



CHINA'S RENEWABLE ENERGY SECTOR **AN OVERVIEW OF KEY GROWTH SECTORS**



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EXECUTIVE SUMMARY

Renewable energy is an increasingly hot topic in China and is a sector targeted for increasing amounts of government attention and investment before 2020.

This paper provides a snapshot of the renewable energy market in China and demonstrates the challenges and opportunities faced by this important industry. The paper identifies the three key drivers behind the increasing importance of renewable energies to China, before examining the Chinese government's targets and strategies at the root of this industry growth in China.

By examining four key sectors in focus, hydro power, wind power, solar PV and biofuels, this paper ultimately demonstrates that while renewable energies are vital to China's continued sustainable growth, there are a number of challenges which must first be overcome in each of the renewable sectors examined here if China is to extract the maximum potential from their renewable energy industries.

THE IMPORTANCE OF RENEWABLE ENERGY TO CHINA

The use of renewable energy is an increasingly hot topic and important issue in China.

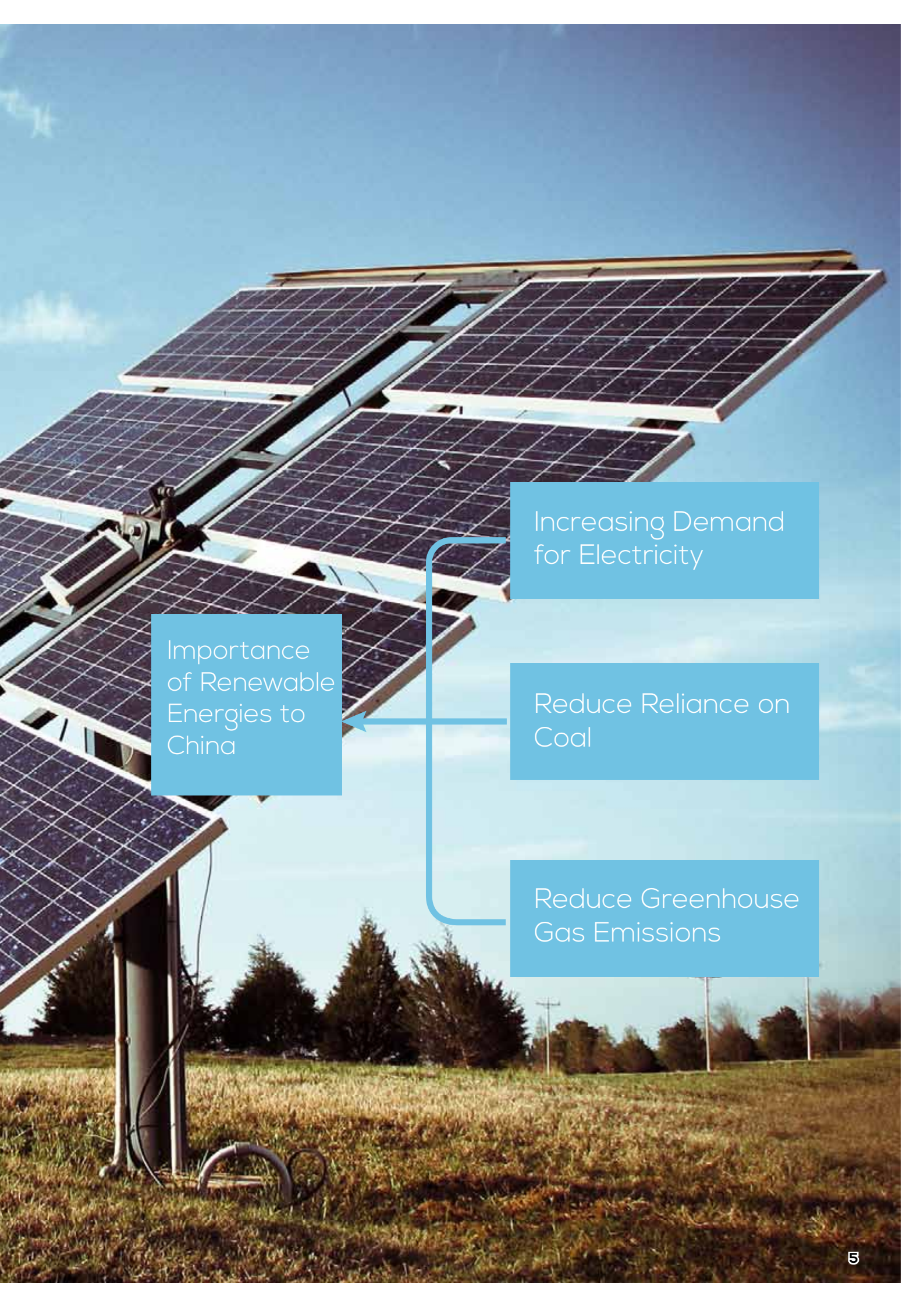
In the face of the problems of climate change, greenhouse gas emissions and oil prices rising, the public has come to realize the importance of developing renewable energy. More and more people opt for green travel or low-carbon lifestyles and the public media has been increasing its coverage and publicity of the development of low carbon technology and renewable energy.

– Liu Mingliang, Analyst, China Wind Energy Association

According to Solidiance analysis, there are 3 key drivers behind the continued interest in renewable energy in China:

1. China's increasing demand for electricity.
2. China's need to reduce its reliance on coal for energy production
3. China's need to reduce its greenhouse gas emissions.





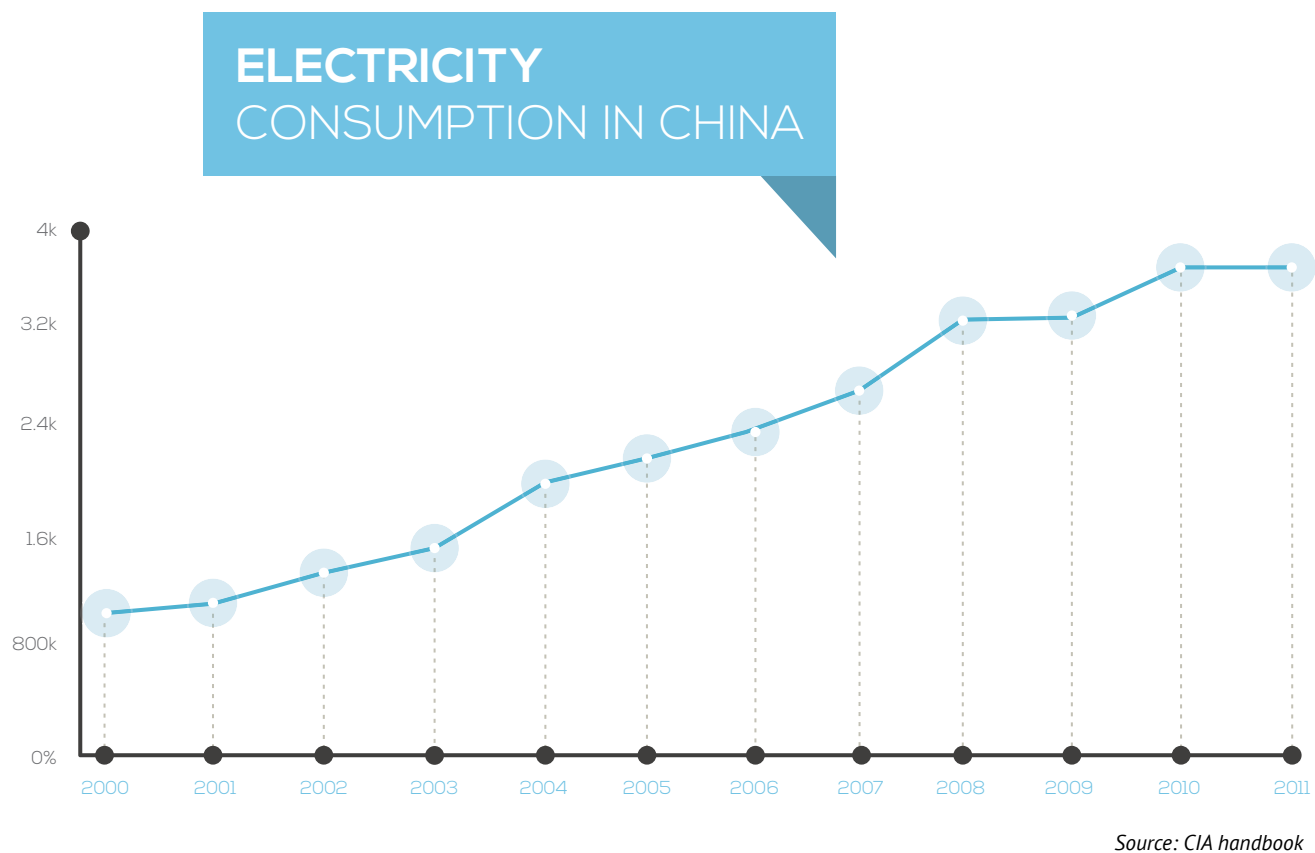
Increasing Demand
for Electricity

Importance
of Renewable
Energies to
China

Reduce Reliance on
Coal

Reduce Greenhouse
Gas Emissions

CHINA'S INCREASING DEMAND FOR ELECTRICITY

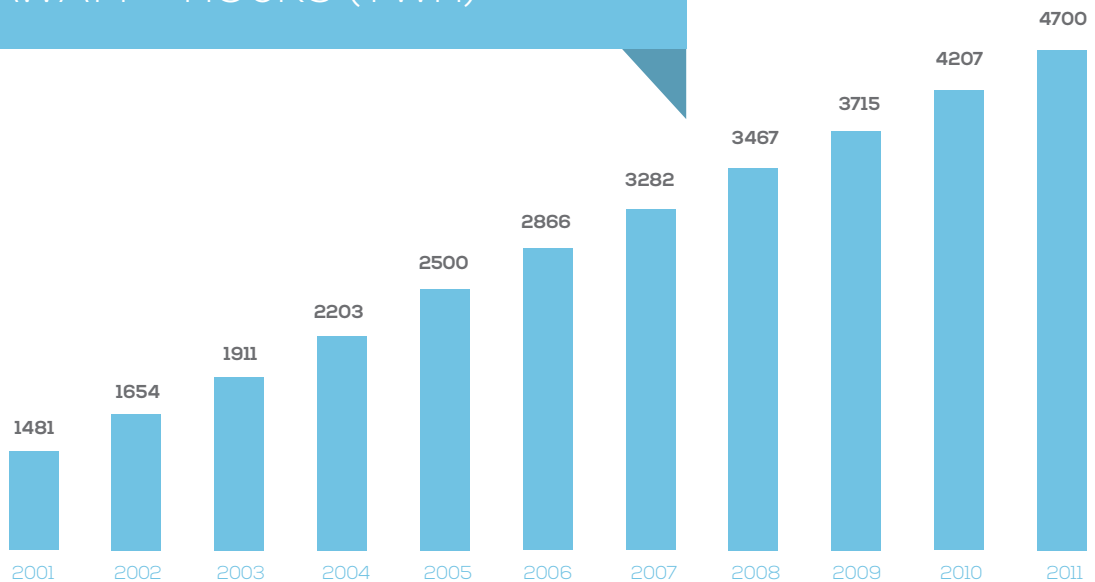


Driven by China's well-documented rapid economic growth over the past 30 years, China's energy consumption has more than doubled in less than 10 years. China is now the world's greatest consumer of energy and as the Chinese government continues to invest in moving Chinese manufacturers away from low-cost manufacturing and higher up the value chain into greater value added activities, China's demand for energy shows no signs of easing. China produced 1/5 of the world's total electricity in 2010, officially overtaking the USA for the first time to become the world's largest generator of electricity.

