visit the Standard Center, the Novem agency, and WWF panda house project, as well as private renewable energy companies in the Netherlands. The study tour also plans to visit the Freiburg Solar Energy Institute and attend the European Solar Thermal Conference in Freiburg, Germany on 20 June 2003.

#### **4.7.6 Hong Kong China electricity wind power project in Guangdong**

Hong Kong China Electricity Group signed a Wind Power cooperation contract with Guangdong Yangjiang Hailing Island Test Area in 2003. The total investments of this project are approximately RMB800 million, which is the biggest wind power project in China so far. The capacity is 100 kW. The value of the wind power generated annually from this project is expected to be RMB200 million.

#### **4.7.7 Shanghai wind power project**

The Shanghai government approved a new 200 kW wind power project in Shanghai at the end of 2002, called "Shi Xing Wind Power Project. The wind power turbines will be built on the seabed of Qian Hai. It is the first on-sea wind power project in China.

#### **4.7.8 ADB Heilongjiang Fujin wind power project**

The People's Republic of China has received a loan from the Asian Development Bank (ADB) towards the cost of the Heilongjiang Fujin Wind Power Project, and it intends to apply a portion of the proceeds of this loan to eligible payments under the contract for which this Invitation for Bids is issued. Heilongjiang HuaFu Wind Power Fujin Co. Ltd (the "Employer"), together with its agent, China Electric Power Technology Import and Export Corporation (CETIC), intend to invite contractors to bid.

## 5. Market Potential

### 5.1 Opportunities for Foreign Companies

Both solar and wind energy systems are suitable for the China market because of the excellent solar and wind resources, limited resources of other forms of energy, decrease in pollution and the local production.

The China government is committed to the Kyoto Protocol Clean Development Mechanism (CDM) and there is an increasing public awareness on environmental issues. The Chinese encounter a few barriers regarding the domestic market expansion. These are:

- durability and reliability
- after sales service
- level of maintenance and public awareness

The government has not expressed any support policy or national priority for renewable energy and currently it does not subsidize household or business purchases.

The renewable energy industry in China faces the following challenges:

- The inconsistent and often poor quality of the products
- Lack of knowledge among consumers
- Local governments do not favor Solar Water Heating (SWH) installations
- The level of technical and management skills of personnel
- The domestic competition (more than 1,000 companies on the renewable energy market)

The China renewable energy industry offers an opportunity for European (e.g. Dutch) companies to enter this market. First of all they can become a strategic partner on product and technology improvement, secondly they could aim at joint projects together with local companies and finally, Chinese are willing to pay a higher price for high quality from Europe.

The State Development Planning Commission (SDPC) issued the new “China New Energy and Renewable Energy” White Book in April 2000. It is a guide book for energy policies in China. To encourage the development of wind energy, State Economic and Trade Commission (SETC) coordinates with the Finance Bureau and National Tax Bureau. Value-added Tax is derated 50%

in the wind energy industry. Benefiting from the new policy, the costs of wind energy are expected to be deducted to RMB0.50/kWh.

According to Electric Power Law of PRC, China encourages and supports utilizing renewable and clean energy to generate electricity. The National Custom Bureau executed a special policy in 1998 to encourage foreign enterprises to invest in this industry. In 1990 the State Development Planning Commission (SDPC) and Ministry of Science and Technology (MoST) issued the "Notice about Further Supports to the Development of Renewable Energy from SDPC and MoST" that puts forward several policies on promoting the development of renewable energy, especially towards wind energy.

### **5.1.1 Opportunities for European companies**

The Chinese renewable energy sector is particularly interested in European suppliers, as the public in countries such as Germany, Austria and the Netherlands generally favour green energy.

The major barrier is cost and lack of market demand. Most of the wind power projects in China have been financed by foreign governmental loans, especially from Europe (Germany, Denmark and Spain) and the US. Bilateral loans are given on the condition that equipments from the country giving the loan are used. Hence, there is no real competition in this case. In spite of this due to government push, investment in wind and solar power is ever increasing through international investment such as the World Bank and Asia Development Bank.

It is expected that Dutch companies will encounter tough competition from German and Danish companies followed by US companies largely due to the fact that they are established in China and also because their respective governments are providing substantial bilateral loans to China.

