NL Agency
Ministry of Foreign Affairs

China - Sustainable Energy Sector

Summarized Fiche

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Colophon

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1 Summary of general developments and opportunities for the Dutch energy sector

During the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in 2009, China's State Council stated that carbon dioxide emissions per unit of GDP will be reduced by 40 to 45 percent by 2020, compared with 2005 levels. The second statement was for alternative energy to meet 15 percent of the country's energy needs by 2020. To meet these targets, the National Energy Administration (NEA) has compiled a development plan for emerging energy industries from 2011 to 2020 that will require direct investments totalling 5 trillion RMB. This plan will contribute 1.5 trillion RMB in added-value per year and create 15 million job opportunities.

The plan has specified major policy measures for the development and utilization of nuclear, wind, solar, biomass, geothermal, unconventional natural gas and other new energies. It also detailed the industrialized application of clean coal, smart grid, distributed energy and alternative-fuel vehicle technologies.

China’s energy consumption per unit of GDP was reduced by 20 percent between 2005 and 2010. China's installed power capacity hit 962 GW at the end of 2010 and its installed power capacity rose 10 percent year on year. Installed thermal power capacity was 706 GW and installed hydropower capacity had reached 213 GW. Installed nuclear power capacity had increased to 10 GW, with 29 GW of nuclear power capacity under construction. Wind power capacity connected to power grids increased by 14 GW to a total of 31 GW. In 2010, China's power consumption reached 4,190 tWh, reflecting a steady growth of 14.5 percent year on year.

This year, China has been listed number 1 in the ‘Nation’s Renewable Energy Attractiveness Index,’ published by Ernst & Young. This index, which covers 30 nations, emphasized that China has become the leader of renewable energy. China’s record-breaking investment in wind power in the 3rd quarter of 2010 accounted for half of the world’s gross investment in new wind power programs. Half of the solar panels produced in 2010 globally are made in China and total capacity is above 8 GW.

For Dutch innovative niche sectors this trend implies challenges and opportunities. The challenges are presented by lower costs, unfair competition and IP protection.
The opportunities are inspired by potential demand in China for Dutch innovation, joint research & development and reconfiguration of production chains. The sale of high-tech products and technology to

Chinese companies generates the profits that are needed to finance new R&D in the Netherlands.

2 Investment and development plans of Chinese local governments in the energy sector

On a national level, the National Development and Reform Commission (NDRC) launched 15 national energy research centers. The central government spent 1.5 trillion Yuan on the 11th
Five Year Plan, and it will need to increase spending by 45 percent to achieve the carbon intensity goals. Regionally, three geographical centers stand out as green energy hubs: Wuxi, in southwestern China's Jiangsu province, is believed by experts to have the strongest R&D capabilities; Baoding City in Hebei, is regarded as the center of clean energy manufacturing; Inner Mongolia is viewed to have natural attributes for projects such as wind-power.

Within the coming 12th
Five Year Plan, sustainable development will be enhanced and resource utilization will be optimized. Attention will be given to improving renewable energy, efficient coal use (China’s main fossil fuel source), decreasing wasteful water consumption and major pollutants to purify air and water quality, cultivating farmland, containing environmental degradation, increasing carbon credits, combating desertification, controlling greenhouse gas emissions and enhancing disaster relief efforts.
For 2010 China remained the world's leading investor in clean energy with an investment of 54.4 billion USD, an increase from the 39.1 billion USD for 2009, according to a report released by US-based Pew Environment Group. China was followed by Germany and the United States in the ranking, which invested 41.2 billion USD and 34 billion USD in the sector respectively last year. Worldwide, the clean energy sector achieved a record of 243 billionn USD worth of finance and investment in 2010.

3 Investment and development plans of Chinese companies in the energy sector

Focus areas
China is seeing the world's largest increase in electricity capacity with an average of 2 coal plants being built in one week. The rate of power capacity increase is more than 100 GW capacity being built in a year. China has long relied on coal, most of the power is using coal energy as a source (see annex 1). It consumes 3 billion tons of coal per year and is importing 180 million tons per year. Due to the carbon emissions and shortage of coal production, China is rapidly developing in renewable energy. Nuclear and solar energy are getting a boost, while wind energy has been the fastest growing market in energy. Wind energy will increase to 50 percent of the global capacity. Hydro capacity is being built again as China is missing its target on energy efficiency.
In this fiche for promising sectors in Energy, a division in renewable energy and fossil energy is made. Nuclear energy will not be discussed as for the moment it has no business opportunities due to the non-proliferation agreement between both countries.

3.1 Renewable energy

3.1.1 Wind energy

The Global Wind Energy Council (GWEC) report
showed global wind power capacity growth by 31 percent, a 37.5 GW increase to 157 GW in 2009. A third of the increase came from China, which doubled its capacity from 12 GW to 25 GW. China's electrical grids will connect 90 million kW of wind power capacity by 2015. The figure will rise to 150 million kW by 2020, according to the State Grid Corporation of China (SGCC).

China's wind power installation has doubled every year for the past five years. It totalled 40 million kW in 2010, ranking first in the world. China's installed wind power capacity connected to national grids is above 30 million kW. By the end of 2010, China had 29.5 GW wind turbines integrated to the grid. The annual growth of wind power grid admission was nearly 100 percent in the country over the past 5 years. In the first quarter of 2011, China's wind power output rose more than 60 percent to 18.8 billion kWh, growing 30-50 percent faster than the output of thermal power, hydropower and nuclear power, according to the National Energy Administration (NEA).

China Wind Energy Association (CWEA) said China had 44.7 GW wind turbines installed by the end of 2010. This
means 34 percent wind turbines were not joined to the grid. In 2010, China' s wind turbines operated for 2,097 hours on average. Wind power was widely applied in many regions. Wind farms are largely based in northern China and electric power users are mainly found in central and eastern regions. China has to construct large wind power bases over long distance. Ultra-high-voltage power transmission lines are options. State Grid complains that uncontrolled wind farm construction has outpaced the national plan for grid construction, which makes grid access a bottleneck of China’s wind power development.

3.1.1.1 Offshore wind power

China will invite public bidding for more offshore wind power projects in the next five years to reach an installed offshore wind-power capacity of 5 GW by 2015. China's offshore wind-power capacity may reach 5 GW in 2015 and 30 GW by 2020. Following the first batch of four projects established in eastern part of Jiangsu province, more projects would soon be rolled out in Jiangsu, Shandong, Zhejiang and Fujian provinces, and Shanghai municipality.

Last year four offshore wind power projects in Jiangsu province with a combined capacity of 1GW were under public bidding. The four projects include two near-shore plants, each with installed capacity of 300 MW, and two built on tidal flats with a capacity of 200 MW each. Public bidding for these projects started in May 2010 and finished in September 2010.

In June 2011 China announced to open the bidding for its second offshore wind power concession project. The total construction scale will be between 1.5 GW and 2 GW, according to the NEA. The National Energy Bureau (NEB) will launch preparation work. China has installed 142.5 MW of offshore wind turbines, less than 1 percent of the country’s total wind power installed capacity. In the next five years, China will boost its offshore wind power installed capacity to 5 GW and form a complete technology and industrial chain. Afterward, China's offshore wind power will enter into a phase of large-scale development and is estimated to reach 30 GW in 2020.

