Silicon Shortage Prompts Strategy Changes for Photovoltaic Industry

Booming global demand for solar energy has spurred a critical shortage of polysilicon used to make Photovoltaic (PV) cells, causing PV suppliers to realign their business structures and strategies and to seek alternative raw materials.

Global revenue for PV cells is projected to increase to as much as $22.1 billion in 2012, up from $9.6 billion in 2007, according to a preliminary forecast from iSuppli Corp.

By 2020, about 50,000 Megawatts worth of PV systems (MWp) will be installed annually, up by a factor of nearly 20 times from 2,538 MWp in 2007. MWp is a metric that measures the power output of solar cells. However, no market can expand so quickly without some growing pains, particularly shortages that can impact supply.

The global PV industry has the capacity to produce cells and modules that could generate far more electricity than can be supported by current supply levels for polysilicon. Production capacity limitations now are constraining polysilicon supply.

&quotPolysilicon shortages are driving prices up,&quot said Dr. Henning Wicht, senior director and principal analyst, MEMS and PV for iSuppli. &quotFor companies attempting to expand their PV fabs to meet rising demand, it’s becoming very difficult to secure low-priced silicon.&quot

Wicht noted that PV companies must pay polysilicon suppliers between 10 and 20 percent of their total contract costs up front to secure availability of the key raw material. &quotThis has made cost reduction mandatory for the PV industry,&quot he noted.

The shortages and the resulting rise in costs are forcing the PV industry to adopt more vertically-integrated structures, bringing production of polysilicon under their more direct control.

Examples of the trend include a joint venture between chemical company Degussa AG and PV product maker SolarWorld AG &#151 both of Germany &#151 to produce solar-use silicon. Furthermore, solar-cell-maker Q-Cells AG has entered into several joint ventures to secure raw materials, including polysilicon.

The silicon shortage also is driving the advancement of thin-film technologies that can act as the raw material for PV cells. Deposition of functional thin film layers for PV cells can be conducted on glass, steel or polymer foils, with no silicon wafers needed. Because of this, silicon cell manufacturers are investing in thin-film technologies in parallel with their expenditures on polysilicon.

This will cause the revenue market share of thin-film technologies to rise to 20 percent of the total PV market in 2010, up from 5 percent in 2007. Thin-film PV will grow by a Compound Annual Growth Rate (CAGR) of 70 percent from 2007 to 2010.

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