The World Trade Organization offers China an excellent opportunity for the development of solar energy business. Since they appeared on the market, solar water heaters have become a success in China and a number of European countries. China now has a well established solar thermal industry with over 1000 factories manufacturing and selling systems. Most of these collectors are used to heat water and are sold without subsidies. The development and application of solar water heating technology have made great progress and provided people in urban and rural areas with cost-effective energy services; however, the inconsistent quality of the

product and the fragmented nature of the solar industry frequently impede overall market penetration and long-term market growth. Significant growth in the Chinese solar water heater sector would capitalize it for entry into the European market - a source of competition, or opportunity, for European companies.

### **5.1.2 Sectors for investment**

Because China relies on coal to generate almost three-quarters of its power, the electricity sector contains perhaps the largest potential source of viable CDM projects. In the shorter term, CDM investment in China will likely involve incremental projects such as the introduction of highly efficient boilers, energy-efficient buildings, biomass gasification, wind energy, solar heat, electric and natural gas-fired public transportation, and district heating improvements (ideally with natural gas boilers). If projects like these can demonstrate greater efficiency and lower emissions, CDM potential exists.

### **5.1.3 The Kyoto Protocol**

#### **Investment opportunities for solar and wind energy manufacturers**

The Kyoto Protocol Clean Development Mechanism (CDM), created to promote and facilitate investment in greenhouse gas emissions-reduction projects, will provide business opportunities and encourage economic growth. CDM projects in China, in particular, promise to generate revenue and other benefits for companies from industrialized countries that invest in qualifying projects. China ratified the protocol in August 2002.

Though protocol rules dictate precisely what projects will qualify, any project that results in fewer greenhouse gas emissions than before will potentially qualify. With its thirst for foreign investment and its dependence on carbon-intensive coal as a primary source of energy, China may become the largest single recipient of CDM projects. Understandably, China views the CDM as a way to attract more foreign investment, with the added (though perhaps secondary) benefit of obtaining a cheap fix for some of its domestic environmental problems. Since coal is not only the primary source of China's contribution to global climate change, but also the cause of China's major domestic environmental menace—acid rain—China likely considers the CDM as killing three birds with one stone, resulting in more economic development, mitigated global climate change, and less acid rain.

The Asian Development Bank, the World Bank, the Global Environment Facility, and others have financed the CDM and other emission-reduction projects in developing countries. In addition, the Dutch Government and the World Bank's Prototype Carbon Fund are purchasing emissions reductions from eligible projects, often providing additional up-front financing.

### **First Kyoto Protocol project: Chinese win carbon funding for wind farm**

The announcement that the Huitengxile 34 MW wind farm is to receive funding under the Kyoto Protocol marks the first time that funding has been secured for a project in China under the Clean Development Mechanism (CDM). The project will result in savings of 675,000 tonnes of carbon dioxide over the first 10 years of operation. The funding from the sale of these emission reductions is likely to help stimulate the development of wind farms in China, as it makes a significant impact on the economics of these projects within the country. The revenue from the sale of the carbon credits (known as Certified Emission Reductions) to the Dutch Government will be equal to approximately 10% of the cost of the wind farm. The Netherlands buys those carbon reduction credits and uses them to meet part of its own reduction commitments under the Kyoto Protocol. The project involves the installation of 54 turbines, 19 of which have a capacity of 600 kW, and 35 of which have a capacity of 660 kW, providing a total of 34.5 MW. The project is expected to generate approximately 74.7 GWh per year which will be sold into the Inner Mongolian Western Grid. 42 MW of wind power capacity had already been installed at this site prior to this new project.

### **5.1.4 Development in west China**

Renewable energy will play an important role for the energy supply to West China, where the climate is dry, sunny and windy. Hence, solar energy and wind energy are abundantly available. The Chinese government is carrying out a plan called "Power Transmission from West to the East". This key project aimed at transferring electricity from southwest China's Guizhou province to south China's Guangdong province was completed and started official operation in early July. The project will add 1.5 million kW in power generating capacity to the province. So far, the province has benefited from 5 million kW from the western region. The project, with investment totalling RMB3.03 billion (US\$365 million), will greatly alleviate the high demand for power in summer. Under China's 10th Five-Year Plan for 2001-2005, facilities with a combined generating capacity of 10 million kW will be built in Guangdong, Shanghai, Beijing, provinces of Jiangsu and

Zhejiang, and other areas will also benefit from the power-transmission projects, which are also part of China's strategy to develop its western regions.