In the first round of public tender held last year, several wind farm operators won orders with bidding prices from 0.62 RMB to 0.74 RMB per kWh, which is close to the benchmark prices for land-based wind farms. It is expected in the second bidding the final bidding price will be around 0.6 yuan per kWh.

Chinese government
The Chinese government is planning to develop the second stage of 5 GW wind power project in Jiuquan, 2 GW wind power project in Kailu, 2 GW wind power project in Hami, 1.5 GW wind power project in Tongyu for 2011. The country is also planning for a 1 GW offshore wind power project in east China's Jiangsu province and the second stage of the East Sea Bridge offshore wind farm in Shanghai is in progress.

Activities of companies
- China's leading turbine makers are Sinovel Wind, Goldwind Science and Technology, and Dongfang Electric. Together they account for over 50 percent of the market. For a graphic of China's wind market share, see annex 2. Sinovel Wind Group Co. will finish the production of China's first independently developed 6 MW wind turbine in June 2011.
- Siemens AG announced that it received an order to supply 21 2.3 MW wind turbines for Longyuan Power Group's offshore project in Jiangsu Province. The German company has become the first foreign turbine manufacturer to secure an order from a Chinese offshore wind project.
- International companies active in China are among others GE, Gamesa, Vestas, Alstom and Suzlon. Vestas opened a research and development centre in Beijing. Gamesa signed 3 contracts in 2010 with China's leading wind power operators with a total capacity of 251 MW. Gamesa will develop wind farm projects with a total capacity of 600 MW in China with local partners. The wind farms will be built in Jilin Province and the Inner Mongolia Autonomous Region in partnership with Guangdong Nuclear Wind Power and China Huadian New Energy Development. Alstom won an order worth 100mn Euro to supply six 1,000 MW steam turbine-generator packages for nuclear power plants.
- The Chinese XEMC Windpower Co. acquired Darwind in 2009. Darwind is an innovative Dutch developer of offshore wind turbines. The new company XEMC Darwind B.V. will develop two 5MW direct drive offshore wind turbine prototypes with the use of high-tech materials. XEMC from Xiangtan Hunan is one of the largest manufacturing complexes in China, and possesses more than 1000 patents and intellectual property rights.
- ECN has collaborated with Goldwind, HuaYi and Huiteng in the wind energy sector by providing training, consultancy services and sales of software.
- Dutch companies like Direct Wind and Mecal are also active in the field of windpower.

3.2 Solar energy

China is rich in solar power resources, with an average annual solar radiation level in excess of 5,000 MJ/m2 and two-thirds of the country's area experiencing 2,200 or more sunshine hours per year. The Chinese government has passed legislation including the Renewable Energy Law

and the Renewable Energy Medium and Long-term Development Plan, with the aim of seeing China's total solar power capacity reach 300 MW in 2010 and 1800 MW by 2020.

China's overall solar power capacity will reach 10 GW by 2015, according to the National Energy Administration (NEA). China's installed solar photovoltaic generating capacity increased by 580,000 kW in 2010 to 860,000 kW.
In western China, the construction of grid-connected solar-power projects will speed up. The planned solar power generating capacity was set at 5 GW.

3.2.1 PV solar

China is the largest producer in the world of photovoltaic (PV) solar panels. Photovoltaic is a method of generating electric power by converting solar radiation into direct current electricity by using semiconductors. China's monthly output in 2010 has reached 1800 tons and annual productivity will surpass 21000 tons, accounting for almost 20 percent of the world's total. Its companies, mostly private NASDAQ-listed, span the entire value chain of PV solar. Predominantly, they are serving the markets for clean energy generation in Europe, the US, Korea and Japan. PV solar will continue to develop as one of the leading renewable energy technologies in terms of cost effectiveness. At the same time, commoditization as well as overcapacity in silicon, wafer and cell production is causing unprofitable companies, mainly in Europe, to close their business.

3.2.2 Solar thermal

Solar thermal energy is still in experimental stages in China. It faces the obstacles of low efficiency and high developing costs. But China's first solar thermal power project, a 50 MW power plant will rise in Hangjinqi Inner Mongolia autonomous region. The tenders were scheduled to be opened in January 2011. The project is estimated to cost about 1.6 billion RMB and will annually generate about 120 million kWh of power.

Chinese Government
Large scale application of solar power generation is set to grow at an annual rate of 1 GW after 2012. Authorities will encourage more pilot projects over the next 2 years and grant a 50 percent subsidy to key equipment. The ministry also announced the first batch of 13 pilot projects, mainly in new development zones in Henan, Anhui, Shandong, Jiangxi, Hubei, Hunan, Hebei, Liaoning and Zhejiang provinces, Beijing, Tianjin, Shanghai, and Shenzhen.

Southwest China's Tibet autonomous region is poised to become the country's leading solar power generation base with 10 more photovoltaic power plants to be completed within this year. The new plants, with a total investment of 2 billion RMB and a combined 100-megawatt capacity, will take advantage of Tibet's ample solar energy resources to ease the plateau region's power shortages.
Construction of most of the new plants has begun, including a 30-megawatt solar photovoltaic generation plant in Xigaze Prefecture, the plant will generate up to 20.23 million kWh of electricity annually. A 10-megawatt solar photovoltaic generation plant is being built in Yangbajing, near Lhasa, with a designed power generation capacity of 430 million kWh during its 25-year life span.

Activities of companies

- China's LDK Solar will add new capacity in 2010 with 1420 MW. Suntech Power Holdings will add 1025 MW while JA Solar will expand manufacturing by 1000 MW. Yingli Green Energy will add 800 MW of capacity by the end of the year while Trina Solar Energy will install an additional 700 MW.
- Jiangsu is an important PV solar region. Jiangsu Zhongneng Polysilicon Technology Development Co Ltd, one of China's top polysilicon producer, has reduced the cost of polysilicon, the main raw material for wafers used in solar and electronics industries, to almost one-quarter of the world's average price.
- US based First Solar signed a MoU with China Guangdong Nuclear Solar Energy Ltd (CGN SEDC) to jointly develop the world's largest solar power plant. First Solar will build a 2000 MW solar power plant in Ordos, Inner Mongolia in the next 10 years. First Solar and CGN SEDC will co-operate to execute the first phase demonstration project with a 30 MW production capacity in Ordos. The rest of the project will be completed in three stages.
- Yingli Green Energy (Baoding) cooperates with ECN and Tempress Systems in a project to implement high efficiency N-type silicon solar cells, named PANDA, by using the cell design of ECN, the solar diffusion technology and dry PSG removal expertise of Tempress Systems and Yingli Green Energy's leading cell process technology.
- China Sunergy has invested 1.8 billion RMB in fixed assets for the high efficiency Quasar cells project in Jiangsu Province to expand its production of solar cells to 1GW. The first quantity of 500 MW cells produced are expected to be commercialised in the first half of 2012. These cells have an average efficiency of 18.55 percent and the company plans to have large scale production with 20 percent efficiency within two years.
- ECN provided knowledge and technological know-how to JA Solar and Canadian Solar (CSI).
- Dutch solar company, OTB Solar is a supplier of solar cell production technology with a representative office in Shanghai, supplying to several major Chinese solar companies.

