

Light the Green Torch

The National Stadium is just the beginning of expanded use of solar energy in China

By WANG JUN

The National Stadium, a nest-like structure where the opening and closing ceremonies of the 2008 Beijing Olympic Games will be held, is setting a good example for all industries in China by using solar power.

Its supplier of solar power equipment is Suntech Power Co. Ltd. based in east China's Jiangsu Province. The 10-million-yuan contract between the stadium and the solar company includes installing a 130-

kilowatt (KW) photovoltaic (PV) system at 12 stadium entrances. The installation will supplement the venue's conventional power supply and make the stadium an environmentally friendly sporting arena.

Apart from the National Stadium, in 2007, Suntech will also provide \$270 million worth of photovoltaic modules to the global projects of a German company. Industry insiders have deemed Suntech the most competitive Chinese manufacturer of solar products in the global market. Since its initial public offering in 2005, the company

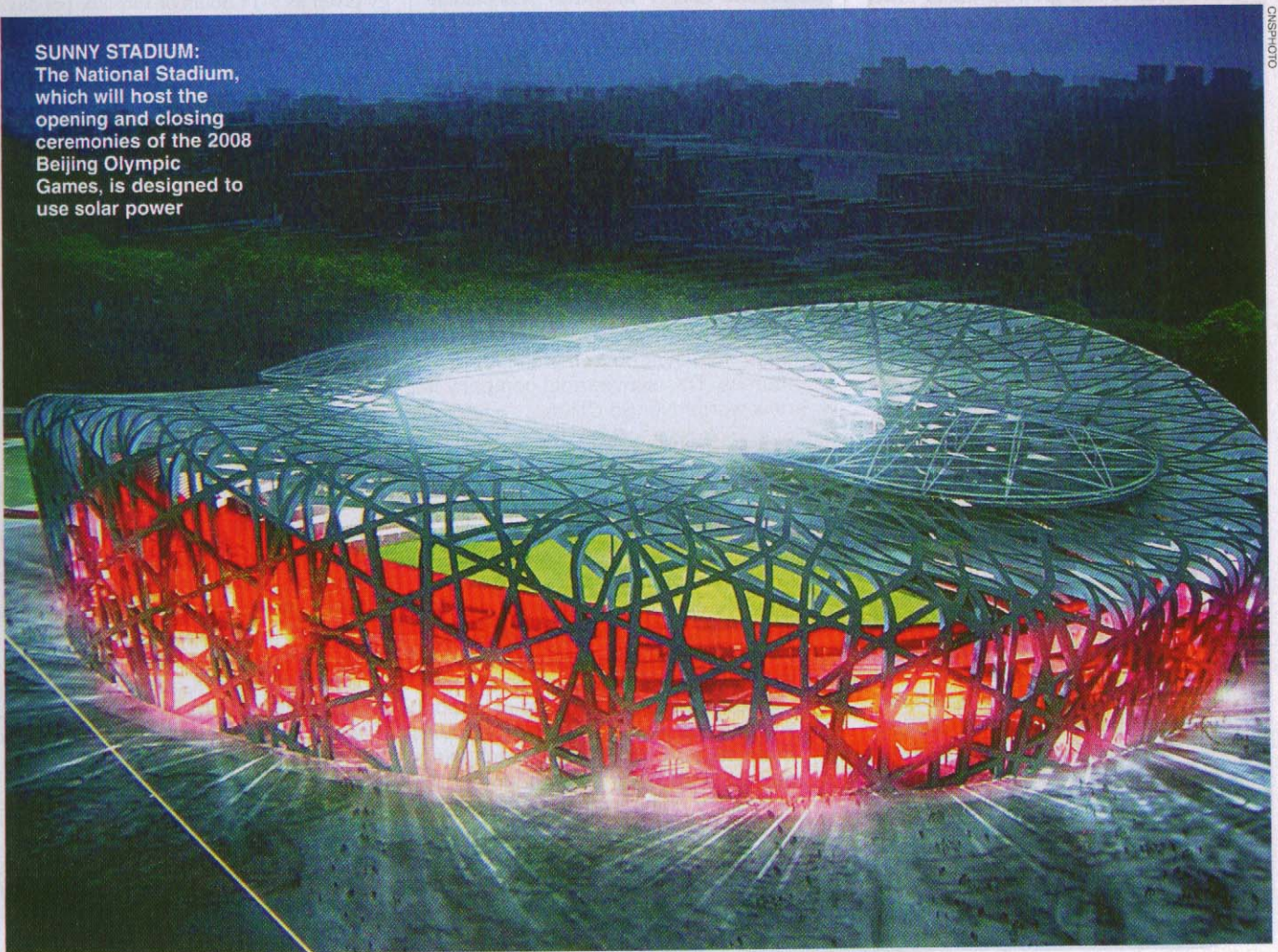
already has achieved a market capitalization of more than 5 billion euros and shown 100-percent growth for several consecutive years, said Shi Zhengrong, Chief Executive Officer of Suntech Power.