### **5.1.5 Beijing Olympic Games 2008**

Another investment opportunity is the Olympic Games that will take place in Beijing in 2008. A Beijing think-tank has placed electricity, solar, wind and geothermal power on its Olympic research agenda to ensure clean air, blue sky and clear water for the Olympic Games. Scientists are hoping for a breakthrough in the development of an electric vehicle, which is still in the research stage now. The electric vehicle will be used inside the Olympic Village to transport athletes, and is also expected to play a part in public transportation in 2008. To fulfill the goal, the national scientific governing division launched a five-year project with a planned investment of RMB880 million (US\$106 million). Planners view solar power as a major alternative to electricity. Such power will fuel up to 90% of the street lamps and heating of bath water in the Olympic Village during the Games. Part of the Olympic Action Plan, the document also focuses on topics like venue construction, telecommunications, security and environmental protection. As for wind power, Beijing plans to increase the capacity to 50,000 kW, which is 20% of the electricity required by the Olympic Park. The government is exploring the feasibility of building a new wind power plant at Yanqing. During the Olympic period, Beijing government plans to buy wind power from its neighbors.

## **5.2 Competitor Analysis**

The wind turbine market in China is occupied by manufactures from Denmark (67%), Germany (21%) and the US (1%). Local manufacturers occupy 1% of the market. The following five manufactures together share more than 10% of the market: Vestas (24%), Micon (23%), Nordtank (15%) and Bonus (14%) from Denmark and Zond (10%) from the US. Nordex and HSW from Germany have 5% and 3% market share respectively.

Major global players on the solar energy market are Astropower, Kyocera Solar, Solar Energy Corporation, Sharp Solar, Uni-Solar, Spire Solar, Solec, RWE Schott Solar, BP Solar, Fokker Space, Free Energy Europe, IMEC, Shell Solar Energy, Siemens NL (now Shell Solar) and Allied Sun Technologies.

On the wind energy markets the following manufacturers are major (Dutch) players; Ge Wind Energy, Enercon, Lagerwey, NEG-Micon, Nordex and Vestas Wind Systems<sup>4</sup>. Major turbine manufactures are in Denmark, Germany, the Netherlands, Spain, the US and Japan. Denmark has the most state-of-art technology on turbine manufacture. Its turbine production exceeds 50% of the production in the world. One-sixth of the turbines made in Germany are exported to other countries. 90% of the turbines used in China are imported or made by joint ventures.

There are more than a thousand solar and wind energy manufacturers in China<sup>5</sup> of which the majority are private owned small and medium sized companies which are mostly located in the eastern part of China.

Although there are many Chinese companies active on the local solar and wind energy market, some companies are also active on the international market. Two of the largest Chinese manufacturers of renewable energy, Xinjiang Sun Oasis and Shandong Himin Solar Energy are pursuing global market opportunities with their patented technologies. The previously mentioned foreign companies do operate on the international market which gives them an advantage over the local companies.

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<sup>4</sup> See appendix 2 for an overview of major wind turbine manufacturers

<sup>5</sup> See appendix 3 for an overview of the companies listed with the Chinese Renewable Energy Industries Association



## 6. China and the WTO

### 6.1 Trade and Investment Policies

China officially became a WTO member on 11 December 2001. Under China's WTO accession agreement, China made substantial market access commitments covering the agricultural, industrial and services sectors:

- Phase-out of non-tariff barriers on imports - Import license requirements will be eliminated within five years of accession, and all quotas will be phased out within five years of accession.
- Tariff cuts - average import tariffs for industrial products will be lowered from currently 14.8% to 8.9% by 2005, and average tariff for agricultural products will be cut to 15% by 2004.
- Conditions on foreign investment - The WTO Agreement on Trade-related Investment Measures (TRIM's) will be implemented; requirements on trade and foreign-exchange balance, local content, and export performance will be ceased or eliminated.
- Trading rights - China agrees to provide trading rights to foreign companies, to be progressively phased in over three years. Majority ownership in wholesale joint ventures will be allowed within 2 years of accession with no geographic or quantitative restriction by then. There will be no geographic, quantitative, equity/form of establishment restriction in retailing within 3 years of accession.
- Open-up of other services - China has also agreed to relax foreign investment restrictions on many important service industries, including distribution services, telecommunications, financial services and professional services. For value-added services in telecommunications, foreign partners will be able to own up to 50% with no geographic restriction within 2 years after accession. For mobile voice and data services, foreign operators can own 25% upon accession, and rise to 35% one year after accession and further to 49% after 3 years. Foreign banks will be able to conduct local currency business with Chinese enterprises 2 years after joining the WTO, and all geographic and client restrictions will be removed within 5 years after accession. For non-life insurance, branch or joint ventures with 51% foreign ownership will be allowed upon accession. Wholly-owned subsidiaries will be allowed in 2 years. For life insurance, joint ventures with 50% foreign ownership will be allowed upon accession.
- To ensure the US of access into the Chinese market and facilitate China's WTO membership, the US government, on 10 October 2000, officially passed a bill to grant the Permanent

Normal Trade Relations (PNTR) status to China. That means the US will no longer renew China's NTR status on an annual basis when China is a full member of WTO.

As a move to liberalize trade, China has continued to reduce administrative barriers to trade by increasingly switching to the use of tariffs and exchange rates adjustments. As of January 2003, the categories of import commodities subject to licensing controls were reduced to 8 (including 143 8-digit product codes), down from 12 in 2002. The tariff rates of over 3,000 items, out of a total of 7,445 product items, were also reduced at various degrees beginning January 2003, resulting in an average import tariff rate at 11%, down from 15.3% in 2001 and 12% in 2002.

For exports, beginning from January 2003, the categories of export products subjected to licensing controls were cut to 52. In addition, China has introduced a bidding system for export commodities quota to manage the exports of 20 categories of commodities.

The Chinese government has also gradually abolished the state monopoly of foreign trade and liberalized its foreign trading system. Beginning from July 2001, the qualification approval system for export rights has been changed to a registration system. All types of domestic enterprises, including private enterprises, can register for the trading right if they meet the prescribed conditions which apply to all types of enterprises.

China's current rates of VAT rebate for exports comprise four levels, i.e., 5%, 13%, 15% and 17%. Products that are entitled to 17% rebates include clothing, machinery and equipment, electrical appliance and electronic products, transport vehicles, instruments and meters.

In a bid to encourage overseas investment in the central and western regions, beginning from September 1996, local authorities of the central and western provinces were empowered to give approval to overseas-funded projects with total investment capital under US\$30 million, up from the previous amount of US\$10 million. Since the Chinese government started implementing a strategy of developing the western region in late 1999, more preferential treatments have been extended to foreign investment in inland provinces and regions. Upon expiration of the preferential tax polices, foreign-invested enterprises may enjoy 50% reduction of corporate income tax for another three years.

On 31 October 2000, the Chinese government officially amended the Laws on Wholly Foreign-owned Enterprises and Sino-foreign Cooperative joint ventures to comply with the WTO

accession requirements. At the Fourth Session of the 9<sup>th</sup> National People Congress, the Chinese government also passed the amendments to the Law of Sino-foreign Equity Joint Ventures (EJV's). After the amendments, foreign enterprises will have greater autonomy in sourcing raw material either in the Chinese Mainland or from elsewhere and will no longer be subjected to the domestic sales ratio restriction. Besides, they are no longer required to file their production and operation plans to relevant authorities. Workers and staff members of EJV's can establish trade union organizations to carry out activities to safeguard their legal rights and interests.

The Ministry of Foreign Trade and Economic Cooperation (now the Ministry of Commerce) issued a notice in July 2001 announcing that China is relaxing its control on foreign-invested companies' rights in international trade. Foreign-invested manufacturing companies are allowed to export any non-monopolised products not under quota or license management, regardless of who produced the items. However, only companies, which have exported more than US\$10 million per year, and have not broken laws and regulations on taxation, foreign exchange and foreign trade in the last two years, are qualified to enjoy the relaxation.

As a WTO member, China has to extend "National Treatment" to all FIE's. While certain preferential tax treatments enjoyed by FIE's will be eventually phased out, China has brought into line the fees and charges between domestic enterprises and FIE's.