3.2.3 Solar Energy development in Wuhan

With annual sunshine hours of 1810-2100 hours, Wuhan is a city suitable for solar energy development, especially in summer time, when the daily solar radiation can be over 5 kwh/m2. In Wuhan, the solar energy is mainly applied in two fields: solar heating and photovoltaic (PV) electricity generation.

3.2.4 Solar heating

Solar heating is widely used in Wuhan. There is a solid market for solar heaters in Wuhan due to unique local climate condition (sunny and hot in summer time). Actually, the sales of solar heaters in Wuhan rank the 2nd among big cities in China. Because of this huge market, China's central government has established the National Quality Supervision and the Inspection Centre for Solar Heaters in Wuhan (the only two solar heater testing centres in China), to offer quality inspection, testing, an R&D platform and technical standard of solar heaters.

Linuo Solar is a local company specialized in producing solar heating material and solar heaters, including borosilicate glass, lead glass tubes and solar heat pipes and tubes. It is the largest producer in China of borosilicate glass material (a special glass material for solar heaters). In nearby Yichang city, Huayang Group has set up a solar heater factory. In order to further develop the solar heater industry, the local government plans to build a solar heater industry park in neighbouring Ezhou city, to attract investment of big solar heater manufacturers.

3.2.5 Photovoltaic industry

3.2.5.1 General development in China

Most local solar energy companies focus on overseas markets. The domestic market is still quite limited due to insufficient financial and policy support from Chinese government. In China, PV technology is mainly applied in two fields:

1 electricity generation in Western China and rural areas, where there still is insufficient coverage by the electricity grid,
2 demonstration project in economically developed cities, e.g. building integrated photovoltaic (BIPV) systems, mostly only applied in public buildings as pilots or demos.

It is still too expensive for commercial use in residential apartments. The other application is solar lighting in parks, stations and other public spaces.

Silicon material: China is short of supply of high purity silicon materials; 95 percent of such material has to be imported. The poly-silicon supply relies much on import. Due to lack of production know-how, insufficient silicon supply becomes a bottleneck for the whole PV industry chain. Solar cells and modules: There's quite some investment in solar cell and module production in recent years. Small scale, high production cost and lack of core knowledge are main problems most local companies are facing.

3.2.5.2 Development in Wuhan

It is planned to build a complete PV industrial chain in Wuhan, from silicon material, silicon wafer, cells, to modules and PV systems. Hubei Province is rich in resources of silica and sand, which is important raw material for silicon crystal production. Wuhan has quite some universities and companies active in PV R&D and manufacturing. The local government has launched a series of financial support and tax preferential policies to support PV development in Wuhan. The current PV application in Wuhan is mainly in BIPV and solar lighting. So far a number of PV demonstration projects have been established, including demo projects in the Yangzi riverside park (wind-solar combined system), Wuhan Botanic garden (solar lighting) and Wuhan University of Science and Engineering (5kw grid-connected PV electricity generation).

Government Organizations
Several government organizations are involved in the PV industry chain, with different focus:

- Science and Technology Bureau: development of upstream and downstream industry chain.
- Industrial and Information department: semiconductor industry in the upstream industry.
- Construction department: downstream industry development, with focus on tilted roof projects.
- Development and reform commission: macro policy of renewable energy development, with focus on the grid-connected electricity generation.

Among them, the Science and technology bureau is the most important organization. It is responsible for the planning and guidance of solar energy development in Wuhan. It is active in the new technology promotion and application of demonstration projects. It offers funding support to local solar energy companies in the R&D and PV demonstration projects.

R&D
Several universities in Wuhan are active in solar cell R&D. They focus on the development of new solar cell products and research of conversion efficiency increase.

- Huazhong University of Science & Technology (HUST) is one of the earliest universities in China active in solar research: since the 1970s. Their research of 'space high efficiency silicon cells' and 'α -silicon thin film cells' has a leading position in China.
- Wuhan University is active in the research of silicon solar cells; especially of conversion efficiency of dye sensitized cells, which is among the highest in China.

Local companies
In China, top 10 solar energy companies are mainly located in Jiangsu, Beijing, Shanghai and Guangdong Province. In Wuhan, the following local companies can be found: Rixin Tech is the largest solar module producer in Central China. It is the biggest supplier of solar modules to the West China market. It has developed lots of demonstration projects of solar lighting for city use. Recently it signed a contract with Germany based Ersol to purchase thin film cells from Ersol.

Jiawei Solar mainly produces solar cells and modules. It is one of the biggest OEM and ODM producers of solar cells and panels in China. 95 percent of its products are exported to the US, Europe and Australia. It recently established a joint venture factory with US based Evergreen to produce wafers in Wuhan.
In nearby Yichang city, a city rich in silica resource, China South Glass (CSG) has established a polycrystalline silicon production base with annual output of 4500-5000T polycrystalline. This is the biggest one of such kind in China. 1st phase with annual capacity of 1500t has been completed.

In addition, two Taiwan based companies, Taiwan Semiconductor Manufacturing Company (TSMC) and Compound Solar Technology, are considering the establishment of 1000 MW GaAS solar power plant in Wuhan, to offer electricity supply to a local wholesales and distribution market.

The cooperation between companies and R&D institutes are also quite close. A good example is the establishment of Hubei PV Engineering Research Centre, which is initiated by Rixin Tech in joint cooperation with a number of universities in Wuhan and Hong Kong.

Website links

- Rixin Tech (www.rixinsolar.com)
- Linuo Solar (www.linuo-solar.com)
- Jiawei Solar (www.jiaweichina.com)

- Huazhong University of Science and Technology (www.hust.edu.cn)
- Wuhan University (www.whu.edu.cn)

3.2.5.3 Solar PV Industry in Jiangsu Province

In the past few years, the solar PV manufacturing industry in Jiangsu has grown rapidly, producing over 2/3rd of solar cells in China

2008:	*1 Euro = 9.2 RMB*	*National Share*
Industrial output value	90 billion RMB	60%
Solar PV Cells	1580 Megawatts	60%

2009:	*1 Euro = 9.2 RMB*	*National Share*
Industrial output value	110 billion RMB	70%
Solar PV Cells	2300 Megawatts	70%

The projected increase rate of manufacturing output for 2010 is 20%. In 2009 there were 400 enterprises working in this industry for the production of highly pure polycrystalline silicon, monocrystalline silicon ingot, silicon wafer to cell, cell battery, and solar PV power plants, covering almost the whole production process. The industry employs more than 100,000 people. Eight companies are listed in Chinese and overseas stock exchanges, and 20 companies have an annual production output of above one billion RMB each.

Import and Export
Before 2008 the raw material - polycrystalline silicon mainly relied on imports, buth with three silicon refineries having been built in Jiangsu, the industry has become less reliant on import. For instance, in the first half of year 2009 the total consumption of polycrystalline silicon was 7600 tons of which 2600 tons were locally made. The main suppliers are those top 7 companies from United States, Germany, Japan, and Italy.