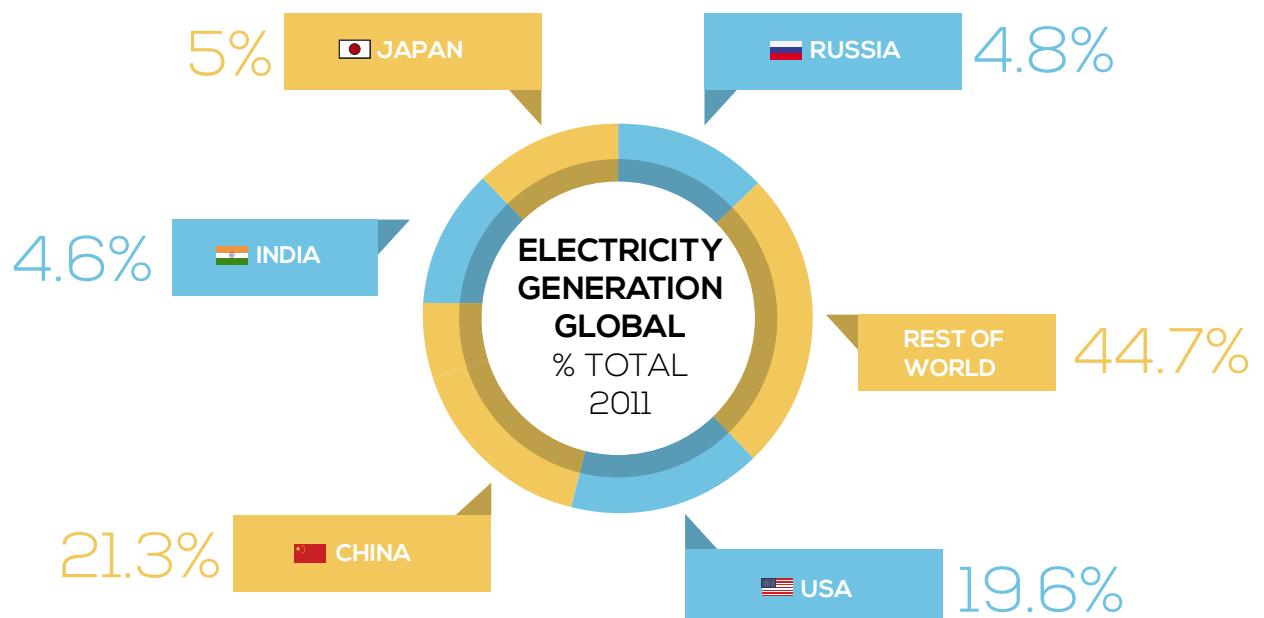
China's demand for energy as well as its capabilities and capacity for energy production are now positioning China to seize the opportunity to take the lead in the development of sustainable energy technologies, so as to further cement its position as an international leader in renewable energies.

Source: BP Statistical Review of World Energy June 2012 and CIA handbook

ELECTRICITY GENERATION IN CHINA TERAWATT – HOURS (TWH)



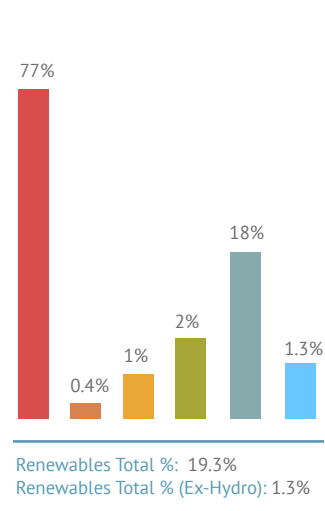
Source: BP Statistical Review of World Energy June 2012



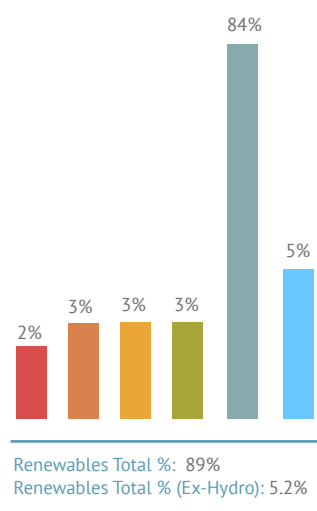
Although the economic development and growth is slowing down, there is still a huge demand for energy in China and that is certainly the main driver for renewable energy growth.

– Qiao Liming, Director for China, Global Wind Energy Council

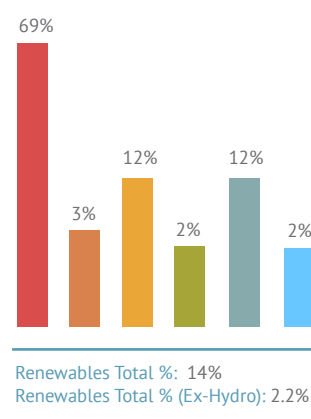
CHINA'S NEED TO REDUCE RELIANCE ON COAL



CHINA



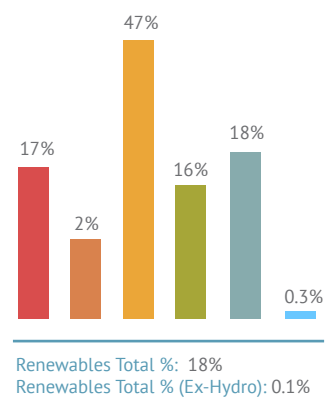
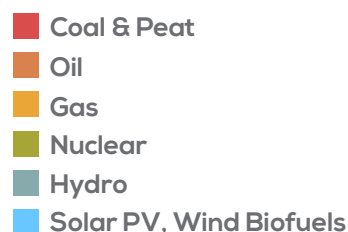
BRAZIL



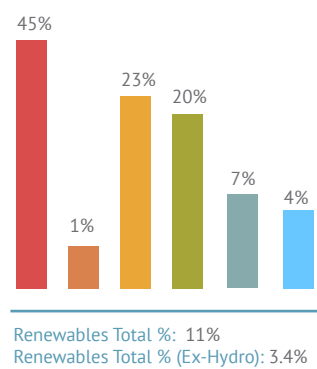
INDIA

RENEWABLE ENERGY IS A NECESSITY FOR **OVERALL ECONOMIC GROWTH** AND ENERGY SECURITY IN CHINA

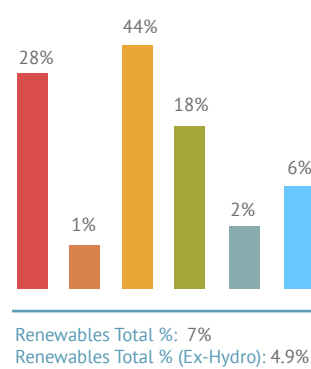
Source: BP Statistical Review of World Energy June 2011




RUSSIA



USA



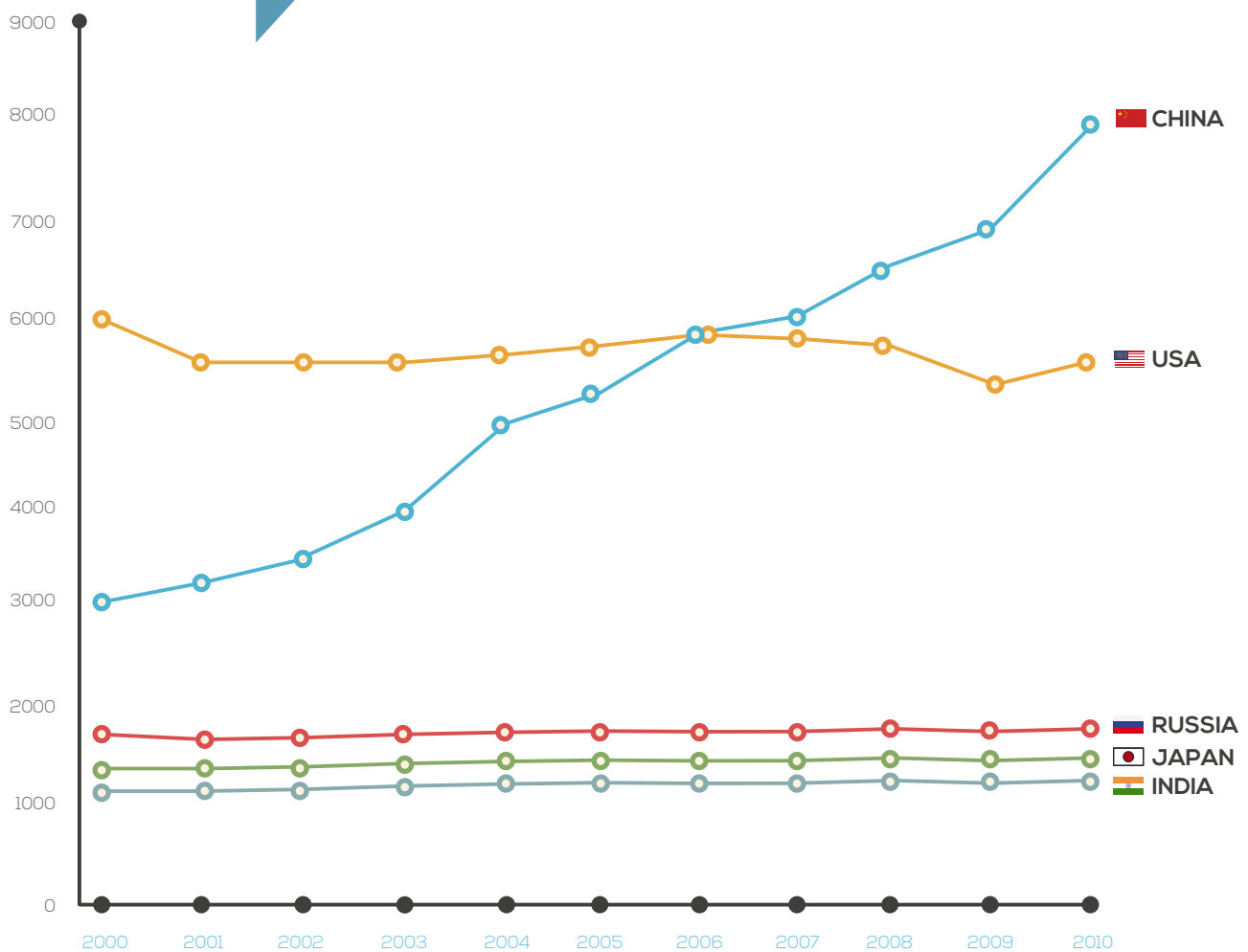
UK



C hina is quickly realising that coal will no longer be able to support the growth of its economy. Considering the logistical aspects of using coal, China has to either import it or have it removed from mines which is very difficult, and as a matter of fact, China is now rapidly using up its coal capacity. China is now recognising that it is unable to get more coal as quickly as it is needed, so China will have to switch to something else.

In the future, the effectiveness of China's industrial evolution will no longer be judged on the speed of development alone. Instead, the application of smarter, more sustainable energy sourcing techniques will serve as a stronger indicator of China's next generation of successful growth in the coming 10-15 years.

CARBON DIOXIDE EMISSIONS (MILLION METRIC TONS)



Source: EIA Statistics

CHINA'S NEED TO REDUCE GREENHOUSE GAS EMISSIONS

China's reliance on coal and peat makes it the world's highest emitter of greenhouse gasses. Overtaking the USA in 2007, China was responsible for emitting more than 8300 million metric tons of carbon dioxide in 2010: nearly 3000 million metric tons more than the USA and more than 6500 million metric tons compared to India.

China now faces significant pressure from international organisations to reduce its carbon dioxide emissions. In November 2009, just before the United Nations Climate Change Conference in Copenhagen, Chinese Premier Wen Jiabao pledged to reduce China's carbon dioxide emissions by 40-45% from 2005 levels by 2020. In order to do this, the Chinese government will need to continue heavily investing in renewable energies and increase the use of sustainable energy sources in its overall energy mix. China targets to increase the use of renewable energies from around 9% of its current total energy mix, to 15% by 2020.


Whether or not these targets will be successfully met remains to be seen. There are still serious doubts as to whether or not China will be able to successfully reduce its dependence on coal generated power, as Qiao Liming, China's Director of the Global Wind Energy Council acknowledges, "the Chinese energy mix is still quite heavily reliant on coal and I don't see that this situation will ever fundamentally change". Despite this uncertainty, the Chinese government is investing heavily in renewable energy in a bid to meet its self-prescribed targets.