A new version of the "Guiding Directory on Industries Open to Foreign Investment" came into effect on 1 April 2002. The number of "encouraged" industry listed in the new directory was increased to 262 from 186, while the number of restricted industry was reduced to 75 from 112. Foreign-invested projects under the categories of "encouraged" will enjoy tariff-free imports of machinery and equipment for their own use and the import value-added tax will also be exempted. The new directory also reflected China's WTO commitment by specifying the liberalization schedule of foreign ownership of different sectors.

In addition, the central government has also introduced tariff-free and VAT-exemption imports of capital equipment for projects within the hi-tech and priority sectors such as energy, agriculture, transport, infrastructure, production of raw materials, and tertiary industries, as well as in the pillar industries. These moves are targeted to attract high-quality overseas investment, introduce high technologies and know-how to rationalize the country's industrial structure.

At the end of 1999, the State Administration of Taxation and Ministry of Finance jointly issued the "Circular on Tax Collection Regarding the Implementation of the Decision Made by the State Council on Strengthening Technology Innovation and High Technology Development". According to the circular, equipment imported for the production of goods listed in the "State Catalogue of New Technology Products" and supporting technology, accessories and parts are exempted from customs duties and VAT on imports. For the import of advanced technology listed in the "State Catalogue of New and High Technology Products", software fees payable outside China are exempted from customs duties and VAT on imports.

At present, all foreign-invested export-processing enterprises are required to pay VAT on imported raw materials, parts and components. Upon exports, the amount of VAT paid will be used to offset the VAT payable for the part of domestic sale goods. Excess will be rebated ("exemption, deduction and rebate").

Starting from 1 October 1999, a new export processing trade management system is implemented. Under the new system, enterprises engaged in processing trade are required to pay a deposit when importing 11 major categories of commodities, which are classified as "restricted products". At the same time, all enterprises involved in outward processing trade will be classified into four categories of A, B, C, and D on the basis of their law-abiding records and business results. Enterprises classified as "C" are required to pay a deposit when importing raw materials, while enterprises classified as "D" will be suspended from outward processing trade business.

## 6.2 Implications of China's Entry into the WTO

The impacts of the WTO on the wind and solar energy industry are:

- The technical restrictions will be alleviated. China can import advanced technologies to enhance the renewable power technical level.
- The export tariff to the most-favored-nations will help China export the mature products such as solar water heaters. The market size of solar water heaters in China increases annually at 20%-30%.
- The costs of generating electricity by renewable energy will be lowered. For example, the costs of wind power will be reduced by at least 10%.

- The finance market will open. International banks will enter China. It is likely that the loan problems in the renewable energy industry will be solved.
- The economy in China will grow quickly after entering the WTO. The demand for electricity will grow accordingly. Hence it will push the renewable energy industry to develop rapidly as well.
- The electricity market will open. The monopolization situation will change and the government will not interfere with the pricing of electricity. The cost of electricity will be lowered. Among all kinds of electricity types, the cost of wind power will be the lowest.

## 7. Appendices

### Appendix 1

#### Wind farms in China since 1998

1 新疆达坂城风电一厂	Xinjiang Da Ban Cheng No. 1 Wind Power Plant
2 新疆达坂城风电二厂	Xinjiang Da Ban Cheng No. 2 Wind Power Plant
3 新疆布尔津风电场	Xinjiang Bu ER Jin Wind Power Plant
4 内蒙古商都风电场	Inner Mongolia Shang Du Wind Power Plant
5 内蒙古朱日和风电场	Inner Mongolia Zhu Ri He Wind Power Plant
6 内蒙古锡林浩特风电场	Inner Mongolia Xi Lin Hao Te Wind Power Plant
7 内蒙古辉腾锡勒风电场	Inner Mongolia Hui Teng Xi Le Wind Power Plant
8 广东南澳风电场	Guangdong Nan'ao Wind Power Plant
9 辽宁东岗风电场	Liaoning Dong Gang Wind Power Plant
10 辽宁横山风电场	Liaoning Heng Shan Wind Power Plant
11 福建平潭风电场	Fujian Ping Tan Wind Power Plant
12 浙江括苍山风电场	Zhejiang Kuo Chang Shan Wind Power Plant
13 浙江鹤顶山风电场	Zhejiang He Ding Shan Wind Power Plant
14 浙江泗礁风电场	Zhejiang Si Jiao Wind Power Plant
15 海南东方风电场	Hannan Dong Fang Wind Power Plant
16 山东荣成风电场	Shandong Rong Cheng Wind Power Plant