The finished product of solar PV industry solar cells and cell panel assemblies are mainly exported to overseas markets. Export is almost 98% of total sales, and 82.5% of the exports go to Europe. In late 2008 due to the global financial crisis the export decreased, which has lead had an overcapacity of 1000 megawatts for the Chinese solar PV industry. Export of solar PV products from Jiangsu province was 6.48 billion US dollars in 2008. In 2009 the export decreased to 5.49 billion US dollars.

Investment
In 2009 total investment on new projects in the solar PV industry almost reached to 10 billion RMB. The investment was mainly done by the local enterprises with financing from foreign and Chinese stock markets and Chinese banks. Foreign venture capital also played important roles in the

direct investment in this industry, attracted by Chinese enterpreneurs with overseas experience in study and research in this industry. A Taiwanese company - CMC Magnetics Corporation has invested 600 million USD in Nanjing to produce film solar cells with the predicted production of 300 megawatts in 2015.

Solar Energy Application in Jiangsu
The application of solar PV products made in Jiangsu had started last year by strong pushing by the provincial government. In 2008 the total capacity of solar power stations in Jiangsu was 140 megawatts (mw). In 2009 more than 140 mw capacity was installed in one year

Although Jiangsu province is short of land resources, there is big potential to use city building to develop solar photo voltage (PV) power plants. The sunlight resource is relatively rich in this province. The average sunshine time is 1400 – 3000 hours, the theoretical annual reserve of solar energy is 1130 – 530 kilowatt per square meter, and the absorption of solar energy per square meter per annual is equal to the heat from 140 – 190 kilogram coal. There are also a number of wetlands and hills along the coast and North Jiangsu which are not suitable for crops and trees to grow, but will be good places to develop ground solar PV power plants. The total area of building roofs in cities is approximately 236 million square meters. If 20% of the roofs can be utilized for solar PV power generation, the total roof area to be used for solar PV power will reach 139 million square meters including building roofs in countryside.Also the south walls of buildings (600 million square meters) can be used to construct integrated solar PV power plants.

In 2009 twelve solar PV power stations were built in Jiangsu province. There are also 5 model solar PV power stations under construction with total capacity of 4000 kilowatts. These power stations are mainly constructed on the ground, on roof, and building embedded.

Government Programmes
In 2009 Jiangsu provincial government has made an Outline of the Plan of Adjustment and Promotion of New Energy Industries, which has put forward the main targets and tasks in regards to new energy industry. For solar PV industry briefing is as follows:

Targets for manufacturing fields
- Optimizing the industrial structure so as to build up a big enterprise cluster which will possess own intellectual properties, famous brands, core competence, and leading in their industrial fields respectively and resulting in one leading enterprise with annual sales over 50 billion RMB, five enterprises with sales over 10 billion RMB, and twenty enterprises with sales over 5 billion RMB.
- Building-up a self-innovation ability, with the innovation centered in the enterprises themselves and aiming to develop key technologies and

high end products. A number of innovation platforms are expected to be established
- By the end of 2011 the industrial sales are expected to reach 350 billion RMB with a solar cell production capacity of 10000 megawatts.

Targets for market applications
- Pushing project for solar power combination/synchronization to national grid,, expanding demonstration projects mainly in building rooftops and large-scale ground solar power stations.
- By the end of 2011 the contribution of solar electricity to the grid will reach 400 megawatts (260 mw from building roofs, 10 mw from building-integrated solar power systems, and 130 mw from ground solar power stations). By the end of 2015 it will be 1000 mw.
- Building up a number of research institutes in regards to solar energy application to develop the key technologies and integrated systems so as to reduce the cost of solar electricity into 2.00 RMB per kw.h by the end of 2011 (recently 2.15 RMB per kw.h). The final aim is to control the cost within 1.00 RMB per kw.h.

Development focus
- In regards to raw material, developing the refinery technology and key equipment for polycrystalline silicon.
- In regards to silicon wafer, developing large and super thin wafer and recycling technology for cutting waste, updating the key technologies of casting and cutting of ingots.
- In regards to solar cells and panels, developing high efficient crystalline silicon cells and film cells.
- In regards to system integration and equipment, developing the technologies and equipment of combination, synchronization, balance between solar power station and national grid.

Industrial regions
- Xuzhou, Yangzhou, and Lianyungang: silicon raw materials
- Wuxi, Changzhou, Suzhou, Nanjing, and Zhenjiang: final solar PV products
- Suzhou and Nantong: film solar cells of new generation.
- Suzhou, Wuxi, and Changzhou: production equipment and testing equipment.
- Zhenjiang and Taizhou: supporting materials and integrated systems.

Governmental Supports
- Solar PV projects can qualify for national and provincial funds for scientific research, high tech industrialization, key industry restructuring, and key machinery manufacturing.
- Solar PV projects have priority in land acquisitions and bank loans.
- Jiangsu provincial government has established special funds which will be used as a subsidy to the price of solar electricity as well as for demonstration projects of solar power applications.

- Supporting solar PV enterprises to employ capital from stock markets and issuing bonds.
- Supporting solar PV enterprises to acquire and merge other firms in both local and overseas market.

Potential Opportunities
The government encourages imports with high technology contents, large industrial scale, and contributing to the leading role into the whole industrial chain of Jiangsu solar PV industry, which can be in forms of manufacturing facility or R&D base. Mainly Jiangsu solar PV industry needs following technologies from foreign suppliers:

- The technology to reduce the pollution during production and application of solar PV cells.
- The technology of solar energy reservation and transformation.
- The manufacturing technology of solar cells of the third generation – high efficient (30%) and low pollution.

Organizations
Development and Reform Commission of Jiangsu Province
Add: 70 West Beijing Road, Nanjing, Jiangsu Province, PR China. PC210013
Tel: +86 25 8330 3845
Fax: +86 25 8663 9170
Contact person: Mr. Cao Yang, deputy division director of foreign investment & trade.
He is a governmental office in charge of provincial industrial development plan.

Jiangsu Solar PV Industry Association
Add: 2 Sipailou, Nanjing, Jiangsu Province, PR China. PC: 210096.
Tel: +86 25 83795053 - 801
Fax: +86 25 83795053 - 804
Mobile: +86 13814053240
Contact person: Prof. Xiong Yuanquan, deputy secretary general
This is a non-governmental organization, with members from the solar PV industry. The Association provides useful industrial and market information on request.

Companies
The main manufacturers of solar PV products in Jiangsu Province are:

- Wuxi Suntech Solar Power Co., Ltd. (www.suntech-power.com)
- China Electric Equipment Group (CEEG) Nanjing PV –Tech Co., Ltd. (www.ceeg.cn)
- Changzhou Trina Solar Energy Co., Ltd. (www.trinasolar.com)
- Nantong Solarfun Power Holdings Co., Ltd. (www.solarfun.com.cn)
- CSI Solar PV (Suzhou) Co., Ltd. (www.csisolar.com or www.canadiansolar.com)
- Jiangyin Solar Jetion Holdings Ltd. (www.jetion.com.cn)

- Jiangsu Zhongneng Silicon Industry (Xuzhou) Co. Ltd.
- Jiangsu Huantai Silicon Technologies Co., Ltd. (www.jshuantai.com)
- Jiangsu Nantong Solarfun Power Holdings Ltd. (www.solarfun-power.com)
- Jiangsu Changzhou GP PV Company Ltd.
- Zhenjiang Daqo Group Co., Ltd. (www.daqo.com)

3.3 Smart grid

Smart grid is a new approach to an automated, widely distributed energy delivery network that functions responsively and organically. Its basic concept is to add monitoring, analysis, control, and communication capabilities to the national electrical delivery system to maximize the throughput of the system while reducing energy consumption.