THE GOVERNMENT'S **GO GREEN PUSH**

THE RENEWABLE ENERGIES SECTOR PRESENTS CHINA
WITH AN OPPORTUNITY FOR GLOBAL LEADERSHIP



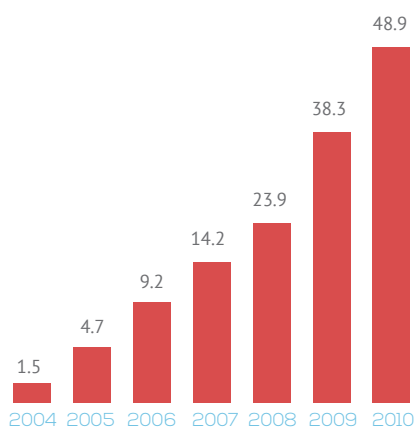


*Green economy, low carbon technology, etc. are emerging...
In some of these sectors, the gap between the emerging economies and the developed nations is relatively small.
In that environment, all we need to do is to take advantage of these [market] trends; if we respond appropriately we can seize this opportunity, gain the upper hand, and push forward a new breakthrough in development.*

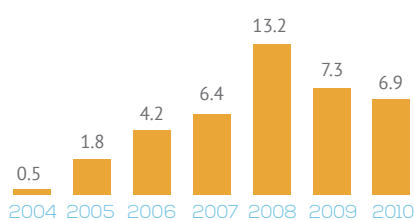
– Chinese Vice Premier Li Keqiang

CHINA'S INVESTMENT IN RENEWABLES

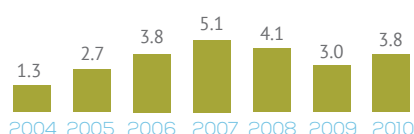
RENEWABLE ENERGY
INVESTMENT
US\$ BILLIONS



CHINA



BRAZIL



INDIA

China's rapidly expanding urban population and push for continued GDP growth make its reliance on non-renewable energy sources unsustainable. Continued investment in renewable energy is required to meet government growth targets. China's investment in renewables has grown at around 80% per annum since 2004, clearly demonstrating China's commitment to pursuing global leadership in renewable energies and building a sustainable support structure for the continued growth and development of its national economy.

CHINESE GOVERNMENT TARGETS

THE 2006 RENEWABLE ENERGY LAW

The China Renewable Energy Law was accepted on 1 January 2006 and was China's first state-supported mandate to help develop the use of renewable energy in China. The law is still a key driver of renewable energy development in China.

The 2006 Renewable Energy Law not only encourages the continued construction of renewable energy facilities, but also puts pressure on the Chinese grid operators to purchase the power generated by approved renewable facilities. The excess cost between the lower cost traditional power and the higher cost renewable energy is subsidised by the government and collected through a surcharge on the price of consumer electricity, collected from all customers on the grid. This surcharge was doubled in December 2011, increasing from 0.04 RMB per kWh of electricity to 0.08 RMB per kWh, creating a total subsidy fund of around 50 billion RMB, all of which is used to further develop the use of renewable energy in China.

However, despite the implementation of legal obligations at a national level, provincial and industrial level infrastructure problems still create challenges for the

future of renewable energy growth in China, thus more specific targets and schemes must still be developed during each of China's five year planning periods.

THE 12TH FIVE YEAR PLAN 2011 - 2015

The 12th Five Year Plan focuses heavily on adjusting the economic growth model. Sustainability is highlighted as key for future development of the economy during this planning period. 3 areas for focused investment have been identified for the planning period, namely clean energy, energy conservation and clean energy cars. Energy use is targeted to be reduced by 15% per unit of GDP, with carbon dioxide emissions to be reduced by 17% by the

periodically during peak season. This suggests a lack of systematic planning of how to develop renewable energy systems along with the relevant supporting industries as part of the government's push to reduce China's carbon dioxide emissions in line with their self-imposed targets.

Highlighting the discrepancy between the planned targets and the implementation roadmap, a Senior Diplomat from the Department of Energy at the US Embassy in Beijing explains that government targets can not be met without explicit instructions on how to achieve them. "The Five Year Plan is a strategic plan of where the government wants to go, but they don't specify how they will get there. The 12th Five Year Plan has been out there for a year or so, but is

Energy	Target by 2015
Reduction in Energy Use	Reduce by 16% per unit of GDP
Reduction in Carbon Dioxide Emissions	Reduce by 17% per unit of GDP
Use of Non-Fossil Fuels as % of Total Energy Use	11.4% - 2015 / 15% - 2020
Investment in Power Industry	Minimum RMB 5.3 Trillion

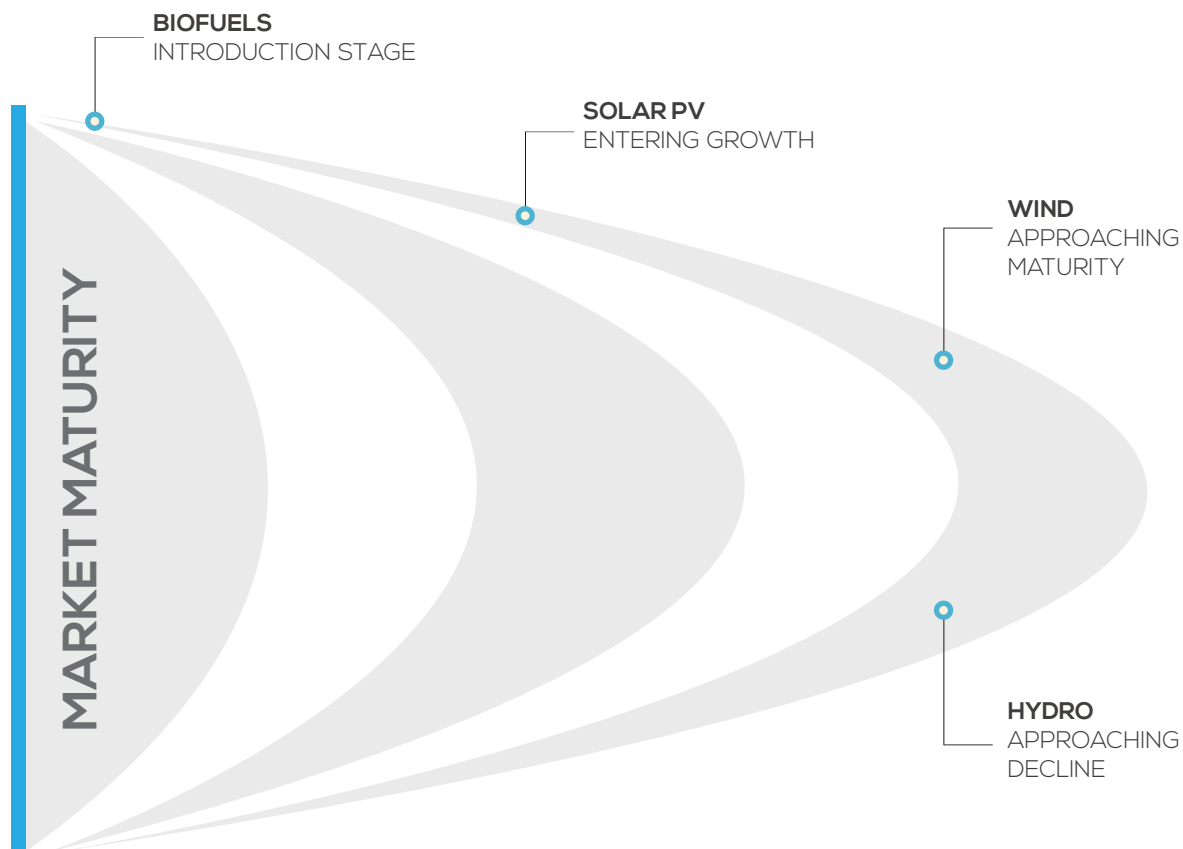
end of the planning period. There will be a minimum investment of RMB 5.3 trillion (around US \$830 billion) into the power industry, with hydro power, wind, solar, biomass and grid development as key targets for this investment. The 12th Five Year Plan marks a turning point for Chinese development and demonstrates the Chinese government's dedication to create a sustainable growth model to help propel China into the next stage of its development.

Despite having set very ambitious targets for the increased utilisation of renewable energy by the end of the 12th Five Year Planning period, questions still remain as to how effective these strategic targets will be at developing the supporting industries. To help meet the energy and carbon dioxide emission reduction targets during the 11th Five Year Plan period (2006-2010), factories were shut down

not in a position of serious implementation. They are only now beginning to look at it from an industrial level and trying to figure out how they can get to where they want to go, they are only now finalising the 'how' part of their strategy".

This raises questions as to how well government targets at a national level are coordinated with the development of renewable energy technology and industry. To examine this further, it is necessary to explore key renewable sectors at different stages of development in focus – hydro power (approaching decline), wind power (approaching maturity), solar PV (entering growth) and biofuels (introduction stage).

SECTOR DEVELOPMENT



These industries are particularly interesting for focused exploration as they represent different stages of development in renewables in China.

Hydro – Approaching Decline: With fewer suitable locations for the installation of hydro power, the industry is experiencing a 'final push' before the final slowdown. The well-established industry is past its peak and now moving towards decline.

Wind – Approaching Maturity: With well-established distribution channels and product standards maturing, the industry is seeing slowed growth after a period of rapid expansion, with recovery rates uncertain.

Solar PV – Entering Growth: With a large number of competitors in the market, industry players are seeking to differentiate themselves, regularly creating product innovations and receiving increased levels of investment.

Biofuels – Introduction Stage: With technical issues still being resolved, industry players are now beginning to show an interest in the sector. The infant industry is being investigated for future investment, with rapid future growth expected.

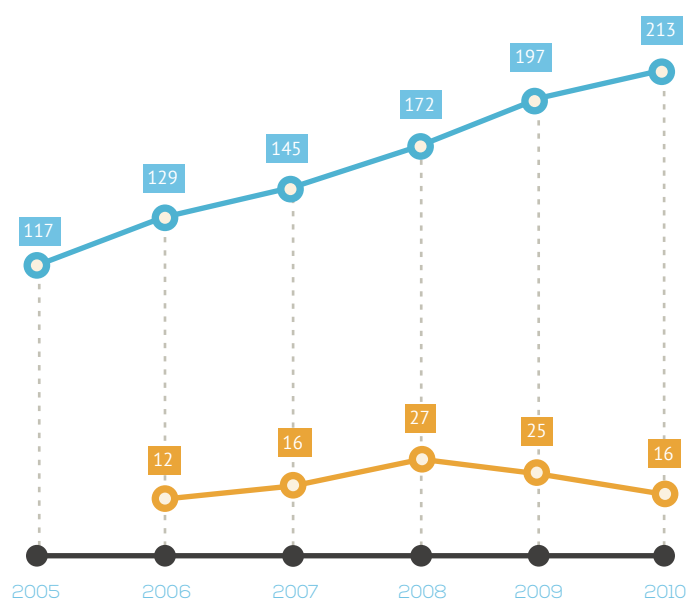


INDUSTRY ANALYSIS **CHINA'S HYDRO POWER**

Hydro power is China's most well-developed renewable energy resource. In a sector dominated by state-owned enterprises and characterised by strict government influence, hydro power looks set for increased investment and growth until 2020.

After 2020, investment forecasts appear bleak, with limited available capacity restricting the continued growth of hydro power in China.

Source: Own interviews

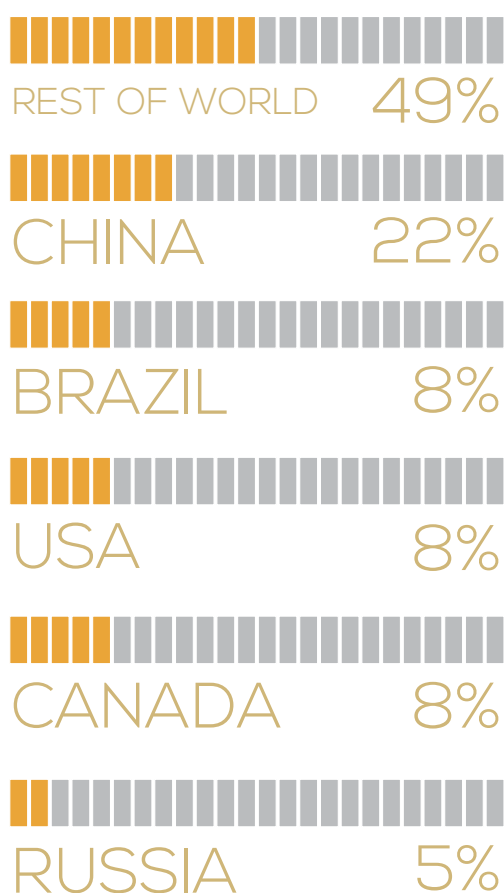


CHINA CUMULATIVE AND NEWLY INSTALLED HYDRO CAPACITY 2005-2010 GIGA WATTS (GW)

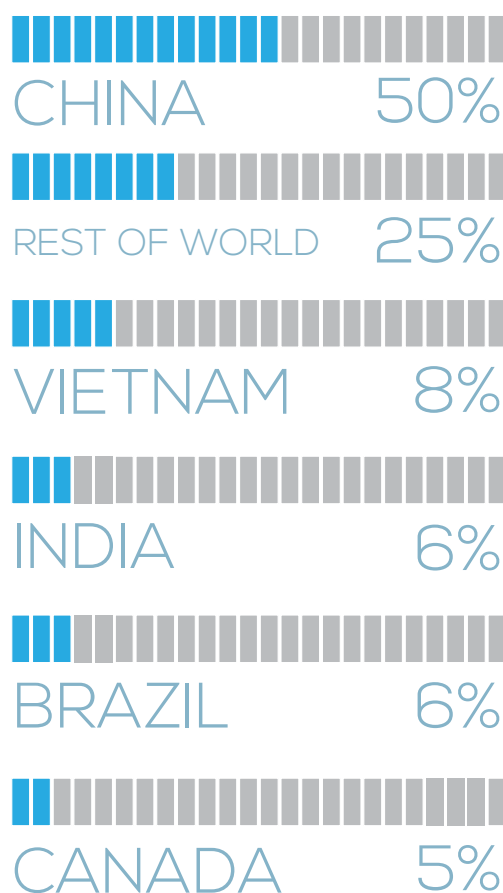
■ Cumulative Installed Capacity
■ Newly Installed Capacity

Source: Renewables 2012 Global Status Report and China Electricity Council Statistics

TOTAL INSTALLED CAPACITY 2011



NEWLY INSTALLED CAPACITY 2011



Source: Renewables 2012 Global Status Report

Hydro power remains China's most well-developed form of renewable energy, with nearly 5 times more installed capacity than wind power in 2010, making up around 20% of China's generating capacity, compared to less than 5% for wind and solar combined. Installations of hydro power continued to rise in the period up to 2011, with China accounting for 22% of the total global installed hydro power capacity, almost 3 times higher than its nearest rival, the USA. China's newly installed capacity accounted for half of the world's total newly installed hydro power capacity in 2011, demonstrating the country's continued determination to exploit its available hydro power resources.