But aside from Suntech, there are many players in China's solar arena, and both industry insiders and local governments are pushing to grow more of this green energy.

Enormous production capacity

China has enormous low-cost manufacturing capacity, with more than 1,000 ►►

SUNNY STADIUM:
The National Stadium, which will host the opening and closing ceremonies of the 2008 Beijing Olympic Games, is designed to use solar power



megawatts (MW) coming online over three years, and the entire solar food chain can now be found within China, including polysilicon feedstock, wafer, cell and module production, and domestic wet-chemistry and equipment suppliers, said Jesse W. Pichel, Senior Research Analyst of Piper Jaffray. Solar companies in China have focused on module capacity, serving historically as outsourced module-manufacturing partners. The module capacity of 450 MW will rise to 1,200 MW by 2008. Wafer capacity of 100 MW in 2005 will grow to about 800 MW by 2008 thanks to the production ramp-up of domestic polysilicon supply, as well as large poly supply contracts beginning in 2008.

According to Pichel, in addition to labor costs that can be less than \$200 per month per worker, Chinese solar companies also benefit from lower sales cost, costs of doing business, research and development, peripheral costs, and the tax rate. There is also an expanding solar manufacturing equipment industry that provides equipment at a fraction of the cost of equipment made overseas. Also there is a growing list of lower cost wet-chemistry suppliers for slurry and aluminum paste. Chinese manufacturing lines tend to be more labor intensive and use more domestic equipment, requiring substantially lower capital expenditures. In particular, some Chinese module lines do not run automated assembly equipment and instead favor an all-labor approach. The only equipment required is laminators and



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POWERED BY NATURE: The largest solar power plant in China is put into operation in Jinan, capital of Shandong Province

module testers.

Weak but potential domestic demand

The Chinese PV industry is completely focused on the export of its products. The domestic Chinese PV market is still very small and grew only by 5 percent in 2005. However, according to the Chinese Renewable Energy Industries Association (CREIA), annual installations should reach 130 MW by 2010. The largest market share is within the rural PV application sector, which is 43 percent.

The market of solar energy in China is likely to expand due to the encouragement of the Chinese Government. In 2005 the Chinese renewable energy law was adopted. According to the law, power grid operators

should buy renewable-source-generated power at government-directed prices. The extra costs incurred by this will be shared throughout the overall power network. Pichel believes that the law is expected to generate 500 MW of annual capacity by 2010, 3 gigawatts (GW) by 2020, and 60 GW by 2050. Western China is an ideal location for the development of solar energy given its 9-11 hours of sunshine per day. Furthermore, many areas in west China are off-grid, and the government has an aggressive rural electrification initiative of about 300 MW. While details on the amount of subsidy have not been communicated, three large 30-MW solar power projects are planned for 2006-07. The prospect of large solar demand in China is likely to only benefit the country's original equipment manu-

Chinese Solar Industry Players

Suntech Power (Wuxi, Jiangsu Province)

Suntech Power Holdings Co. Ltd. specializes in the design, development, manufacturing and sale of PV cells, modules and systems. Founded in January 2001 by Dr. Shi Zhengrong, a distinguished PV technology scientist, Suntech has rapidly developed into a leading solar energy company. In less than three years since it started its business operations in May 2002, Suntech increased its manufacturing capacity by 12 times, becoming one of the world's top 10 PV cell manufacturers in terms of output. According to Shi, Suntech is committed to becoming the lowest cost-per-watt provider of PV solutions. On December 15, 2005,

Suntech Power went public. The stock price rose over 80 percent in four months. This six-year-old company is now worth over \$5 billion.