17 山东长岛风电场	Shandong Chang Dao Wind Power Plant
18 河北省张北风电场	Hebei Zhang Bei Wind Power Plant
19 甘肃省玉门风电场	Gansu Yu Men Wind Power Plant

## Appendix 2

### Overview of major wind turbine manufacturers

	<b>Big Wind Turbines</b>	<b>Small Wind Turbines</b>
<b>Country</b>	<b>Company Name</b>	<b>Company Name</b>
Australia		Westwind
Belgium	TurboWinds	
Denmark	Bonus A/S	Windmission
	NEG-Micon A/S	
	Nordex A/S	
	Vestas A/S	
	Norwin	
Finland	WinWind	Windside
		Shield
France	Jeumont	Vergnet
Germany	AN Windenergie	Aerocraft
	REpower	
	DeWind	
	Jacobs Energie	
	Fuhrlander	
	Pfleiderer	
Hong Kong		Synergy
		Synergy Power
The Netherlands	Bonus	
	Enercon	Turby
	Lagerwey de Windmaster	Fortis
	NEG-Micon	Prowind
	Nordex	Windside-Nederland
	Vestas	
Russia		Windelectric
Spain	Ecotecnia	WindTech
	Gamesa	J. Bornay
Sweden	Pitchwind	

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	<b>Big Wind Turbines</b>	<b>Small Wind Turbines</b>
<b>Country</b>	<b>Company Name</b>	<b>Company Name</b>
UK		Gazelle
		Marlec (Rutland)
		Ampair
		Gazelle/MKW
		LVM
USA	GE Windenergy Suzlon (also Asia)	Windstream
		Bay Winds / Jacobs
		Bergey Windpower
		Windturbine
		Aeromag
		Atlantic Orient
		Southwest Windpower

## Appendix 3

### Companies listed with the Chinese Renewable Energy Industries Association

Organization	Province
Anqiu Xiangyuan Lamp and Lantern Co., Ltd.	Shandong
Baoding Airscrew Manufacturer,	Hebei
Beijing Jike Energy New Tech Development Co.	Beijing
Beijing Main Academy of Nonferrous Metal	Beijing
Beijing Mingcheng Co.	Beijing
Beijing Solar Photoelectricity Center of China	Beijing
Beijing Sunda Solar Energy Technology Co. Ltd.	Beijing
Beijing Suoyang Solar Co., Ltd.	Beijing
Beixin Building Material Group	Anhui
Carton Engineering & Trading Ltd.	Hong Kong
CE Lighting Ltd.	Guangdong
Chang Zhou Consol Energy Co., Ltd.	Jiangsu
Chengdu Hongguang Electrical Engineering Co.	Sichuan
Chengdu Qingguang Electrical Appliance Co., Ltd.	Sichuan
China Fu Ling Wind Energy Co.	Guangdong
China Shandong Himin Solar Energy Group	Shandong
Engineering Machinery Co., Ltd.,	Henan
Focus Solar	Jiangsu
Gansu Genaiyong Solar Power Co., Ltd.	Gansu
Gansu Power Co.	Gansu
Gansu State-Run Zhongxing Solar Co., Ltd.	Gansu
Gansu Taiyang Photoelectricity Co., Ltd.	Gansu
Gofly Green Energy Co.Ltd.	Shanghai
GUANG	Heilongjiang
Guangdong Yuehua Energy Sources & Materials Corp	Guangdong
Guangdong Nan'ao Wind Energy Development Co.	Guangdong
Guangdong Nan'ao Zheng Neng Wind Power Co.	Guangdong
HAMC	Heilongjiang
Harbin Habo Industry Co., Ltd.	Heilongjiang
Harbin Hi-Tech ForeignTrade Corporation	Heilongjiang
Hebei Hua Rui Wind Power Ltd.	Hebei
Hefei Yangguang Power Source Co.	Anhui
Huanyu Wind/PV New Energy Co., Ltd	Inner Mongolia
Inner Mongolian Huade New Tech. Co.	Inner Mongolia
Inner Mongolian Jingcheng Industry Co., Ltd.	Inner Mongolia
Inner Mongolian Wind Power Main Co.	Inner Mongolia
Kaifeng Solar Battery Manufacturer	Henan