With government targets for hydro power installations of around 325GW by 2015 and a newly revised target of 430GW (up from 380GW) by 2020, China's love affair with hydro power looks set to continue over the next decade as investment in hydro power becomes one of China's key focuses. (Source – New Scientist, Xinhua, China Global Times, Deutsche Bank, own interviews)

Although hydro power is the most cost effective method of creating energy from a renewable source, challenges such as the long development periods, associated social displacement and environmental concerns as well as the increasing difficulty in accessing potential development sites suggest that China's investment in hydro power will decline after 2020.

GOVERNMENT TARGETS AND SUBSIDIES



GOVERNMENT TARGETS

2015

Total Installed Capacity of 325 GW -
284GW (conventional hydropower) +
41GW (pumped storage)

2020

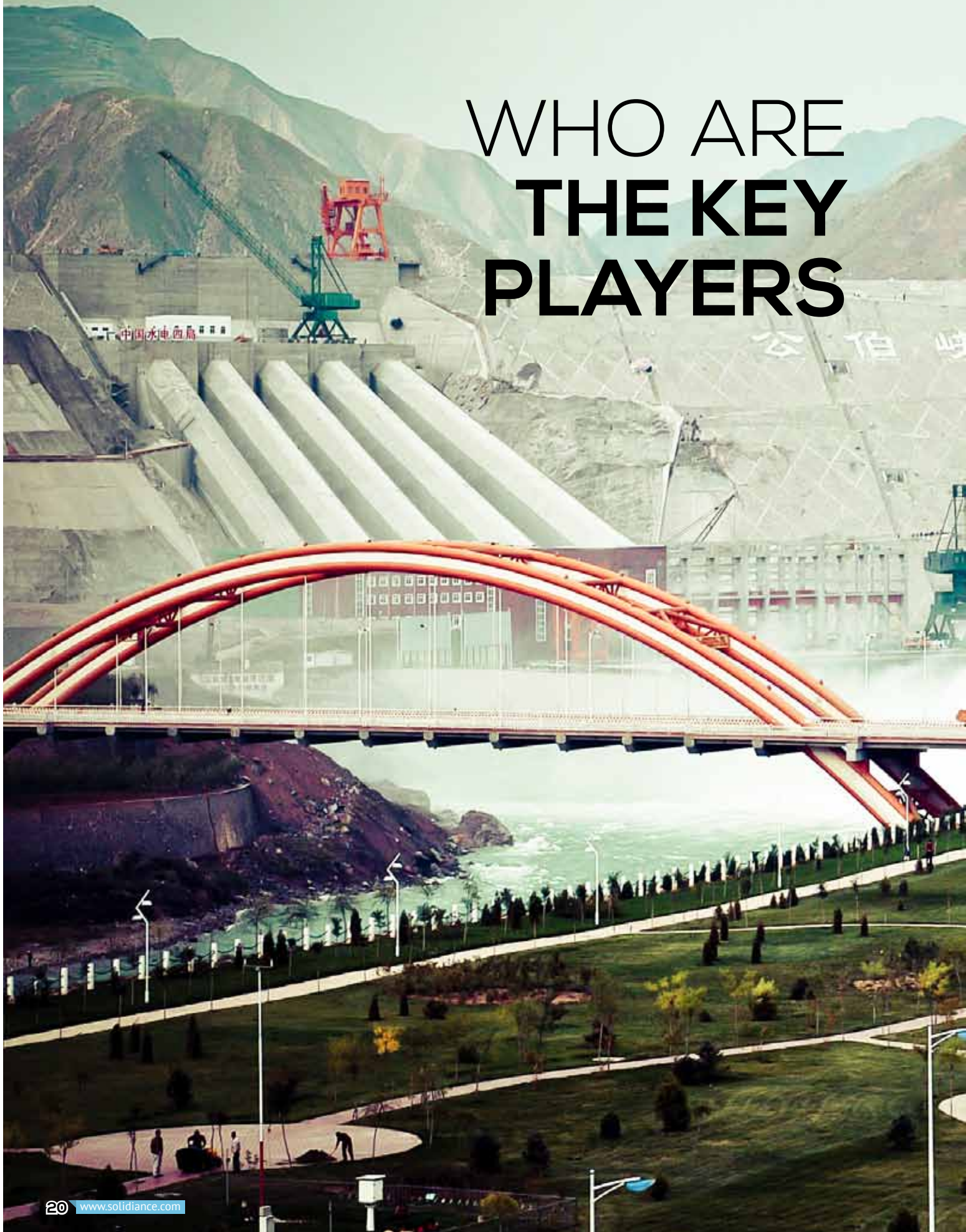
Total Installed Capacity of 430GW –
revised upwards from 380GW

GOVERNMENT SUBSIDIES

FEED IN TARIFFS
0.2-0.3 RMB per kWh

*Source: New Scientist, Xinhua, China Global Times,
Deutsche Bank, own interviews*

WHO ARE THE KEY PLAYERS



The Chinese hydro power sector is dominated by SOEs, in both operation and construction. In the operation of Chinese hydro power facilities, the top 10 players occupy almost half of the market in terms of installed capacity of hydro power, many of the top 10 state owned firms. In terms of the construction of Chinese hydro power facilities, the three dominant market leaders belong to the State Owned Assets Supervision and Administration Commission (SASAC) and the Chinese Armed Police Force.

This demonstrates not only the government's keen interest in developing and assisting the construction of large hydro power facilities, but it also shows clearly the dominance of Chinese players within the market. Whilst it is possible for foreign firms to invest in the sector, their capacity is largely limited to a supporting role, with the government firmly controlling the development of this carefully crafted sector.

Source: State Electricity Regulatory Commission (SERC)



Source: State Electricity Regulatory Commission (SERC) - China Electricity Council



Source: State Electricity Regulatory Commission (SERC) - China Electricity Council



ADVANTAGES OF HYDRO POWER

The chief advantage of hydro power is its considerable cost effectiveness in comparison with other renewable energy forms such as wind or solar.

Marginal Cost For Different Energy Production Methods (RMB)

	Hydro	Fossil	Wind	Nuclear	Solar
High	0.37	0.53	0.62	0.48	1.4
Medium	0.2	0.38	0.43	0.38	1.23
Low	0.03	0.33	0.36	0.35	0.81

Source: Haitong Securities

Electricity produced by hydro electric power is the most cost effective and stable form of renewable energy, allowing developers to install hydro electric power without the need for considerable feed in tariffs. As a senior diplomat from the US Embassy's Department of Energy in Beijing acknowledges, "the Chinese government's focus has been on hydro, as it is the most well- developed technology and can be used as a base load due to its consistency". Hydro power also benefits from flexibility, with plants being able to adjust their output quickly to adapt to changing energy demands over certain periods, as confirmed by a chief engineer from the Gezhoubu Group who states that "hydro is the most efficient method of power generation, because we can control the capacity and store the power easily".

Considering this, it is easy to understand why hydro power remains the priority interest for the Chinese government in driving forward their use of renewable energy and reducing their carbon dioxide emissions.



DISADVANTAGES OF HYDRO POWER

Despite its appearance as the most effective of all renewables, hydro power also carries some serious disadvantages which will impact the future development of hydro power in China. Firstly, hydro power projects have a lengthy development period. For example, despite the main construction of the dam body being completed in 2006, the Three Gorges Dam project was only declared fully functional as of July 2012 when the final turbine began production. The lengthy and complex process reduces the investment appeal of large scale hydro projects.

Social and environmental consequences of large hydro power installations are another inextricable challenge for hydro power. Almost 1.5 million people were displaced due to the construction of the Three Gorges Dam, a level of displacement which, according to analysts, will make future hydro power development more complicated. The enormous reservoir created in the Yangtze River by the Three Gorges Dam project is now plagued by pollution and in 2009, construction on a major hydro power dam project was halted due to environmental objections. In 2012, China is still experiencing one of the most severe droughts in the past 50 years, affecting water availability and flows, complicating the coordination and integration of hydro power. However, whether or not such issues will severely impact China's continued investment in hydro power is uncertain. According to one analyst, "environmental and social aspects could theoretically have the biggest impact on China's use of hydro power in the future, however, this really depends on the continued evolution and change in the Chinese political system, which is not something anyone is able to predict".

Finally, hydro power should be regarded as a finite resource. There are a finite number of locations suitable for large scale hydro projects and China is quickly reaching its capacity. It is clear that China's golden days of relying on hydro power to meet its renewable energy quotas are gone and that whilst hydro power may be entering a new period of increased investment, the end is in sight. Industry players are now quitting the market, as confirmed by a previous sourcing manager from GE Energy, "we have already sold our hydro power business division because the global market is shrinking". After 2030, expansion in hydro power in China will become increasingly difficult as suitable sites become harder to find. (Source: Xinhua)

THREE GORGES DAM

China's Three Gorges Dam spanning the Yangtze River is the world's largest hydro power station in terms of installed capacity with a maximum capacity of 22.5GW. The dam became fully functional on 4 July 2012 when the last of the 32 main turbines began production. The project is regarded as a historic feat of engineering for China and can be considered as a turning point in the development of the domestic hydro power industry. Through the development of the project, the Chinese industry gained valuable technological capabilities through partnering with foreign suppliers. (source – China Three Gorges Corporation)

However, the dam project has been widely criticised among the international community, with the Chinese government admitting the existence of social problems and pollution caused by the dam. A director from the Yangtze River Water Conservancy Committee admitted “we put 1/3 of our total expenditure into the allocation of migrants”. During the construction of the Three Gorges Dam, almost 1.5 million people were displaced, with archaeological and cultural sites being flooded and an increased risk of landslides in the area being attributed to the construction of the dam.

According to the Chinese Society for Electrical Engineering, the dam was expected to provide 10% of China's power, however as electricity demand continued to increase during the lengthy construction period, the dam only supported around 1.7% of electricity demand in China in 2011. The controversial project was expected to be the jewel in the crown of China's hydro development, however, the project has created a number of doubts over the application benefits of large scale hydro power and could serve to complicate the development of similar large scale projects in the future, such as those in the Jinsha and Mekong Rivers.





HYDRO POWER SUMMARY

Whilst on the surface the Chinese hydro power sector appears to be on the verge of a period of increased development, the government's immediate investment plan within the sector masks the fact that hydro power in China is a market past its prime. With an ever shrinking availability of resources and increasing resistance to the social and environmental consequences of hydro power installations, China will need to begin investigating other options away from hydro power as well as to focus on other renewables, such as wind and solar.