Increasing amounts of wind energy and solar energy will require elements of a smart grid. Solar and wind energy are generated in bursts during the day which make a transmission capacity with storage capability essential. With total power capacity set to reach 1430 GW by 2015 from 874 GW at the start of 2010, China has to figure out how to bring trillions of kWh of power to more than a billion customers, sometimes over very long distances.

In the 12th Five-Year Plan, the Chinese government is expected to focus on developing smart grid over the next five years. The government has already been increasing investment into smart grid technology to prepare for national energy needs that are expected to double in 10 years.

While the United States is expected to invest 240 billion RMB in renewable energy in the next 10 years, China is projected to spend 1388 billion RMB. As for smart grid, the Department of Energy has directed 30 billion RMB billion toward smart grid projects to take place over the coming years, while in China, government spending on smart grid-related technologies reached 48 billion RMB this year. It is estimated that total investment in smart grid by the Chinese government will reach 4 trillion RMB.

3.3.1.1 Role of Chinese government

China's Smart Grid policy is tied directly to its overall energy policy and is controlled by the central government through its chief administrative authority, the State Council. The State Council has tasked several government agencies and one hybrid government/industry organization to inform and implement governmental energy policy on its behalf.

The State Electricity Regulatory Commission (SERC) oversees regulatory policies and rate structures of electrical energy. The National Development and Reform Commission (NDRC) is the overall planning authority for all major national initiatives including energy related programs that it administers through its energy agency the National Energy Administration (NEC).

Modern Chinese governmental electric power policy was set with the adoption of the Electric Power Law. This law established legal protections for investors, consumers, and producers and regulated the generation, distribution and consumption of electricity. The Electric Power law was followed by a series of State Council energy proclamations which together were consolidated into an energy policy declaration, the China's Energy Conditions and Policies.

State Grid Corporation of China (SGCC) is one of the two state-owned grid enterprises. SGCC is the largest electric power transmission and distribution company in China and in the world. It covers 26 of China's 31 provinces, and is planning to invest 1.7 trillion RMB on new power routes, laying 337000 km of capacity of 110 KV. The system will be "basically smart" by the end of 2015.

Zhejiang Province will invest 28 billion RMB in extra-high voltage grid network and 46 billion RMB in power network with voltage below 110 KV. The investment of the 2 projects accounts for 59 percent of the total. By 2015, Zhejiang also intends to build 15500 KV transformer substations, 138220 KV transformer substations totalling 46 MW in electric capacity and 531110 KV transformer substations.

The first 110 KV smart substation in Anhui Province, the Huaibei 110 KV Huantan substation, was put into operation. This substation is among the second round of smart grid demonstration projects conducted by State Grid Co., and is also a national key scientific and demonstration project. The Huantan substation project was launched in July 2010. All electric equipment was installed in December.

The substation adopted a comprehensive data collecting and processing system, which is able to run condition monitoring simultaneously. Also the system can execute a malfunction analysis and provide recovery advice in order to solve problems in a minimum amount of time. The static investment of the project is about 42 million RMB. There is also a 380V PV power system on the roof which can generate 90,000 kWh of electricity per year. The PV system can help reduce coal consumption of up to 29.2 tons per year, and reduce 89.7 tons of carbon-dioxide emissions and 2.7 tons of sulphur-dioxide emissions.

3.3.1.2 Activities of companies

Note: Smart grid technologies are still in its infancy. Chinese investment in smart grid will give a boost to companies winning smart grid projects in China. The Chinese market is, despite its size, a highly competitive market with local companies competing mainly on price.

- Chinese smart grid companies are among others: Tianwei Baobian, Tebian Electric Appliance, Henan Pinggao Electric, XJ Electric and Changyuan Group.
- International companies active in China are among others Siemens, GE, IBM, ABB and Areva. China has the opportunity of creating a transmission capacity from scratch. Almost 666 billion RMB is going to be spent over the next 5 years attracting even IT firms like IBM and Cisco. IBM has already tied up with Chinese cities to roll out a pilot program.
- China lost 2.8 billion kWh of power in 2010 due to insufficient transmission capabilities and grid connection. Power grid upgrades continue to lag behind the expansion of wind turbines. State Grid plans to spend 500 billion RMB to upgrade the grid. Inner Mongolia accounts for 75 percent of unconnected wind-power generation. To overcome this problem, China is developing a smart-grid system for the long term.
- State Grid Corporation of China, the Chinese Academy of Science and GE will work together to develop standards for China's monster smart grid rollout.
- State Grid Corporation of China's Ningdong-Shandong 660 KV HVDC connection was inaugurated – the first 660 KV direct current power transmission link in the world, according to Alstom Grid, which partnered on the project. Alstom Grid opened a R&D and testing center in Shanghai to further Ultra High Voltage Alternating Current (UHVAC) and Ultra High Voltage Direct Current (UHVDC) transmission equipment and energy management solutions. The company wants to help China move to the highest voltages, 1,200kV in alternating current and 1,100kV in direct current, by 2020 which is the completion target for three major transmission lines, each with 20 GW of transmission capacity.
- KEMA has many projects in China and has signed cooperation agreements with Petrocom, CPECC, CDEPCI and Renfeng/Guolian. KEMA also has 4 laboratories testing electro-technical products in China and an Energy Consulting Co. in Beijing.

Smart grid projects underway include:

- UHV DC Converter Station www.sgcc.com.cn/ywlm/gsyw-e/218921.shtml
- Power System Digital Real-time Simulation Device www.sgcc.com.cn/ywlm/gsyw-e/218927.shtml

- Electric Vehicle Charging Stations www.sgcc.com.cn/ywlm/gsyw-e/218933.shtml

3.4 Hydro energy

China's annual hydro electricity production is 585 TWh, which is the largest in the world. And China will expand its hydro power capacity to 300 million KW by 2015 from the current 200 KW. For 2020 China set its target to 380 GW.

China had stopped giving permit for huge hydro projects after the problems of the Three Gorges Dam, as it led to protests over its environmental impacts and threat of earthquakes. However with China having to meet the targets of reducing the energy intensity of GDP by 40-45 percent by 2020, the government has started giving permits for large hydro projects again. NDRC has approved 2.4 GW Guan'di hydropower station, 600 MW Tongzilin hydropower project and 2.6 GW Changheba hydropower project. Large hydro projects have a long gestation period of 5-6 years.