Yingli Solar Co. (Baoding, Hebei Province)

The second largest module manufacturer in China, Yingli Solar, produced 16 MW of modules in 2003. Within two or three years it expects to produce 600 MW. Yingli Solar developed from Tianwei Yingli New Energy Resources Co. Ltd. which was founded in 1998. Ever since, Yingli Solar has kept developing state-of-the-art production lines for wafers, cells and modules. State support and imported technology helped Yingli Solar become one of the hottest PV companies in China.

The company currently has an annual capacity of 500 MW of wafers/cells and modules. With 70 percent of its facilities completed by the

end of 2006, its production capacity is expected to reach 600 MW by the end of 2008, with a turnover of 16 billion yuan and a net profit of 3.5 billion yuan.

Other ambitious solar companies

Although it has only been in full operation for one year, Wuxi Shangpin Solar is heading for rapid growth. The company plans to double its module production to 30 MW next year and will build its own cell production line.

Companies such as Trina Solar, Comtec and LDK Solar are seeking major expansions in the field of silicon wafer manufacturing. LDK Solar is aiming to achieve a 1,000-MW silicon wafer production capacity by 2010.

Another high flyer is Nanjing CEEG PV-Tech that focuses on solar cell manufacturing. Jianhua Zhao, the founder, said that his company started its first production line with an annual

facturers (OEMs) or global players with a manufacturing presence or joint investment in China.

In the next decade, this market will change from smaller systems to larger grid-connected power generating systems, including larger PV power plants of 10 MW in desert areas and rooftop systems like the 100,000-roof program in Shanghai.

Of course the Chinese solar industry itself is confident about a future domestic market, as are some local governments that are rendering support to new initiatives aiming to boost the domestic market. Wei Qidong, Secretary-General of the Energy Research Association of Jiangsu Province, once explained that the association has developed a roadmap for PV development.

PV industry revenues in 2006 reached around 1 billion euros, but are likely to hit 10 billion within five years in this region. The Jiangsu Provincial Government is working on the first steps of domestic market development with a 10,000-roof program. And it has started discussions with energy utilities for a feed-in tariff incentive for PV applications. Wei sees a bright future for the PV industry in Jiangsu, with research and development plans focused on cell efficiency improvement, concentrator PV systems and thin film technologies.

Possible challenges

However, the Chinese solar industry is facing some challenges, including a shortage of polysilicon. According to Pichel,



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LOOKING GREEN: Workers of Suntech Power Co. Ltd. produce crystalline silicon solar cells

capacity of 32 MW in June 2005 and that it will further expand its capacity to 600 MW by 2008.

Shanghai Comtec Solar Technology is a relatively new player in the field of solar wafer production. The company, however, plans to increase its capacity to 1.2 million mono wafers this year.

Trina Solar is a typical and vertically integrated PV company with an annual production capacity of 50 MW. It plans to increase its ingot, wafer and module production capacity to 300 MW by 2008.

Source: www.solarplaza.com

three Chinese polysilicon manufacturers dominate the domestic landscape. Sichuan Xinguang, which is still under construction, is scheduled to begin operation in 2007, with its production capacity reaching 1,250 tons in 2008. LSCS plans to increase its production capacity from 300 tons last year to 1,000 tons this year. ESM's current polysilicon production stands at around 100 tons. Domestic poly production will not address near-term needs, as most production will not come online until 2008. Several Chinese solar companies, in anticipation of a future capital market transaction, have been stockpiling poly to the order of hundreds of tons.

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