INDUSTRY ANALYSIS **CHINA'S WIND ENERGY**

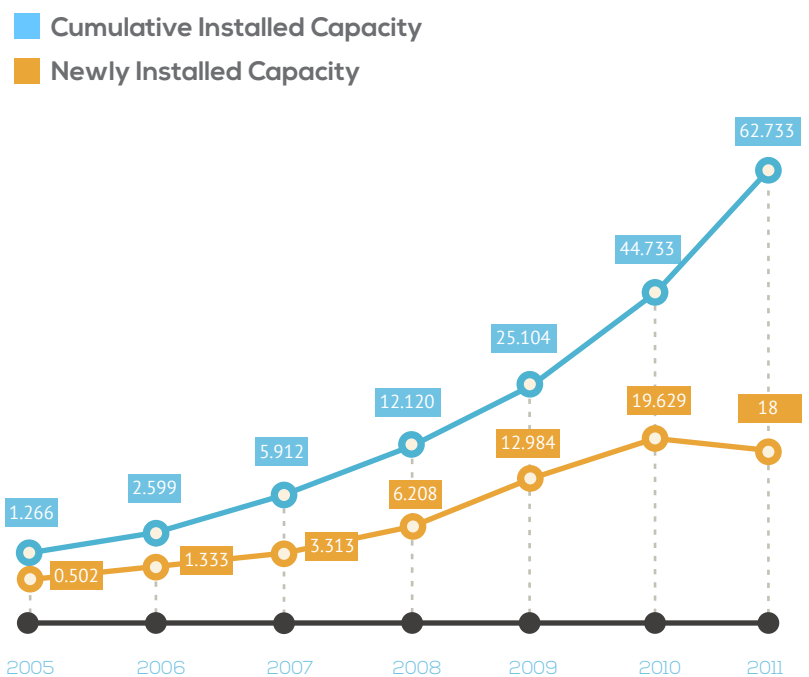
2011 marks the beginning of a period of adjustment in the Chinese wind power industry as government regulations and requirements increase, the overheated market begins to consolidate and power grid capabilities take time to catch up to meet the unharnessed production output of current installed capacity.

With key industry trends including consolidation and internationalisation, the Chinese wind power market is taking the opportunity to mature.

While long term market growth is still likely, the unpredictable outcome of this adjustment phase makes short term growth patterns uncertain.



CHINA CUMULATIVE AND NEWLY INSTALLED WIND CAPACITY 2005 - 2011 GIGA WATTS (GW)

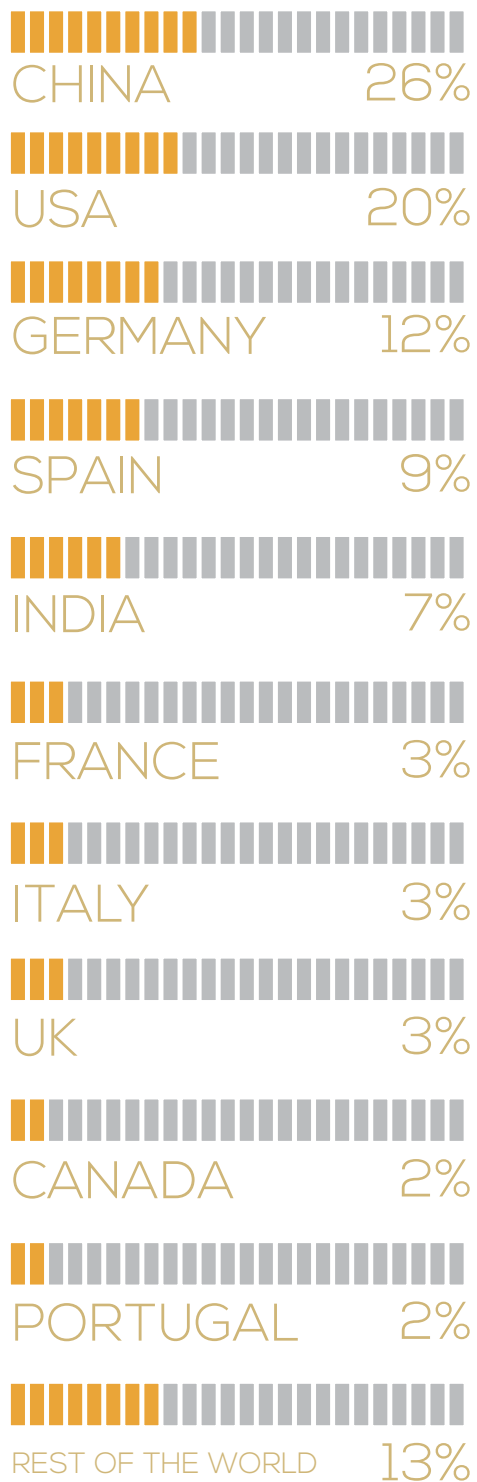


Source: Global Wind Energy Council

2011 is the first time that newly installed wind power capacity has been lower than the previous year.

GLOBAL TOTAL INSTALLED

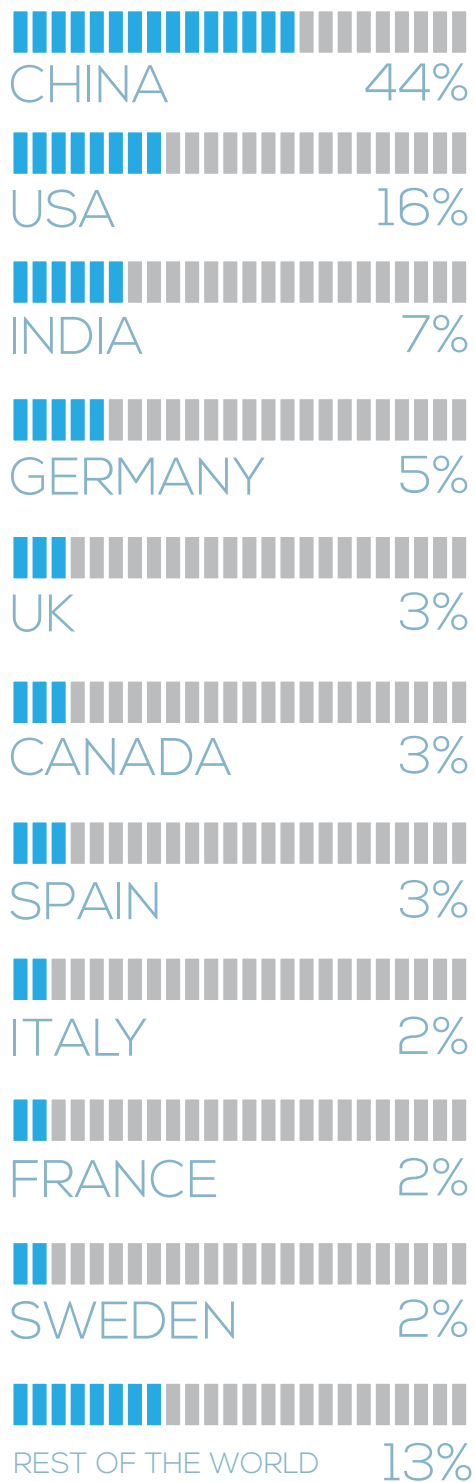
WIND CAPACITY 2011
MEGA WATTS (MW)



Source: Global Wind Energy Council

GLOBAL NEWLY INSTALLED

WIND CAPACITY 2011
MEGA WATTS (MW)





GOVERNMENT TARGETS AND SUBSIDIES

GOVERNMENT TARGETS



2015

Total Installed Capacity of 100 GW
5 GW Installed Offshore – 30 GW by 2020

While government targets and subsidies are financially suitable to help support industry development, the Global Wind Energy Council believe that the government now needs to become more involved in setting policy for standardisation of wind power regulations.

GOVERNMENT SUBSIDIES

FEED IN TARIFFS

Feed in tariffs vary according to installation region:

Windy areas of Inner Mongolia and Xinjiang – RMB 0.51/kWh, other parts of Inner Mongolia and Hebei – RMB 0.54/kWh, Jilin, Heilongjiang, Gansu, Ningxia and remaining parts of Xinjiang – 0.58/kWh, all other areas – RMB 0.61/kWh

CONCESSION ROUNDS

Primarily for offshore wind

1. Pilot scheme – 2010 Shanghai Donghai Bridge – RMB 0.987/kWh
 2. Jiangsu Province – tariffs ranging from RMB 0.62-0.73/kWh
- These tariffs are regarded as too low, delaying construction
 - A second concession round due 2012

Source: China Greentech Initiative Renewable Energy Finance Autumn 2011
IEA Technology Roadmap – China Wind Energy Development Roadmap 2050

CURRENT OVERVIEW

Although newly installed wind capacity continued to grow in China in 2011, it was at a slower overall rate than previous years. However, China still dominates the global wind energy market with 25% of total global installed wind capacity and leading global growth, installing almost half of the world's total new wind power installations in 2011.

Source: Global Wind Energy Council

The slower pace of new installations in China marks a new period of adjustment for the industry, which has, until now, undergone almost a decade of unchecked, unassisted and uncoordinated growth. Despite the government's ambitious growth plans by 2015, the Chinese wind power market is now expected to plateau, although it is uncertain how long for. Those within the wind turbine manufacturing industry expect the market to pick up within 2 years, but according to Qiao Liming, the Director for China at the Global Wind Energy Council, this estimate is optimistic and the slowdown period could last for anything up to 5 years. Other renewable energy experts in the Chinese government have even suggested the wind power market may take up to a decade to recover, with others suggesting wind power in China has almost reached saturation, with continued future growth uncertain.

There are 2 key reasons for the slowdown in newly installed capacity – the need for more regulated growth and the need to improve grid connectivity.

REGULATING GROWTH

Before 2011, the wind power industry was poorly regulated, with no coordination between local governments, the national government and the industry. Wind power facility installations were approved at provincial level, often by unscrupulous local officials eager to meet and exceed their local economic development targets, which meant permits were obtained quickly and easily. With subsidies arranged according to installed capacity figures rather than grid connected capacity, wind power facilities were erected without being grid connected. According to Liu Mingliang, an analyst from the China Wind Energy Association, this led to the construction speed of wind power facilities occurring faster than the network planning, which has resulted in a serious shortage of grid connected wind power.

The Chinese government is now attempting to restrain this kind of growth. In order to have access to national subsidies or feed in tariffs, new wind power facilities must now receive approval from the central government. According to a senior project manager at Sinovel, one of China's leading wind turbine manufacturers, this has seriously slowed the approval process, resulting in the decline in domestic installations.

However, according to Qiao Liming, the Director for China at the Global Wind Energy Council, this slow-down should be perceived as a positive step, building a more solid platform from which the industry can continue to grow in future. "This is the time for the industry to reflect on a lot of issues. The fast development of the wind industry has diverted people's attention from a number of important issues, including technological, planning and coordination issues between the grid and the wind farm developers. Now is the right time to slow down and to intensively adjust regulations in order to better drive future growth in the sector".

IMPROVING GRID CONNECTIVITY

Currently, at least 30% of the installed wind power capacity in China is not connected to the grid and due to problems with the old fashioned electric grid system in China, the power that is connected to the grid suffers from curtailment and transmission problems. (source – own interviews) This critical oversight in the rapid establishment of wind power in China has rendered its capabilities fruitless. The fact remains that a meagre 1% of China's electricity is generated by wind power. The latest Five Year Plan seeks to address these problems, shifting policy away from targeting just capacity and towards grid connectivity.

Transmission – The majority of the wind power generation facilities established in China are in the rural far north and west, away from the main demand centres along China's eastern and southern coasts. Currently, China's transmission lines are not sufficient to transfer the electricity generated at the power facilities to the population centres. The Chinese grid system is very outdated and the transmission lines are not suitable to handle the long distance transfer at present. To solve this, more long range transmission lines need to be installed, which will be costly and difficult and may carry no economic benefit to the power companies themselves. Until China's transmission lines are able to cope with the extra power transmission requirements created by wind energy as well as other renewables, many projects will be stalled and remain unconnected.

Curtailment – Energy supply and energy demand coming onto and off from the grid must be exactly equal on a second by second basis. The majority of wind power is produced at night, when the demand for energy is lowest, which means other power generating plants must be turned off from the grid to compensate for this. In China, this usually means that a coal power plant will have to be turned off, in order to allow the wind power to be accepted onto the grid. However, as coal power does not cycle well, turning these plants off is not efficient and is rarely done. Instead, wind power is simply not accepted by the grid.

STRONG AND SMART GRID PLAN

RMB 3.8 TRILLION
INVESTMENT IN 3
MAIN STAGES:

Chinese firms stand to take the lead in smart grid technologies. Stakeholders – government and grid companies – must coordinate activities to ensure effective development and installation of smart grid technologies to avoid future compatibility issues.

There are 2 key reasons for the slowdown in newly installed capacity – the need for more regulated growth and the need to improve grid connectivity.

