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PV Market Bi-Monthly Note

1st September 2017

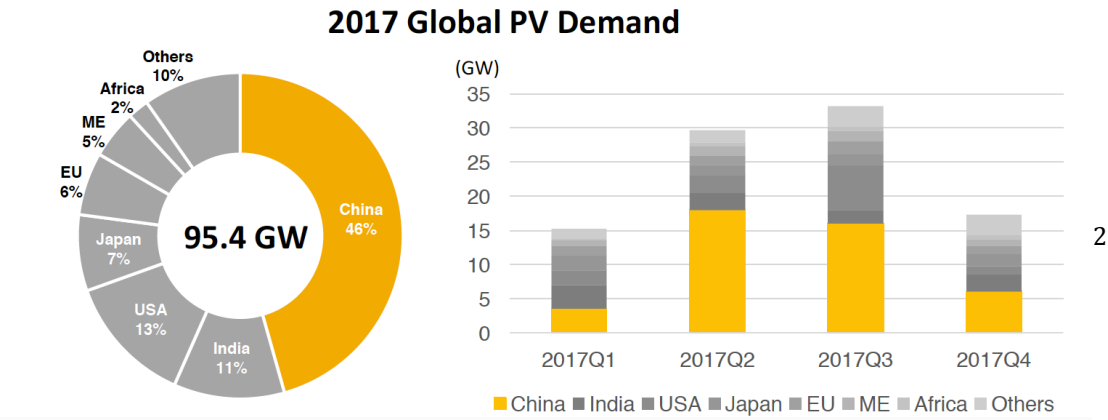
PV InfoLink

Content

Section A - Executive Summary

Demand:

Global module demand will reach 95.4GW. The demands from China, India, Japan, and the US will represent 77% of the world's demand. For the emerging markets, the growth will be the most significant for the Middle East, Brazil, and Mexico. Demands this year peaked in Q3. The China DG Demand is the most significant factor in Q4, otherwise seems that no country is supporting the module demand in Q4



Supply:

By 2018, the demands are expecting to decline simultaneously in China, Japan, and the US. The overall PV demand may begin to reflect a downtrend. The situation of oversupply will also intensify next year due to the continuous capacity expansion. Therefore, prices are expecting to remain weak for a long time despite the imbalanced relationship between supply and demand.

Polysilicon makers have expanded many capacities this year. Meanwhile, since it's cheaper to use diamond wire multi-Si wafers, the polysilicon sector will witness the most serious oversupply in the end of 2017, driving down the overall prices for next year.

Many new cell capacities will still be released every year. The total cell capacity will continue to increase as well. The PERC cell capacity will rise from 15GW in late-2016 to 29GW in late-2017. Judging from the capacity expansion, conventional mono-Si cell will be slowly replaced by mono-Si PERC cell, becoming one of the standard equipment for the production lines. After PERC machines gradually fulfill the switch of mono-Si production lines, more manufacturers will conduct upgrades of conventional multi-Si with the PERC technology. As a result, multi-Si PERC capacity is expecting to increase significantly from 2019 to 2020.

The shipment of PERC modules will increase substantially this year as PERC module is the product with the best profit nowadays. It's projected that there will be 9.5GW of actual PERC module shipment in 2017. Following the lower mono-Si wafer costs and the increasing popularity of the PERC technology, mono-Si will account for a larger proportion of the market shares. The ratio of mono to multi-Si market share will be 50:50 in 2020. As manufacturers put a lot of efforts in the PERC technology development in terms of quantities, prices, and efficiencies, the N-type technology can't grab more market shares rapidly. Therefore, the market share of the N-type cells won't increase much before 2019.

Section B - Supply – Company Update

Polysilicon:

Polysilicon demand remained stable in July and August. As polysilicon makers continually conduct the equipment maintenance from the beginning of August, the polysilicon market has witnessed short supply. In addition, 中能 had quality issues in early-August. The company not just suffered from the tight supply, the wafer supply has been affected too. Due to the equipment maintenance and several emergencies, the total polysilicon production reached 3,500-4,500 tons in August, down 10% MoM. Therefore, polysilicon price has increased from RMB 128/kg in late-July to RMB 143/kg in late-August, up 12%.

Most of the polysilicon orders for August were confirmed in early-July. The average trading price was RMB 130-135/kg back then. Manufacturers were only negotiating for small orders or with trading companies in August, with the prices surging to RMB 140-145/kg. Wafer prices increased as well.

Many manufacturers will still be conducting the equipment maintenance in September, including XTNY Solar, Daqo, CSG, and 亞矽. Although 中能 conducted the equipment maintenance ahead of time due to the quality issues in August, the original maintenance plans may be executed in September too. Manufacturers will decide whether they should postpone the maintenance plans depending on the market demands. But if the maintenance is postponed for too long, they will face greater risks for quality and equipment security. As a result, manufacturers may proceed in small scale. According to the estimation from the above, the amount of polysilicon that will be affected by the equipment maintenance is expecting to reach 3,000-3,500 tons in September. Consequently, the polysilicon market will still witness tight supply in September with slight fluctuation in prices.

Currently, China is very strict on the environmental protection, which also affected the raw material of polysilicon – silicon powder. No companies

were affected by the short supply of raw materials yet, but the raw material costs may boost the production costs of polysilicon manufacturers in the long run.