The largest power project under construction is currently the Three Gorges Dam along the Yangtze River, which includes 32 separate 700 MW generators, for a total of 23 GW. When fully completed, it will be the largest hydro electric dam in the world. The Three Gorges project already has several units in operation, but the project is not expected to be fully completed until 2011.

China was reliant on foreign technological imports and knowledge to operate its power stations, construct its dams and build its modern factories, nowadays the country has a small but growing number of companies with the knowledge and expertise to supply its domestic needs. After relying on foreign imports from global players like France's Alstom and America's General Electric, China is slowly becoming self-sufficient in the design and production of the turbines and equipment needed to build hydro power stations.

German company Siemens supplied the turbines for China's first hydro power station back in 1909, Chinese firms are now building 19 of the 24 largest hydropower plants currently under construction worldwide. The 12600 MW Xiluodu dam, being built by state-owned Gezhouba Water and Power Group will be the country's second-largest after the Three Gorges project, with a 22500 MW maximum output when it comes operative in 2015.

In February 2011, the National Development and Reform Commission (NDRC) approved the construction plans for the Ahai Hydropower Plant on the Jinsha River. The project will feature five 400 MW turbines and will be constructed by Jinsha River Hydropower Development Co Ltd. The project

is the 2nd hydro plant to be built along the Jinsha River after the 2400MW Jin'an Bridge project. China plans to build 8 hydro projects with 21 GW of total installed capacity along this stretch of the river.

3.4.1.1 Activities of companies

- All three of the big global players manufacture in China. Alstom produces turbines in Tianjin; GE builds hydro generators and turbines in Hangzhou; while Siemens-Voith produces its locally-sold equipment in Shanghai. Toshiba invited Sinohydro to take a 20 percent stake in a 166 million RMB turbine and generator plant in Hangzhou in 2005. The plant has so far picked up orders for 80 generators and turbines, including a contract to supply four turbines for the 178.6 MW Dayingjian project in Sichuan.
- Chinese firms such as Dongfang and Harbin Electrical develop larger and technologically more advanced hydropower equipment, they are well-positioned to challenge the so-called big-three manufacturers.
- Atlantis Resources Corp, an ocean-current turbine maker, plans to expand in China, India and South Korea, after winning a bid in the UK to build the world's largest tidal-power project. China is the next big market for tidal energy. It has the most natural tidal resources in the world and can be home to more than 1000 MW of tidal energy.
- Alstom opened a 1 billion RMB hydropower manufacturing facility in Tianjin. The plant can deliver up to 30 turbine and generator units with capacity ranging from 20 MW to 1000 MW per year. Alstom also won a 444 million RMB contract to supply five 40 MW bulb turbine and generator units to the new Xiajiang hydropower station, currently under construction on the Ganjiang River
- Key operators within hydro electric energy are: China Yangtze Three Gorges Project Corporation, Ertan Hydropower Development Company, Huanghe Hydropower Development Company, Wuling Electric Power Company, Yellow River Water and Hydropower Development Corporation and Fujian Shuikou Power Generation.

3.5 Biomass

3.5.1.1 Biofuel

China can become a leader in the production of second-generation (2G) biofuels, made from agricultural waste instead of foodstuffs, such as sugar, starch and vegetable oils, according to Novozymes. Global biofuel consumption will increase from the current level of 55 million tons of oil equivalent - the amount of energy obtained by burning one standard barrel of oil - to 750 million tons in 2050. Meanwhile, over the same period, the proportion of biofuel used in the transportation-fuel market will rise from 2 percent to 26 percent, with 2G biofuels accounting for roughly 90 percent of all biofuels used, according to a report by the

International Energy Agency. It is expected that energy consumption of non-fossil fuels could account for more than 11 percent of the country's total energy consumption by 2015.

Between 2.4 and 2.8 percent of China's total energy consumption could be produced from biomass (organic material). Chinese annual biofuel production stands at 2 million tons, 2G biofuel production could benefit the economy with less effect on food supply and prices. Production of the fuel from agricultural waste will have a lower effect on food prices.

According to the World Economic Forum (WEF) report in June 2010, the conversion of biomass into fuel, energy and chemicals has the potential to generate upwards of 230 billion USD for the global economy by 2020. China's use of biofuel ethanol will reach 12.7 billion liters by 2020, while automotive ethanol gasoline usage will be 100 percent, and annual consumption of biodiesel will reach 2.3 billion liters, according to the targets set by the National Development and Reform Commission.

3.5.1.2 Activities of companies

In May 2010, Novozymes, China National Cereals, Oils and Foodstuffs Corporation, and China Petrochemical Corporation announced the construction of a 10,000 ton-capacity demonstration plant for commercial-scale production of advanced biofuels from corn stover - the leaves and stalks of maize plants - which will begin this year.
In April 2010, Novozymes and Dacheng Group, a leading corn processer located in Jilin province, made an agreement to make plastics from agricultural waste. The companies have agreed to expand their cooperation in developing biochemicals derived from biomass and to promote production of plant-based glycol. The two are evaluating different production methods.

3.5.1.3 Biogas

Biogas is a combustible mixture of gases produced by micro-organisms when livestock manure and other biological wastes are allowed to ferment in the absence of air in closed containers. The major constituents of biogas are methane (60 percent), carbon dioxide (35 percent) and small amounts of water vapour, hydrogen sulphide, carbon monoxide and nitrogen. Biogas is mainly used as fuel, like natural gas, while the digested mixture of liquids and solids 'bio-slurry' and 'bio-sludge' are mainly used as organic fertilizer for crops. Chinese companies are now finding numerous other uses for biogas, bio-slurry and bio-sludge in China.

After 2000, the Chinese government made various policies to accelerate the establishment and research of large scale biogas-plant. In 2005, the number of newly built biogas plants had reached to 1,000. Nevertheless, the current small-scaled and ineffective development of biogas industry is still the major problem in China.

By the end of 2006, the total number of families in China that use biogas reached 22 million, with a total annual biogas production of 8.5 billion m3 and had built biogas pits for 22 million households in rural areas, and provided more than 5,200 large and mid-sized biogas projects based around livestock and poultry farms. By 2020, 300 million rural people will use biogas as their main fuel.

China developed 2,200 grid power biogas engineering projects for wastes from intensive animal husbandry and poultry, treating more than 60 million tonnes of manure a year, that is in addition to the 137,000 installed digesters to treat sewage. According to The Chinese Academy of Sciences and Geography, the total annual production of manure and night soil could theoretically generate 130 billion m3 of methane, equivalent to 93 million tonnes of coal and 80 percent of industrial wastewater can also be used to produce methane. The number of large scale grid power scale plants are planned to increase to 30,000 by 2030, a 15-fold increase.

By the end of 2010, total biogas generation capacity stood at 800 MW, together with 500 MW of waste-fired generating capacity. The China Industrial Energy-saving and Clean Production Association expects these figures to rise to 1.5GW and 2GW, respectively in 2020, by which point 30 percent of household waste will be burnt to generate electricity.

3.5.1.4 Activities of companies

General Electric is active in China and has expanded its Jenbacher gas engine distributor presence throughout the country and has a regional gas engine packaging operation at GE’s manufacturing center in Hangzhou. GE also announced it would open five additional regional centers in Shenyang, Wuhan, Chengdu, Xi'an and Guangzhou.