Source: China Greentech Initiative China's Strong and Smart Grid Investment Plan Autumn 2011

PILOT

2009 – 2010

- Establish Standards
- 228 Demonstration Projects
- 26 Provinces
- 21 Solution Ideas

CONSTRUCTION

2011 – 2015

- Ultra High Voltage (UHV) lines
- Distribution networks – Urban and Rural
- Remote Monitoring Systems

INDUSTRIALISATION

2016 +

- Planned implementation

To try and address the issue of grid connectivity, China's State Grid Corporation has created plans to build a strong and smart grid.

UPDATING THE GRID

As noted by Zhu Shunquan, an analyst from China's National Renewable Energy Centre, smart grid technologies are still at an early stage of development across the globe. Zhu notes, "it is important that we first recognise smart grid as a concept that is still being developed internationally, with each country now trying to use their own concept to develop their own understanding of smart grid". China is not the exception to this rule. Generally, it is accepted that smart grid technologies have 2 key characteristics, one being that they are intelligent and connected to IT systems, the second being that they are decentralised and thus reactive to consumer demand.

However, the fundamental problem with China's grid development is that the Chinese electricity grid is monopolised by state owned companies. The lack of a liberal market system means that the Chinese version of smart grid is thus being developed to help the grid companies rather than the consumer.

This raises serious questions as to the future development of the smart grid and whether or not the Chinese grid will be radically overhauled to facilitate the acceptance of renewable energies in the long term, or whether a series of small scale developments will be made with only short term applications. This poses a significant challenge for the future development of China's wind power industry.





5GW OF OFFSHORE WIND CAPACITY BY 2015

CHINA HAS AROUND **750 GW** OF EXPLOITABLE WIND RESOURCES OFFSHORE – **3 TIMES THAT ON LAND**

LOCAL GOVERNMENTS AND LEADING POWER COMPANIES HAVE ANNOUNCED OFFSHORE WIND PLANS **LARGER THAN THE NATIONAL PLAN**

- **Southern China's Guangdong** province plans to construct 2-3GW offshore before 2015, and another 7-8GW from 2016 to 2020
- In February 2012, **Sinovel** announced it would supply 17 offshore turbines of 6MW for the first stage of Shanghai Lingang offshore pilot project
- **China Longyuan Power Group** plans to build 1GW of offshore wind farms by 2015

RESULTS?

- 4 projects for 200 MW wind farms in Yancheng agreed by end of 2010 → no construction started to date
- Delays occurring due to lack of coordination among government bodies and manufacturers

Source: Company websites



PROBLEMS AFFECTING OFFSHORE WIND

China's offshore wind targets and plans are extremely ambitious. Currently, there are serious delays in the development of offshore wind and despite the ambitious government installation targets, the future development prospects remain uncertain.

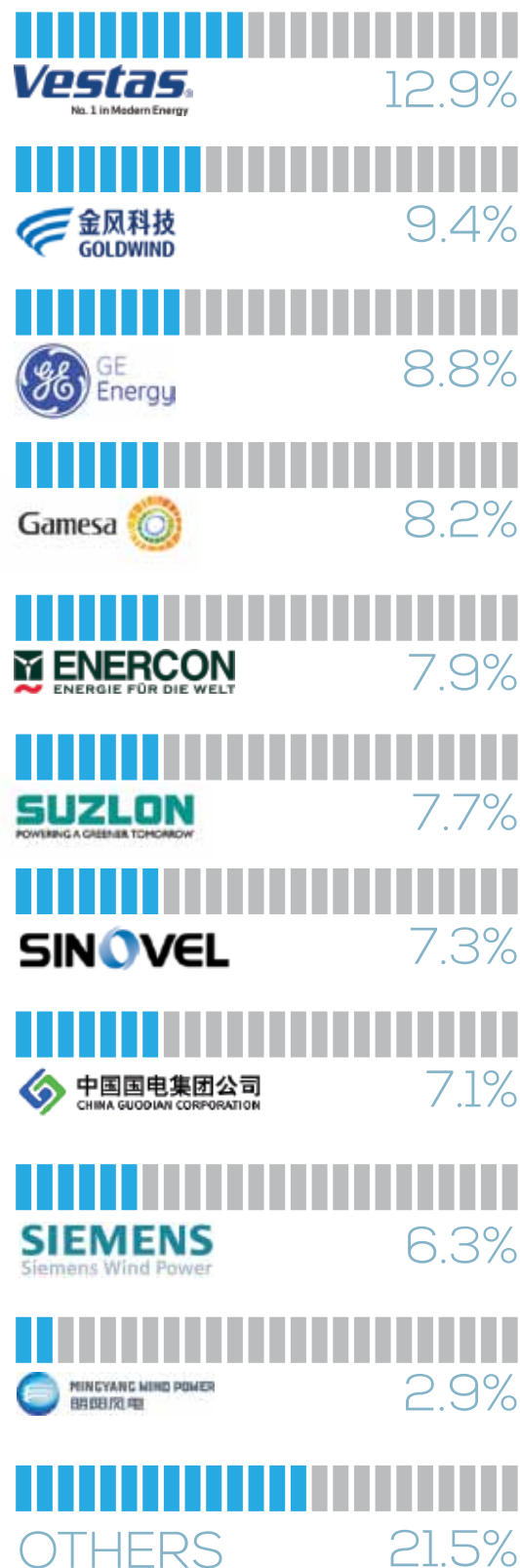
One problem hindering the development of offshore wind is that the technology involved is far more advanced than that required for inland developments. According to Zhu Shunquan, a senior analyst from China's National Renewable Energy Department, Chinese manufacturers are still learning a lot from European technology developments and have a long way to go before they will be fully able to develop the necessary technology to successfully exploit offshore wind.

Secondly, a lack of coordination between different

government entities is severely delaying the development of agreed offshore projects. Last July, the National Energy Bureau and the State Oceanic Administration issued rules for offshore development. Under these regulations, offshore wind farms must be constructed no less than 10 kilometres from shore, and in waters no less than 10 meters deep. This will limit the development of inter-tidal projects - near-shore stations in waters less than five meters deep - which are taking place mainly in Jiangsu and Shangdong provinces and create further obstacles for developers. According to Qiao Liming, China Director at the Global Wind Energy Council, the coordination between the different interest groups could take as long as 2, 5 or 10 years, or even as little as only 3 months – nobody is certain. However, until these coordination issues are solved, the future of offshore wind development remains uncertain.

WHO ARE THE KEY PLAYERS

- 4 Chinese wind turbine manufacturers are included in the global top ten
- Each of these follows the general trend of falling revenues and profits in Q1 2012
- Domestic competition and revised government policy creating a challenging domestic market situation
- Chinese manufacturers are seeking growth opportunities internationally



Source: Renewable's 2012 Global Status Report



HOW ARE THE KEY PLAYERS EXECUTING?

 金风科技 GOLDWIND	 sinovel 新 能 风 电	 中国国电集团公司 CHINA GEZHOUBA CORPORATION	 POHANG HEAVY POWER POHANG HEAVY POWER POHANG HEAVY POWER
Q1 2012 Profits fell by 97% compared with Q1 2011	Q1 2012 profits fell by 87% compared with Q1 2011	Q1 2012 results 'sluggish' - blame national economic slowdown	Q1 2012 profits fell by 88.9% compared with Q1 2011
Developing 6MW PMDD prototype for offshore use in Jiangsu	\$1.2 billion lawsuit with AMSC over copyright infringement	March 2012 - RMB 9 billion contract with Zhoushan government - 500 MW offshore wind farm	Q1 results follow a challenging 2011 - profits fell by 53% compared to 2010
Expanding globally – Ecuador, Australia, United States	Refocus on Middle East and Southern Europe – 1200 GW deal in Romania	First international operations – 6 turbines in Texas	Launch of North American R&D centre in North Carolina, joint venture

Source: Company websites and press releases

INDUSTRY TREND - CONSOLIDATION

During China's period of slowed, more coordinated growth in the wind sector, firms have gone through significant restructuring and resizing, resulting in some cases, obsolescence. According to Liu Mingliang from the China National Wind Energy Association, in the past 2 years, market consolidation in the wind power manufacturing sector has become more prominent. Liu Mingliang explains that by the end of 2011, there were a reported 80 domestic wind turbine enterprises in the Chinese wind power market, with the top 10 enterprises sharing 84% of the market and more than 60 enterprises accounting for only 3.5%. In the face of the current industry downturn, it is these small and medium-sized wind turbine enterprises that are exiting the market. At this level, it is mostly those firms with poor

technological development and research capabilities who are being forced out of the market due to healthy market competition.

Industry consolidation is not only limited to small and medium-sized domestic firms, but is also visible at a higher level. International firms such as Vestas and Suzlon are consolidating their efforts in the China market, with Vestas selling a factory in Hohhot, Mongolia and Suzlon selling its Tianjin factory. (Source – interview with Sinovel employee) This shows that at all levels, competition is high and the slowdown in China is beginning to affect strategies and operations.

INDUSTRY TREND - INTERNATIONALIZATION

While China remains the largest wind power market in the world, the domestic slowdown in installations has caused all the large domestic manufacturers from China to try and expand their operations abroad. "The internationalisation of operations really is the big ship right now for Chinese wind turbine manufacturers, in terms of trends, this one is really big," said a Senior Project Manager at Sinovel. He further explained that Sinovel currently has subsidiaries in all major markets, while Ming Yang recently announced plans to establish a joint venture in India and in Q3 of 2012, rumours emerged of its interest in purchasing Vestas. Many firms in China are using the current European crisis as a chance to expand into the European market and gain market share as well as technological capabilities.

The focus on international operations is likely to continue even after the domestic market recovers, with the Chinese market recovery expected to help the Chinese turbine manufacturers in their further internationalisation efforts.

Those foreign players who manage to maintain their operations within China are expected to use these factories as a basis from which to expand into China's neighboring countries where the markets, despite the fact these markets are still in what Qiao Liming describes as "very early stages of development".

It is worth noting that the Chinese wind power manufacturers were developed with government support to mostly serve the domestic market, rather than for exports. Now that these manufacturers have reached a certain level of maturity, it is logical that they would begin to expand overseas. However, Chinese firms are now having to adjust to international local content rules, similar problems that foreign firms had when entering China. The Chinese firms are having to expand their international capabilities quickly and learn how to adapt to heavily politicised and regulated markets.

WIND POWER SUMMARY


Overall, China's wind

power market is entering a very interesting and unique stage. Following years of unregulated growth, the market is entering a period of consolidation and increased regulation. Key industry trends include consolidation and internationalisation, with key domestic players finally taking further steps onto the world stage.

Challenges exist for the future development of the wind industry in China in the form of the development of the Chinese grid and the continued delays in successful coordination of government bodies in the development of offshore wind.

Opportunities in China's wind power industry exist in the form of internationalisation for local players. For foreign players looking to involve themselves in the wind market, opportunities exist in the application of advanced technology to assist the predictability and grid connectivity of wind power.

It seems that, for the next few years at least, the domestic wind power market will be undergoing an unpredictable period of adjustment, the results of which will determine the future growth potential of the market. While some industry operators have unwavering confidence in the resurrection and continued growth of China's wind power market, some market observers and analysts appear more skeptical. However, given China's desire to position itself as a world leader in renewable technologies, it seems unlikely that the market will stall for long, with pressure from industry and the need to support the 'national champion' firms leading the development to be undertaken as quickly as possible.



INDUSTRY ANALYSIS CHINA'S SOLAR ENERGY

2 011 was a year in which solar PV installations increased by nearly 3 times in China, following the government's increased commitment to the development of the industry.

Whilst installations are expected to continue a rapid ascent, the starting point of this growth is low. The overcrowded industry is pushing the weaker firms out of the picture, with strong firms suffering from problems of overcapacity, troublesome technological development processes and an international slowdown and struggle for survival.

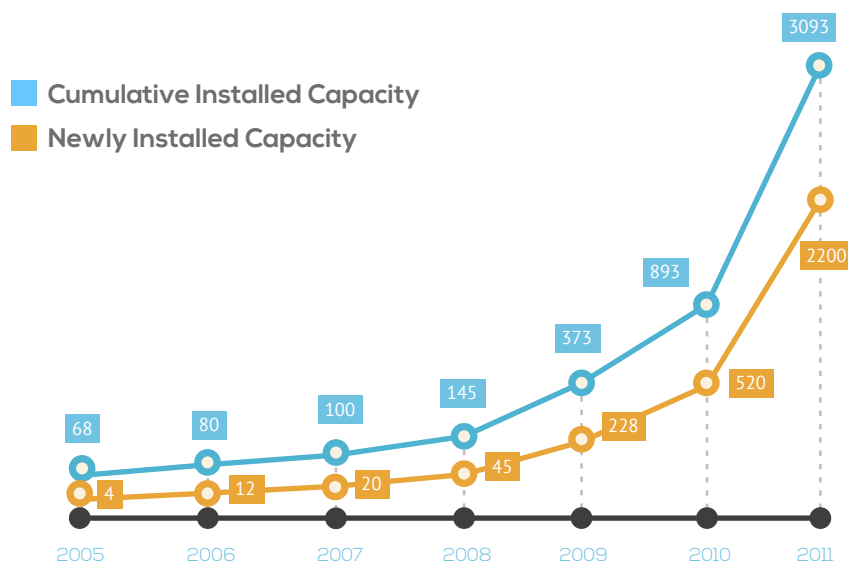
Long term market growth potential is significant, but coordination issues and grid capacity problems will need to be resolved to ensure the continued development in the short term.



