

China's Booming Solar Energy Market Filled with Smoke and Fire

With ten highly prominent initial public offerings (IPOs), China's solar energy industry is poised to make a major impact on worldwide polysilicon capacity and solar cell production. However, determining who will succeed among the new firms in the domestic and international market remains highly uncertain, as it is likely that at least some publicly announced plans will not materialize into actual projects. SEMI has looked into the emerging China photovoltaic (PV) and solar energy industry in an attempt to "separate the fire from smoke" and provide our members with a more realistic understanding of this dynamic segment of the global solar energy industry.

In the last two years, China's ten IPOs have raised nearly \$2 billion to meet the world's growing demand for PV related products and services. The attractiveness of PV to Chinese industrial policy is understandable due to China's internal demand for energy, the exciting global economic projections for the solar industry, and the alignment of PV manufacturing needs with China's current industrial and technology capabilities. China's domestic market for accumulated PV installation is expected to reach 300MW by 2010 (up from only 80MW accumulated and 10MW yearly installation in 2006), but the China PV industry is planning to more than meet its domestic needs.

Since 2004, China's solar cell production and capacity have reached growth rates from 100-400% per year contributing to the world's shortage of polysilicon feedstocks. In 2008, cell capacity of 4 gigawatts (GW) has been announced, and after growing a projected 40% this year, China's solar wafer capacity will also reach 4GW. However, how much poly will be available and who will be able to obtain it remains extremely uncertain.

Unbalanced Polysilicon Supply Chain

In response to China's and the world demand, news reports of new polysilicon projects in China have appeared regularly in China business, technology and trade press over the last year. In 2007, SEMI identified 27 separate polysilicon production projects that have been announced (SEMI analysis of the China PV market is currently in progress and these estimates are preliminary). Investment for these projects comes from a variety of sources, especially silicon manufacturers, traditional energy producers and chemical companies. Of these 27 projects, 7 projects will rely upon China-based technologies, while 6 will source technology from Russia, 5 from the Europe or U.S., and 4 projects will be a partnered combination of China and international technology. These projects will be located throughout China, with the leading regions being the western part of China (11 projects) and Yangtze Delta (4 projects).

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As of December 2007, only 20 of these projects have begun construction. Of the identified 27 polysilicon projects that announced nearly 30,000 metric tons (Mt) of poly capacity by 2008 year-end, SEMI estimates less than 5,000 Mt will be produced this year. By 2010, of the 70,000 Mt capacity that has been announced, SEMI projects only 30,000 Mt will reach market. In response to the discrepancy between announced and expected capacity, nearly all China cell and module manufacturers have entered into long-term, expensive supply contracts. However, these contract prices are still much lower than the spot market prices, which was around \$400 per kilogram in December 2007.

Emerging Solar Equipment Industry

In addition to polysilicon, China will also benefit from localized crystal growth. Xi'an University of Technology, Jingyi and Jingyuntong are all qualified vendors for mono-crystal ingot growth equipments. Silicon ingot capacity will reach 20,000 Mt in mono crystal and nearly 23,000Mt in multi in 2008. In addition to polysilicon, solar grade wafers and solar cells and modules, China will also benefit from an emerging domestic equipment industry representing the entire production process including thermal process, plasma etch, wet bench, PECVD and semi-automated screen printing. Supporting equipment and component vendors are also expected to emerge in China.

The business model for many of these new solar energy firms such as Suntech, Yingli and Jing'ao follow a vertically integrated path. Some companies such as LDK or CSUN, however, are planning to specialize in a limited number of steps in the supply chain.

In conclusion, while the global PV industry is certain to grow over the next several years, considerable uncertainty surrounds the China market. Polysilicon shortages will remain in effect for the next 18 months and sources of future supply in China have not yet reached high confidence levels. Average efficiency of China-based PV technology is approximately 16–17% and top tiers will improve it to 19% by the end of this year. Human resources will always remain limited for the fast expanding industry. Regardless of the ultimate scope and nature of the future industry, China's role in the global industry will certainly grow—and like most industrial segments in China, achieve global impact.

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