After mid-August, the module and cell sectors have started to reduce the number of orders placed and lower prices. Therefore, despite the strong demands and tight supply situation for the upstream sectors, polysilicon manufacturers will have more pressures as demand drops significantly after mid-October. Meanwhile, all sectors of the supply chain hope that the lower polysilicon prices can bring down the costs further and the selling price of polysilicon has increased too rapidly in a short period of time, prices are expecting to decline rapidly as well.

Orders for September have mostly been placed. The contract price increased further to RMB 145-150/kg. Many manufacturers are wondering whether there will be another turning point after the holidays in October. According to the current observation, polysilicon demand in Q4 will be lower significantly than Q3.

- A capacity of 800-1,000 tons is estimated to affect 中能. The company has resumed the production entirely before mid-August. Meanwhile, GCL purchased 1,000 tons of polysilicon to fulfill its own shortage.
- XTNY Solar conducted maintenance for fault equipment in August, affecting 500-800 tons of polysilicon. The company is expecting to conduct full equipment maintenance in September, which will potentially affect more than 1,000 tons of capacity.
- Sinosico's equipment maintenance affected more than 500 tons of polysilicon in August.
- A total of 12,000 tons of capacity was overhauled in August for Daqo, affecting more than 800 tons of polysilicon.
- LDK's equipment maintenance affected 500 tons of polysilicon in August.

- Dunan conducted the equipment maintenance from mid-August to mid-September.
- CSG will conduct the equipment maintenance in September.
- HKSilicon will make adjustment to its equipment maintenance schedule according to the market changes. They are planning to do it when the demands turn weak in October.
- OCI is almost running at full capacities after August.
- Asia Silicon plans to conduct the equipment maintenance in September. But if demand remains high, they may postpone it to October.
- East Hope has resumed the production and started to supply a variety of products in small quantity. Its goal is to enter the mass production stage before late-Q4.

Wafer:

The wafer market that originally suffered from the tight supply, along with GCL's polysilicon quality issues in early-August and Longi's grid maintenance at Yinchuan in September led to the reduction of 50 million pieces of wafers for the two leading wafer companies. This resulted in higher wafer prices. In addition, the price rise of wafers also reflected the increase of polysilicon prices.

Basically, the wafer market has witnessed short supply in Q3. The shortage is supposed to be alleviated in mid-September as demand weakens, but because manufacturers had to stock ahead of time for China's national holidays in early-October, it's still difficult to get wafers before late-September.

The demands and prices have reflected a downtrend for modules and cells. It's estimated that wafer demand will begin to drop after China's national holidays in October, leading to lower prices. The next-round increase of the market demand will depend on whether China will lower the FiT for the distribution generation (DG) systems in early-2018. If the FiT will be lowered, there may be another installation rush in October, supporting wafer demands.

As the market has lower tolerance for module prices, many wafer makers still had to conduct the equipment upgrade when demand remains strong. They had to do so in case they have to lower the prices to maintain the competitiveness when demand weakens. In the latest capacity statistics, the proportion of diamond wire multi-Si wafers is expecting to reach more than 50%, a rise compared to July.

- GCL's polysilicon quality issues in early-August affected 40-50 million pieces of the wafer capacity. Currently, the production has been resumed. GCL still received more than 50 million pieces of orders in September.
- Longi is expecting to increase the prices in September. The average trading price may reach RMB 6.15/pc for 190 μm wafers and RMB 6/pc for 180 μm wafers. The overseas prices are expecting to reach US$ 0.82/pc for 190 μm wafers and US$ 0.8/pc for 180 μm wafers. Another leading mono-Si manufacturer Zhonghuan will release the prices in early-September.

It's projected that over 50% of the total multi-Si wafer capacity (nearly 44GW) will be switched to diamond wire sawing by late-2017. In the end of 2018.

Black Silicon Technology Status

	Additive Method	Wet Etching	Dry Etching
Cost Reduction of Diamond Wire Multi-Si Wafers	-6		
Cost Forecast of Black Silicon Technology	+0.5	+1.5	+4
Overall Cost Reduction	-5.5	-4.5	-2
Increase in Module Power Output	Almost flat	+1-3W	+3-5W
Power Output of 60-Cell Modules	265-270W	270-275W	275-280W
Status	Products using the additive method are often used in the production lines. Despite the lower cell efficiency and appearance issues that haven't been solved, under the circumstances where there are no extra equipment expenditures, companies that own power plants chose to consume their own productions. In order to lower the module costs to enter the emerging markets, some firms have increased their needs for DW wafers.	This technology is more complicated and has the problems of waste discharge. But as some leading manufacturers took the lead to implement it and the wet etching method has high cost effectiveness, many manufacturers still chose the wet etching method with module technologies to boost the module efficiency to more than 275W.	Expansive equipment and low production efficiency. Although efficiency increase is still the key to cells in the long run, the diamond wire sawing with lower costs is still the mainstream in the short run.
MP Manufacturers	Trina, JA, Hareon Solar, and DMEGC	CSI, BYD and GCL	JA Solar and Risen
Manufacturers About to Join	Many cell manufacturers	Jinko Solar and Suntech	Belight(OEM)

Diamond Wire Capacity Collection and Forecast of Multi-Si Wafer Makers

Company	Sep-17 Estimate	Dec-17 Target
GCL	180	300
Rietech	38	60
Konca Solar	30	50
Jingying Solar.	22	30
Meike Silicon	20	35
Huantai	15	30
Sornid	10	20
Yongxiang	10	15
Dahai	8	10
Others	180	270

(Mpc/month)

Cell:

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Appendices - I

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