CHINA CUMULATIVE AND NEWLY INSTALLED SOLAR CAPACITY

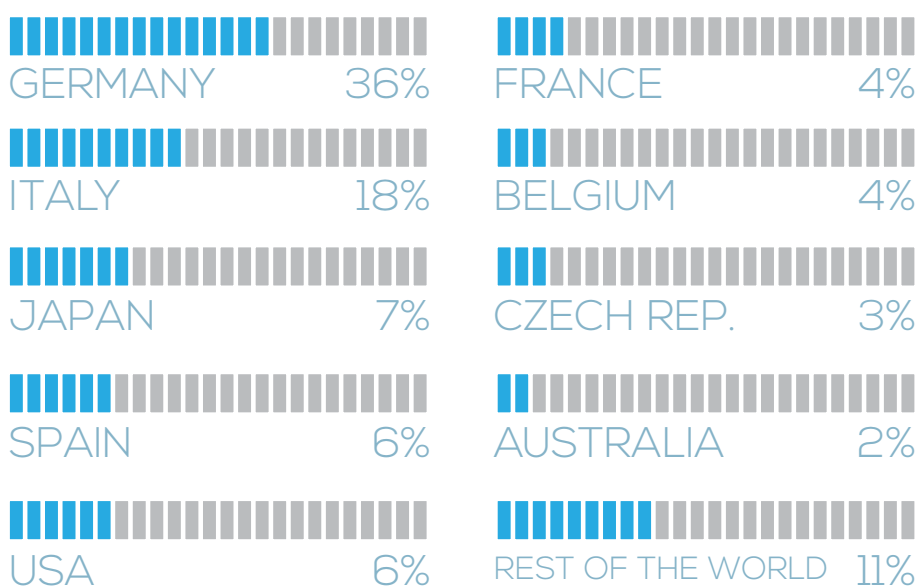
2005 - 2011

MEGA WATTS (MW)



Source: EPIA Global Market Outlook for Photovoltaics Until 2016 May 2012

GLOBAL TOTAL INSTALLED SOLAR CAPACITY 2011 - MEGA WATTS (MW)



SOLAR POWER GOVERNMENT TARGETS AND SUBSIDIES

GOVERNMENT TARGETS

2015

Total Installed Capacity 21 GW

2020

Total Installed Capacity 50 GW

GOVERNMENT SUBSIDIES

FEED IN TARIFFS

National Feed in Tariff (FiT):

- Approved before 1 July 2011, Operating before 31 December 2011 RMB 1.15/kWh
- Approved after 1 July 2011, Operating after 31 December 2011 RMB 1/kWh

Provincial Feed in Tariff:

- Shandong RMB 1.2/kWh
- Zhejiang RMB 1.43/kWh

THE GOLDEN SUN PROGRAMME

- Started in 2009 – rural electrification and building projects
- Allowed 140 MW installations in 2011
- Around 1GW expected installations 2012

THE GOLDEN SUN PROGRAMME

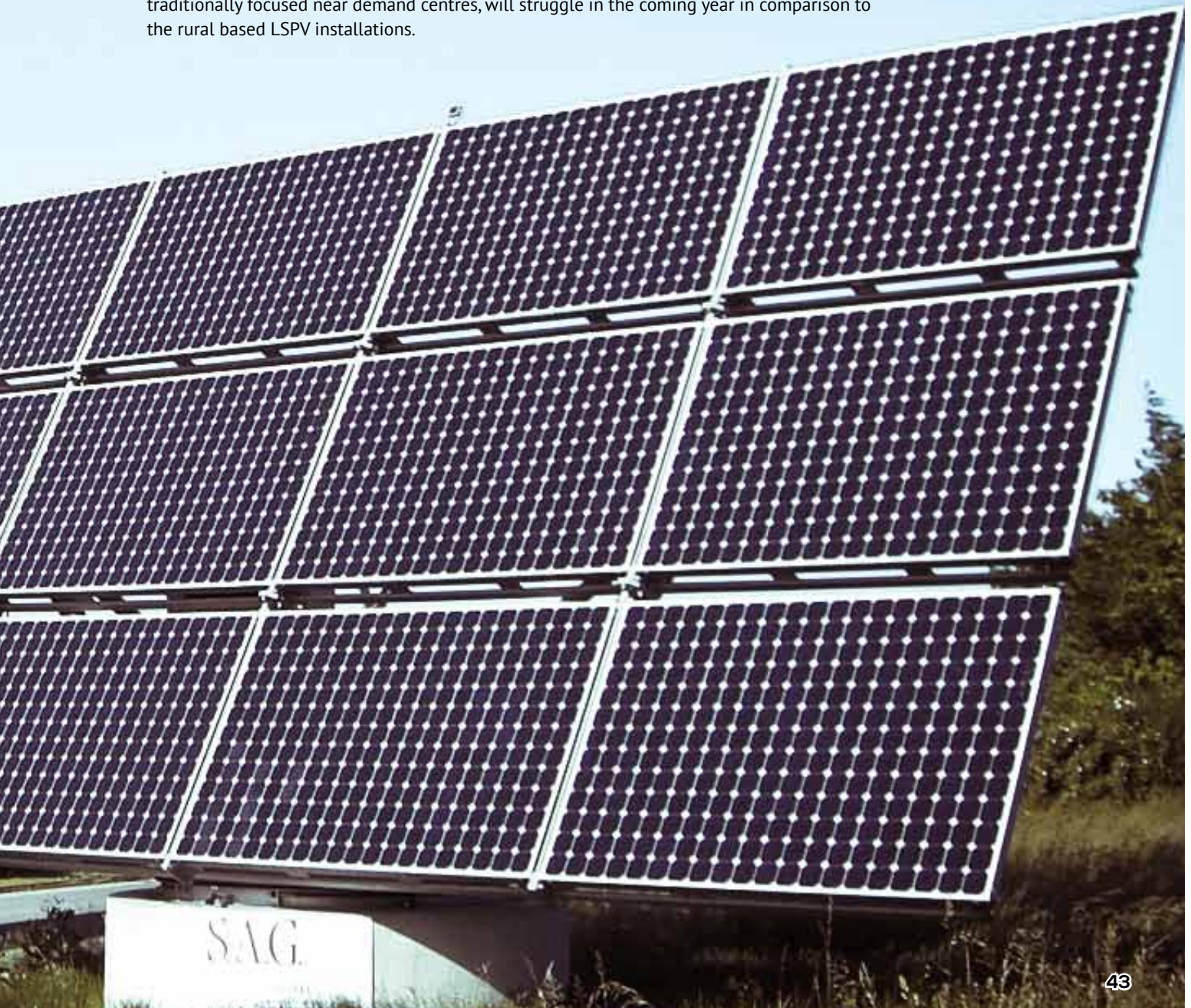
Subsidy programme – 2009 – to assist development of building integrated solar PV.

Source: : China Greentech Initiative Renewable Energy Finance Autumn 2011 and Center for American Progress

Solar PV installation targets have been revised again in June 2012, to 21GW by 2015 up from 15GW. This not only shows the determination of the Chinese government to aggressively meet the overall renewable targets, but also demonstrates their belief that the solar industry is ready for growth and a suitable target for investment. Following the Fukushima disaster in Japan, China's investment in nuclear energy has been reduced and offset by an increase in solar PV investment.

China's solar PV manufacturers have traditionally exported, with around 80% of PV modules and cells produced in China being exported by the end of last year. The government is keen to develop the domestic market quickly, so it's providing a greater number of subsidies and incentives to private manufacturers, aiming to develop the domestic market.

The national feed in tariff (FiT) has stabilised the Chinese solar sector, no longer allowing large SOEs to dominate in the former auction style scheme which created unintentional consequences of underbidding on large scale projects by SOEs in order to capture greater market share. The new national system eliminates such consequences and creating greater and true market competition and dynamism within the sector. However, the FiT figures for 2012 will only incentivise projects in locations away from demand centres, where solar energy is more cheaply produced, meaning BIPV systems, traditionally focused near demand centres, will struggle in the coming year in comparison to the rural based LSPV installations.



CURRENT OVERVIEW

China is now a multi-gigawatt market, with over 2GW of newly installed solar PV capacity in 2011. It is also the fastest growing solar PV market in the world, with cumulative capacity expected to continue climbing over the next few years. According to Lu Fang, Secretary for the Solar PV Committee of the China Renewable Energy Society, experts have already assessed that in 2012 China's domestic newly installed capacity will be around 5GW, bringing the total cumulative installed capacity before the end of the year to 8GW. The majority of the new installations will be in grid connected solar PV projects, such as BIPV (Building Integrated PV) and




LSPV (Large Scale PV), moving the market away from rural electrification.

Despite China's impressive investment volumes and consistent growth, the global solar PV market is still dominated by Europe with around 75% of the world's total capacity. However, the EU financial crisis and changing EU regulations and installation policies mean European demand for PV is falling and the industry is diversifying across countries, paving the way for China's sustained growth.

The global value chain for solar PV is suffering from serious overcapacity, leading to increased competition and consolidation in the manufacturing market. Excess components from the value chain are being reinstalled domestically, increasing newly installed capacity but limiting opportunities for foreign investment.



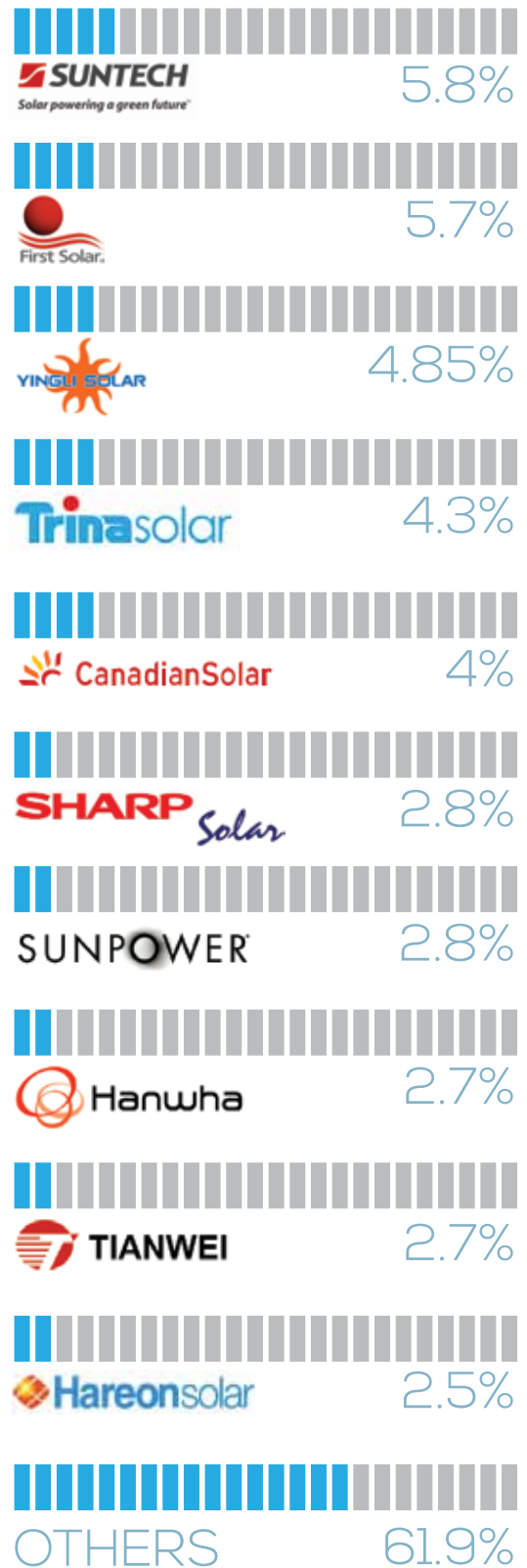
HOW ARE THE KEY PLAYERS EXECUTING?