3.6 Fossil Energy

The full-year amount of power use in 2011 is expected to total 4.6 trillion kWh. The growth rate is higher than the 9 percent increase the National Energy Administration (NEA) forecasted. Power consumption will grow 11 percent in the first half of this year to 2.2 trillion kWh. China used 1.09

trillion kWh of electricity in the first quarter this year, an increase of 12.7 percent from last year. The NEA also forecasted stronger demand for oil and gas with auto sales likely to approach 20 million units this year, increase of 11 percent from 2010. Oil consumption is expected to climb 9 percent from last year to 130 million tonnes in the first half and gain 8% percent year on year to 265 million tonnes for the full year. Gas consumption will likely reach 104 billion m2 this year, up 7.5 percent year on year. China Shenhua Energy Co. Ltd., the country's largest coal producer, has planned to build a coal processing project on China-Mongolia border to better use coal imports.

3.7 Shale gas

China is at the preliminary stage of developing unconventional gases such as shale gas and coalbed methane gas. However, shale gas production has not yet started, while coalbed methane gas output is small. The formation of a shale gas market is linked to the ability to access resources and exploration, pipelines that link assets with the market, and a downstream pricing mechanism.

China has offered 6 shale gas exploration blocks to PetroChina, Sinopec, CNOOC and Shaanxi Yanchang Petroleum Group Co in an auction that took place in November 2010. The shale gas blocks, each as large as 7000 km2, are in the provinces of Guizhou, Shanxi, Anhui and Zhejiang, and the municipality of Chongqing. The government is considering offering an exploration subsidy of between 0.23 yuan and 0.30 yuan per m3. China may have 26 trillion m3 of shale gas reserves, more than 10 times its proven holdings of conventional natural gas, and production may reach the equivalent of as much as 12 percent of conventional gas output.

A form of shale gas market will emerge quickly in China as the players ramp up activities in the unconventional gas sector, which is likely to experience double-digit growth year-on-year. Natural gas will account for 12 percent of the primary energy needs over the next decade from the current 3.8 percent. The country's annual use of shale gas is expected to be 15 billion m3 by 2020, 0.45 percent of total energy consumption.

3.7.1.1 Role of Chinese government

China will auction 8 shale gas exploration blocks in the first quarter of 2011. The blocks will cover a total area of 18000 km2. China is keen to introduce more competition into the bidding process. Estimated total shale gas production capacity is 15-30 billion m3 by 2020. China's total potential shale gas reserves are 26 trillion m3.

In June China offered its first 4 shale gas blocks to domestic developers. Companies including Petro China, Shaanxi Yanchang Petroleum Group Co., China United Coalbed Methane Co. and Henan Provincial Coal Seam Gas Development and Utilization Co. placed bids for the blocks in Guizhou and Chongqing.

China has 1.3 trillion cubic feet of "technically recoverable" shale gas reserves, 48 percent more than the U.S., according the U.S. Energy Information Administration (EIA). The government aims to triple the use of gas to 10 percent of energy consumption by 2020. It is drafting a plan to develop domestic shale reserves in the five-year period ending 2015 according to NEA.

3.7.1.2 Activities of companies

- Chinese oil companies have entered partnerships with foreign gas explorers, including Royal Dutch Shell PLC and Chevron Corp. China´s largest oil producer China National Petroleum Corporation (CNPC) and Royal Dutch Shell are having a joint shale gas exploration project in Sichuan. In February 2011 three shale gas wells have been successfully tested. Shell may invest 6.6 billion RMB each year in China.
- CNPC and Royal Dutch Shell are exploring the Jinqiu shale gas block in Sichuan province. Shell and PetroChina are operating the Changbei tight-gas field in the Ordos Basin in Shaanxi province and exploring the Fushun-Yongchuan block in Sichuan.
- Royal Dutch Shell has a project with Shanghai-based Wison Engineering Ltd to jointly develop a "hybrid" gasification technology demonstration plant in China. The plant is expected to further expand the market for syngas, the main product of the gasification process , into the chemicals, hydrogen and fertilizer industries.
- China's second-largest oil company, Sinopec, may sign an accord with Chevron to develop shale gas in the southwest of the country. Sinopec and BP PLC are also in talks to cooperate in shale gas exploration and development. Sinopec has charted 2000 km2 in Kaili, Guizhou province in Southwest China and 1000 km2 in Huangqiao, Jiangsu province in East China, as potential cooperation blocks.
- ConocoPhilips is in talks with PetroChina over the development of a 3000 km2 shale gas block between Chengdu and Chongqing municipality. Statoil ASA, Norway's biggest company, is also in negotiation in China.
- CNOOC Ltd completed a deal with Chesapeake Energy Corp and purchased a 33.3 percent undivided interest in Chesapeake's 600.000 net oil and natural gas leasehold acres in the Eagle Ford Shale project in South Texas. In addition. The country's largest oil producer PetroChina aims to produce 500 million m3 of shale gas by 2015.

4 Trade Fairs & Exhibitions

- **20 Jan 2011**
  China Unconventional Gas Congress 2011 Beijing China
- **22 Jan 2011**
  2nd International LP&GP Summit 2011 Shanghai China
- **25 Jan 2011**
  1st World Congress of Endobolism 2011 Xiamen China
- **19 Feb 2011**
  CFO China Summit 2011 Beijing China
- 24 Feb 2011
  China International Forum on Small Wind Turbine (CSWT 2011)
  Beijing China
- **02 Mar 2011**
  7th Global Aluminium Industry Summit 2011 Ningbo China
- **03 Mar 2011**
  7th Global Copper Industry Summit 2011 Ningbo China
- **18 Mar 2011**
  China Crop Protection Summit 2011 Shanghai China
- **18 Mar 2011**
  International Conference on Emerging Economies: Challenges and Opportunities Chandigarh India
- **26 Mar 2011**
  International Conference on Information Science and Technology
  Nanjing China
- **5 Apr 2011**
  Carbon Markets & Climate Finance Sao Paulo, Brazil
- **12 Apr 2011**
  3rd EV Battery Forum Barcelona, Spain
- **19 Apr 2011**
  China Sourcing Summit On Petroleum Equipment (CSSOPE 2011)
  Beijing China

- **27 Apr 2011**
  Global Chrome Ore Forum 2011 DUBAI United Arab Emirates
- **02 May 2011**
  International Biomass Conference & Expo America, St. Louise
- **09 May 2011**
  Euro heat & Power 35th Biennial Congress Paris, France
- **16 May 2011**
  5th Annual Global Refining Summit, Rotterdam, Netherlands
- **19 May 2011**
  Revisiting the Socio-Political and Technological Dimensions of Climate Change Preston United Kingdom
- **14 Jun 2011**
  Mines and Money Beijing Beijing China
- **19 Jun 2011**
  37th IEEE Photovoltaic Specialist Conference Washington
- **24 Jun 2011**
  International Renewable Energy & Environment Conference Kuala Lumpur, Malaysia
- **28 Jun 2011**
  Clean Power Asia Conference and Expo 2011 Bangkok, Thailand
- **27 Jun 2011**
  Advanced Biofuels Workshop America St. Louise
- **12 Aug 2011**
  2011 International Conference on Information System and Management (ISM 2011) Wuhan China
- **08 Sep 2011**
  The Power Engineering and Automation Conference (PEAM 2011) Wuhan China
- **14 Sep 2011**
  International Biorefining Conference & Trade Show Houston, Texas
- **22 Sep 2011**
  BITi¯s 4th Annual Congress and Exposition of Molecular Diagnostics (CEMD) Beijing China