Organization	Province
Lanxin Photoelectricity Co., Ltd.	Gansu
Lanzhou Electrical Machinery Manufacturer	Gansu
Nanjing High-Speed Gear Case Manufacturer	Jiangsu
New Green Energy Ltd.	Shanghai
Ningbo Solar Electrical Source Manufacturer	Zhejiang
PV Energy Co.	Tibet
Qinghai Solar Power Co., Ltd.	Qinghai
Qinghai Tianpu Solar Science and Tech. Co., Ltd.	Qinghai
Qinhuangdao Huamei Co.	Hebei
Riquan Photoelectricity Co., Ltd.	Anhui
Shandong Himin Solar Energy	Beijing
Shandong Sunny Industry Group Co., Ltd	Shandong
Shandong Yanglide New Energy Co., Ltd	Shandong
Shanghai Electrical Machinery Manufacturer Co., Ltd.	Shanghai
Shanghai Institute of Low Iron Glass	Shanghai
Shengguang Solar Co.	Tibet
ShenZhen Sunshine Electronics Co., Ltd	Guangdong
Shenzhen Topray Solar Co. Ltd.	Guangdong
Shenzhen Zhongda Co.	Guangdong
Shuangdeng Power Source Co., Ltd.	Jiangsu
Silicon International Ltd.	Hong Kong
Solar Electronic Equipment Manufacturer, Solar-E Tech Co.	Beijing Hong Kong
Tibet Machinery Element Manufacturer	Tibet
TRONY Science and Technology Development Co., Ltd.	Guangdong
TurboSun International Energy Engineering (HK) Co., Ltd.	Hong Kong
Urumqi Solar Electronic Engineering Co.	Xinjiang
Wuwuling Manufacturer	Hebei
Xiangtan Bergey Windpower Co., Ltd	Hunan
Xiangtan Electrical Machinery Group Co.	Hunan
Xining Dawa Solar Co., Ltd.	Qinghai
Xining Gesang Solar Co., Ltd.	Qinghai
Xining New Energy Development Co., Ltd.	Qinghai
Xining Solar Power Development Center	Qinghai
Xining Tianyu Solar Electrical Source Manufacturer	Qinghai
Xinjiang Lida New Energy Electron Co., Ltd.	Xinjiang
Xinjiang Solar Science and Tech. Development Co.	Inner Mongolia
Xinjiang Sun Oasis Co.	Xinjiang
Xinjiang Wind Power Co.	Zhejiang

## Appendix 4

### Fairs

For 2003 there are quite some fairs planned in China of which the majority will be held in Shanghai and Guangzhou.

#### **2003 Shanghai Environment Protection and Renewable Energy International Forum, June 3-4**

This forum, organised by the National Environment Protection Bureau, Shanghai Development & Planning Commission and Shanghai Municipal Government, includes a workshop on renewable energy development and environmental protection. Topics covered include solar, wind, biomass, waste treatment and clean environment friendly vehicles. The forum will also include the Annual Conference of Shanghai's Solar Energy Society.

#### **2003 Shanghai International Expo on Renewable Energies, October 10-12**

This exposition will be held at the Shanghai Ever-bright Convention & Exhibition Centre. The organisers of the exhibition are Shanghai Solar Energies Society; Shanghai Centre for Scientific and Technological Exchange with Foreign Countries; China Renewable Energy Society; and Shanghai Jiaotong University. The Conference and Exhibition will cover renewable energy technologies including solar photovoltaic, solar thermal, wind energy, biomass, hydrogen, fuel cell, geothermal and micro-hydro power, as well as solid waste utilisation.

#### **Other exhibitions**

The 7<sup>th</sup> National Congress of the China Solar Energy Society and 2003 Academic Conference on Renewable Energy will be held in the same venue and at the same time. As the biggest academic event on renewable energy ever held in Shanghai, the organisers say that this conference has attracted registration of around 1,000 participants from across China, who will also share their academic expertise on the exhibition. Dozens of organisations from over 10 countries have already secured their space in the 2003 SREXPO.