 SUNTECH 尚德电力			OTHER KEY MOVEMENT
Q1 2012 gross profit fell by 99% compared with Q1 2011	Q1 2012 profits fell by 87% compared with Q1 2011	Q1 2012 gross profit fell by 34.7% compared with Q4 2011	Overcapacity of solar modules globally – impacting price
US Anti-Dumping / Countervailing Duties equated to 4.7% of revenues	Excessive module supply, US anti-dumping measures and European subsidy adjustments	Continued global module price decline impacting profitability	Consolidation - mergers and acquisitions - Jiangsu Shenlong → Hareon
Slim frame 60 cell panel – one of the lightest in the industry	An official sponsor of Brazil 2014 World Cup	High efficiency 'Honey Technology' – Honey Ultra	Fukushima disaster – China reducing nuclear targets, offsetting with solar

Source: : China Green Tech Initiative and company websites

PV SOLAR PANEL MANUFACTURERS 2011 - MARKET SHARE %

- 6 Chinese wind turbine manufacturers are included in the global top ten
- Domestic and global trend of falling revenues and profits in Q1 2012
- Extreme overcapacity at all stages of the solar PV value chain – future consolidation
- EU financial crisis and adjusted energy policies impacting Chinese manufacturer



Source: : Renewable s 2012 Global Status Report

INDUSTRY TRENDS

Whilst growth is expected in installed solar PV capacity in China, the manufacturing industry has been suffering from serious overcapacity and profit reduction. According to a solar technology developer at 3M, around half of the domestic module companies have disappeared in the last year and only large companies with strong technological capabilities survive. Industry consolidation is rampant, the consistent fall in the price of silicon and the increased availability of domestically produced silicon in China (at 70% in Q3 2012 according to the Solar PV Committee of the Renewable Energy Society of China), small manufacturers who only focus on assembly are struggling to remain competitive and falling out of the market. According to a senior diplomat at the US China Embassy Department of Energy, this is now causing a large number of SOEs to enter the solar industry. Until now, the industry has been dominated by private firms, but following the consolidation of the solar market, combined with the Chinese government's push for increased solar PV installations, SOEs are becoming increasingly involved in the solar industry. This could increase competition and serve to drive the market, but the long term impact remains uncertain.

Following the global financial crisis, many Chinese companies are now focusing on domestic orders to survive. In comparing some of the chief local players, industry experts explain that Yingli Solar are surviving the industry consolidation period well due to the skillful and aggressive push on developing domestic demand, whereas Suntech are struggling to maintain profits with the reduction in their core enterprises abroad. According to a solar technology developer at 3M, survival at this point seems to be the key goal, "the manufacturers are just trying to survive through this hard time. Some of the really big companies have a lot of loans and a lot of money borrowed from the banks, which means that even if they sell a lot of modules, they can't even balance their books".

INDUSTRY OPPORTUNITIES

Clearly then, opportunities for growth and development exist within the solar PV industry. Solidiance analysis has identified 3 chief opportunities for growth within the Chinese solar PV sector – 1. domestic development, 2. new technology research and development and 3. cost reduction.

The change in EU subsidies for solar PV creates a huge opportunity to reinvest excessive capacity into the domestic market. China has an abundance of potential for solar PV installations, with 1 GW of installations in Qinghai province alone, a figure exceeding the entire solar installations of the UK and over half of the total installations of France in 2011. Qinghai is also home to the world's largest PV plant with 200MW capacity, the equivalent of 6 times Brazil's cumulative installed capacity in 2011. In 2011, PV shipments from China shared around 50% of the world total PV shipments, suggesting a significant availability of technology for domestic installation within a compressed time frame.

Chinese companies have gained strength in terms of production quality and cost on a global scale in comparison to market developments of the last 2-3 years. According to Lu Fang, Secretary for the Solar PV Committee of the China Renewable Energy Society, Chinese firms are now developing technologies and efficiencies of their solar cells on a 'world class scale'. Suntech is researching technology that will improve the efficiency of their mono and poly crystalline solar cells, with Trina Solar also reported to be increasing the efficiency of their solar cells at extremely fast rates. According to a senior electricity analyst from the US Energy Information Administration, opportunities for technological innovation in the solar sector are continually emerging, The analyst explains, "if someone were to come out with an inexpensive solar cell that is actually cost competitive with other electricity generation technologies, that would change the story of solar all over the world, not only in China – of all the companies with opportunity, the Chinese seem most likely to access such technology first".

Prices for solar module components are continuing to drop, allowing manufacturers to produce solar modules in greater volumes for more cost effective installations. For example, one component, called E.V.A, vital for manufacture of solar modules, has fallen by around 5RMB (US \$0.80) per square metre in the last 2 years. At the same time, manufacturers are continuously putting vendors under pressure to lower costs, according to 3M. The falling cost of silicon cells has also contributed greatly to the falling cost of solar modules, making lower cost, higher efficiency modules one of the leading market opportunities.

However, despite being at a prime development stage ready for investment and rapid development, there are a number of challenges being faced by the Chinese solar PV market which can not be ignored.

INDUSTRY CHALLENGES

Firstly, overcapacity issues within all stages of the solar PV value chain will present a short term challenge to the future development of key solar manufacturers in China. Whilst Chinese manufacturers dominate the export market, with an existing trade US trade surplus of US \$1.6 billion, overcapacity issues are creating a difficult operating environment for smaller, assembly focused plants. These plants are mainly exiting the market or being bought by SOEs which creates a new level of competition for the established, high level solar module manufacturers. Whilst the precise role of the SOEs in the market remains to be seen, it is clear that competition is building within the market.

High cost of technology – Solar PV technology remains comparatively more expensive than hydro or wind power, with many technologies dependent on subsidies and feed in tariffs for economically viable installation. If the solar industry is to witness continued growth and development, the technologies will have to rapidly fall in price and match grid parity. However, this problem appears to be gradually easing,

with the falling price of silicon expected to increase the market share of thin film technologies by as much as 10% within the next 2 to 3 years, according to the National Renewable Energy Centre.

The drop in demand from the USA and Europe for solar PV exports presents a challenge for many high level Chinese domestic solar module manufacturers. In Europe, Spain and Germany in particular have been reducing their incentives for solar installations owing to the recent EU financial crisis, whilst the USA is now focusing financial incentives towards consumers, rather than importing businesses. Further, following the bankruptcies of some high profile US solar manufacturers, such as Solyndra in 2011, the USA has imposed countervailing duties between 2.9% and 4.75% on all Chinese made solar panels starting in 2012. For Chinese firms, this creates a unique challenge and will require them to adjust their business models away from international exports and toward domestic installations and technology development.

Given the variability in energy production cycles of solar PV, the challenges facing the Chinese electricity grid will increasingly also serve to create difficulties for the development of the solar industry. It is expected that LSPV systems, installed in western deserts where the solar radiation is highest, will struggle to be connected to the grid, and according to Lu Fang, "a lot of the solar electricity produced in LSPV plants will be wasted". However, the issue of grid connectivity is potentially less serious in the solar industry than in the wind power industry as solar power is much better at load following than wind. When the solar power generated is at its highest and supply is high, the electricity demand on the grid is equally high, which enables more power to be accepted by the grid.



SOLAR SUMMARY

The Chinese solar PV market shows future potential and is earmarked for concentrated government investment and development. Solar PV is China's next big renewable sector.

However, the global solar situation is causing short term development issues, with many Chinese domestic module manufacturers struggling for survival amid growing competition and shrinking international demand. Grid problems also cause concern for the immediate future of solar technology, with grid capacity and transmission problems affecting solar development and installation.

Given China's increasing technological capabilities and determination to quickly develop their domestic industry, it seems that solar PV growth will continue unabated despite these concerns, although questions of regulation and coordination must be raised and addressed in order to guarantee the solar industry does not reach industry slowdowns as has been affecting the wind industry.



BIOMASS AND BIOFUELS


Biomass and biofuels represent a key potential future growth area for renewables in China, with opportunities in second generation biofuels, ethanol and energy produce from feed stock sources. Despite their future potential, it is important to recognise that these areas are just getting started in China and currently have very poor supporting infrastructures.

In biomass, China has strong existing understanding and knowledge of the required technologies as well as understanding of how to build and operate the power plants. According to discussions with experts in this field from governmental energy departments, the main restriction for development of biomass is currently the lack of supportive infrastructure. China is currently investing in a small number of test projects for biomass, which are expected to lead the way for further research and investment before 2015.

The focus for Chinese biofuel development has been in two areas – ethanol production and second generation biofuels. Ethanol production remains a small area of investment for China, who lacks processors and matching infrastructure as well as knowledge on the right mixture to create a suitable power source. However, as the production of such energy would likely use stocks that will compete with food, some experts believe that investing heavily in this area would be “a negative thing for them to do”.

Second generation biofuels (non food sources that can be generated into biofuels) offer potential to China, who are now placing emphasis on the use of jet fuel in a bid to try and create a national source of price stable biofuels to reduce the impact of external geopolitical situations which could impact fuel security. According to China's Civil Aviation Administration, China is expected to use 12 million metric tons of aviation biofuels by 2020, accounting for around 30% of the country's total use of jet fuel.





China is also beginning to invest in energy that can be produced from feed stock sources such as corn stocks, wheat stocks and gutter oil. They are also investigating the use of different grasses and algae and other fast growing plant materials that can be used a feed stock that is not competing with food sources. Biofuels using algae are already more advanced than in other countries, according to the US Department of Energy at the US Embassy in Beijing, China's the scale of China's investment and existing capabilities are already greater than those of the US in this area.

Sinopec and Sinoc, as well as other Chinese oil companies are beginning to recognize the potential value of this area for future development. They see that if they can generate aviation biofuels in China and export them globally, they would quickly rise to a position of global leadership. Which is why entities such as the China National Petroleum Corporation announced plans this year to build a refinery capable of producing 60,000 tons of biofuel annually by 2014.

Although these areas remain underdeveloped in China, compared to solar, wind or hydro technologies, biomass and biofuels could be described as the next generation of renewable energies in China and are the key growth markets to watch over the course of the 12th and 13th Five Year Planning periods.

SUMMARY

ENERGY DEMAND

China's ever growing demand for energy necessitates the use of sustainable production methods

GOVERNMENT PRIORITY

Clean energy as key investment sector - \$51 billion invested in renewables 2011

HYDRO POWER

China's most well developed renewable energy sector, set for short term investment boost but ultimately an industry in decline sustainable production methods

WIND POWER

Challenging market undergoing domestic adjustment causing leading Chinese firms to seek international expansion sustainable production methods

SMART GRID

China's grid system is in need of complete overhaul, investment in smart grid systems vital for future growth of renewables in China

SOLAR POWER

Chinese market set for long term growth after period of global and domestic consolidation

BIOFUELS

Underdeveloped infrastructure limiting short term growth, industries at early stages of development, being investigated for future development potential



CONCLUSION

Renewable energy is undoubtedly of vital importance to China. Owing to China's increasing energy consumption, its need to restructure a coal-dominated industry and the need to meet greenhouse gas reduction targets, renewable energies application in China and indeed globally, are gaining significant attention on the global energy platform.

However, despite ambitious government targets and investment into the sector, a lack of coordination between concerned stakeholders in the development of China's renewable energy industries is the key barrier to the future growth of renewables in China. With China's main source of renewable power (hydro) entering its final flourish and with its designated successor (wind) entering a period of consolidation and uncertainty, China will need to invest heavily in sectors marked for growth (solar PV and biofuels) to ensure its own national growth remains sustainable.

Renewable energies are here to stay in China, but it is not without significant coordination and continued investment that the reliability on alternative energy sources, in the manufacturing center of the world, becomes a reality.



Solidiance is a dedicated B2B marketing and growth strategy and consultancy firm focused on the Asia Pacific Region.

ABOUT SOLIDIANCE

What We Do

We help multinational clients understand the Asian market landscape by profiling industries and competition, sizing the markets, segmenting customers, analyzing distribution channels, determining the best locations, preparing investment feasibility studies, identifying suppliers, reviewing potential joint ventures or acquisitions, and delivering market entry and growth strategy in Asia.

What We Are Focus On

Our industry experience is centered on industrial applications, green buildings, cleantech, technology, and healthcare. Our Asian market entry and growth strategy services provide the required insights and the necessary roadmap to capture a profitable market share in the region.

Additional Details

Solidiance has offices in China, India, Indonesia, Malaysia, Singapore, Thailand, Myanmar and Vietnam. We are fast expanding and always on the lookout for exceptional people.



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