- **25 Sep 2011**
  6th Dubrovnik Conference on Sustainable Development of Energy, Water and Environment Systems, Dubrovnik, Croatia

- **27 Sep 2011**
  Exploration & Production Summit 2011 Houston, Texas

- **8 Nov 2011**
  Smart Utilities Australia & New Zealand 2011, Sydney, Australia

- **16 Nov 2011**
  Global Refining Strategies Summit 2011, Houston, Texas

5 Dutch Government Economic Network

The Dutch Government Economic Network consists of the Economic Department of the Embassy, Consulates and the Netherlands Business Support Offices. The network supports Dutch companies and other organizations to find their way to do good business in the Chinese market or help with the preparation for a market entry. All the services are provided uniquely to Dutch organizations/companies, free of charge

The Dutch Government Economic Network provides the following services to Dutch companies:
- Provide industry and market information (from small request to larger individual Market Scans)
- Support in the match making of trade missions
- Provide connections with the right partners in China to do business
- Support in connecting with local authorities
- Identification of market opportunities
- Trade promotion

For more information on the services and the activities of the Dutch Government Economic Network: http://business.hollandinchina.org

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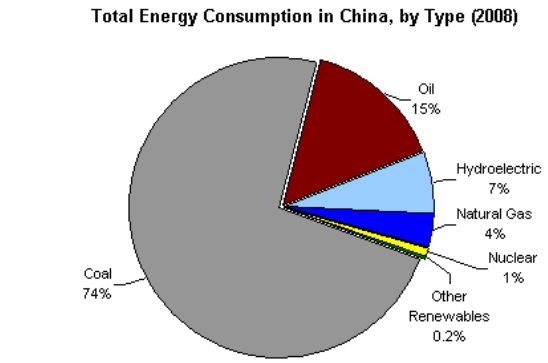
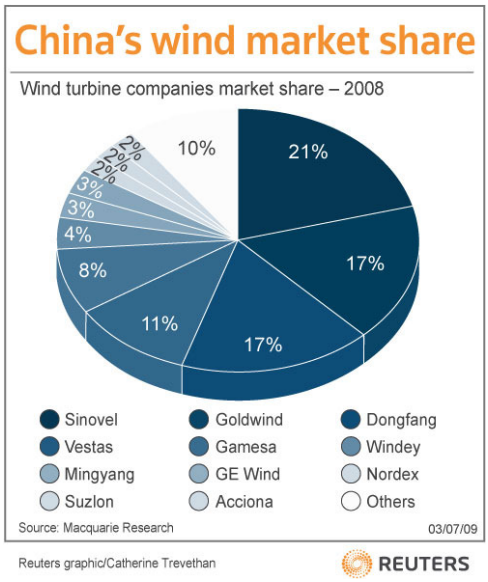
6 Annexes 1 - 6

6.1 Annex 1 Total energy consumption by China

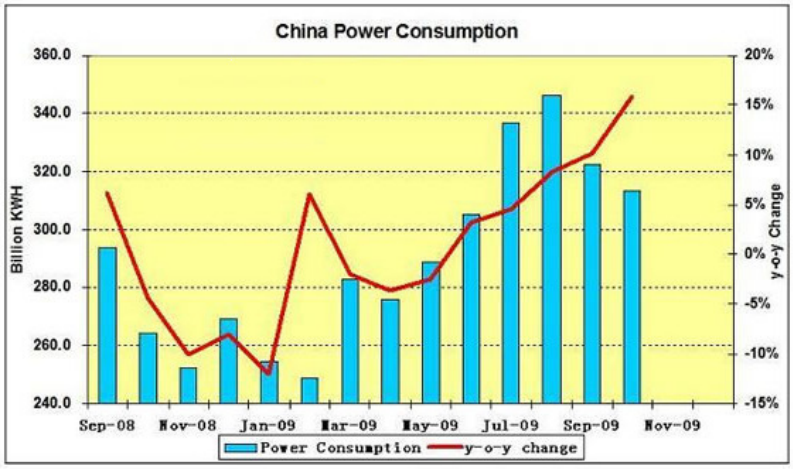


Source: EIA International Energy Statistics 2008

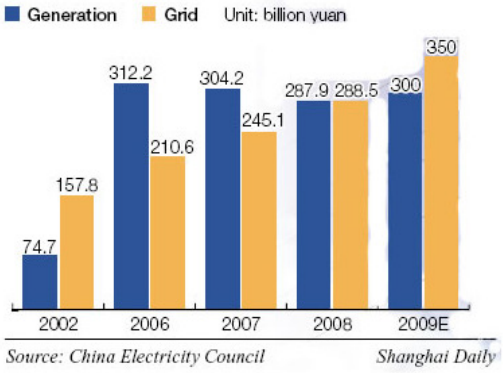
6.2 Annex 2 China´s wind market share



6.3 Annex 3 China Wind Power Consumption



6.4 Annex 4 Investment in power generation and grid construction



6.5 Annex 5 National Grid Plan

6.6 Annex 6 Municipal Solid Waste and food waste biogas plants currently under consideration in China

Location	Start	Feedstock	Technology Developer	Capacity mt/a	€	Comments
Beijing Dong Cun Taihu Coun.	2007	Restaurant- & MSW,manure	Linde Valorga Biomax	0.2	Inv.18m Fee13.5/t	Feasibility 2005, CDM
Beijing	till 2010	Restaurant- &. MSW, ..				9 plants anticipated
Shanghai Jinshan	2008	MSW, BMW		0.22	Inv. 32m	Ppublic tender
Shanghai Putuo, Shanghai	2007	Municipal wet waste	Valorga Biomax	0.18 to 0.29	Inv.30m Fee17/t	Feasibility 2005, CDM PDD1/06
Guangzhou Likeng (Guandong)	2007	Municipal wet waste	Valorga Biomax	0.36	Inv.32m	Preparation
Changsha Huiming (Hunan)	2005	MSW		0.73	Inv.11m	Biogas power plant
Mianyang (Sichuan)	2002	MSW	Tunnel type	0.25 AD: 3600t/a		AD as pilot project
Yingkou (Liaoning)	2007	MSW, SS	Tsinghua Tongfang	0.27	Inv.20m	
Shenyang (Liaoning)	2010	BMW (source separation)	Wet AD recommended	0.12 to 0.20	Inv.12m Fee >6/t	Prefeasibility-study

Source: Biogas from Municipal and Agricultural Bioorganic Waste: Renewable Energy for China, Bernhard Raninger, ZHAO Youcai , Jl Rong, LI Aimin , Werner Bidlingmaier , LI Rundong , LI Ronggang; International Symposium MBT 2007