Date	Fair	Location
17-19 September 2003	ELENEX China 2003	China Foreign Trade Center, Guangzhou
1-3 October 2003	PTC CHINA	Shanghai New International Expo Center
4-5 October 2003	Energy Asia - 2003	Shanghai New International Expo Center

## Appendix 5

### Useful Addresses

The China Statistical Yearbook 2002 (published by the National Bureau of Statistics of China) has been used for preparing this report. Further to this, the following Internet sites have been used for preparing this report.

[www.ahk-china.org](http://www.ahk-china.org)  
[www.apecnetwork.org](http://www.apecnetwork.org)  
[www.awea.org](http://www.awea.org)  
[www.cbs.nl](http://www.cbs.nl)  
[www.ccchina.gov.cn](http://www.ccchina.gov.cn)  
[www.ccre.com.cn](http://www.ccre.com.cn)  
[www.ce.cei.gov.cn](http://www.ce.cei.gov.cn)  
[www.china.com.cn](http://www.china.com.cn)  
[www.china.org.cn](http://www.china.org.cn)  
[www.chinaafdi.org.cn](http://www.chinaafdi.org.cn)  
[www.chinabusinessworld.com](http://www.chinabusinessworld.com)  
[www.chinaembassy.nl](http://www.chinaembassy.nl)  
[www.chinaenvironment.com](http://www.chinaenvironment.com)  
[www.chinainfobank.com](http://www.chinainfobank.com)  
[www.chinainvest.gov.cn](http://www.chinainvest.gov.cn)  
[www.chinese-embassy.org](http://www.chinese-embassy.org)  
[www.clingendael.nl](http://www.clingendael.nl)  
[www.cnn.com](http://www.cnn.com)  
[www.creia.net](http://www.creia.net)  
[www.crein.org.cn](http://www.crein.org.cn)  
[www.customs.gov.cn](http://www.customs.gov.cn)  
[www.e7.org](http://www.e7.org)  
[www.ebigchina.com](http://www.ebigchina.com)  
[www.ecn.nl](http://www.ecn.nl)  
[www.eco-web.com](http://www.eco-web.com)  
[www.eia.doe.gov](http://www.eia.doe.gov)  
[www.energy.sourceguides.com](http://www.energy.sourceguides.com)  
[www.energy-china.com](http://www.energy-china.com)  
[www.energytrends.pnl.gov](http://www.energytrends.pnl.gov)  
[www.fe.doe.gov](http://www.fe.doe.gov)  
[www.focus-solar.com](http://www.focus-solar.com)  
[www.friedlnet.com](http://www.friedlnet.com)  
[www.greenpower.grchina.net](http://www.greenpower.grchina.net)  
[www.hollandsolar.nl](http://www.hollandsolar.nl)  
[www.hollandtrade.com](http://www.hollandtrade.com)  
[www.ita.doc.gov](http://www.ita.doc.gov)  
[www.minbuza.nl](http://www.minbuza.nl)  
[www.mlr.gov.cn](http://www.mlr.gov.cn)  
[www.mofcom.gov.cn](http://www.mofcom.gov.cn)  
[www.moftec.gov.cn](http://www.moftec.gov.cn)  
[www.most.gov.cn](http://www.most.gov.cn)  
[www.nepa.unep.net](http://www.nepa.unep.net)  
[www.newenergy.org.cn](http://www.newenergy.org.cn)  
[www.nlembassypek.org](http://www.nlembassypek.org)  
[www.nrel.gov](http://www.nrel.gov)  
[www.opet.net.cn](http://www.opet.net.cn)  
[www.peopledaily.com.cn](http://www.peopledaily.com.cn)  
[www.pnl.gov](http://www.pnl.gov)  
[www.seia.org](http://www.seia.org)  
[www.solarbuzz.com](http://www.solarbuzz.com)  
[www.stats.gov.cn](http://www.stats.gov.cn)  
[www.tdctrade.com](http://www.tdctrade.com)  
[www.tradeport.nl](http://www.tradeport.nl)  
[www.unctad.org](http://www.unctad.org)  
[www.uneptie.org](http://www.uneptie.org)  
[www.unesco.org](http://www.unesco.org)  
[www.uschina.org](http://www.uschina.org)  
[www.usembassy-china.org.cn](http://www.usembassy-china.org.cn)  
[www.worldbank.org](http://www.worldbank.org)  
[www.worldwatch.org](http://www.worldwatch.org)  
[www.wto.org](http://www.wto.org)