

Surviving the Solar Shakeout

Mort Cohen, MBA

RevGen Group

Mort.Cohen@RevGenGroup.com

Industry in Change

Economic Factors

- ▶ Silicon PV module supply far exceeding demand
- ▶ Oversupply creating price pressures that could result in module ASP between \$0.50/W and \$0.70/W
- ▶ Leading PV module suppliers suffering significant gross margin pressures
- ▶ More than 30 solar module companies have declared bankruptcy, stopped production, or cancelled expansion plans in the past year
- ▶ Installation companies benefiting from dropping module prices with lower all-in costs
- ▶ Levelized Cost of Energy (LCOE) for solar projects becoming more competitive with other forms of energy

Industry in Change

Regulatory Factors

- ▶ European countries reducing or eliminating Feed-in-Tariff (FIT) incentives
- ▶ US solar incentives being driven by state-instituted Renewable Portfolio Standards (RPS); approximately 30 states now have RPS requirements
- ▶ China RPS requires that 8% of energy come from non-hydro renewable energy by 2020; \$0.15/kWh FIT in place
- ▶ Japan instituting generous solar FIT incentive through March 2013 (\$0.53/kWh) to offset reduction in nuclear power and discourage oil imports
- ▶ Mainland Chinese-made modules being sold mainly outside US; Taiwan becoming significant source of Chinese-made modules for the US to circumvent US tariffs

Industry in Change

Energy Usage Factors

- ▶ De-emphasis of nuclear power in Japan and some European countries spurring more rapid installation of solar
- ▶ China is encouraging the use of renewable energy for rural areas
- ▶ South Africa, Brazil and Morocco are planning on increased use of renewable energy
- ▶ Decline in natural gas prices to \$2 to \$3 per MMBtu could have long term impact on the growth rate of solar in US

Solar Technology Outlook

	Trends	Outlook
Silicon PV	<ul style="list-style-type: none"> • Emphasis on lower manufacturing costs to maintain acceptable gross margins • Cell efficiency improvements being pursued • 2X to 10X concentration being pursued to improve system efficiency 	<ul style="list-style-type: none"> • Module oversupply will cause shakeout in number of PV module suppliers • Chinese module suppliers could hold >50% market share • Significant emphasis on reducing Balance of System and installation costs
Thin Film PV	<ul style="list-style-type: none"> • Narrowing of price advantage over silicon PV jeopardizing market share • Manufacturing plants closing to reduce fixed costs • Emphasis on lower manufacturing costs to maintain acceptable gross margins 	<ul style="list-style-type: none"> • Number of module suppliers will decrease • Larger suppliers such as First Solar, Solar Frontier, and TSMC likely to ride out downturn • Project-centric emphasis to maintain overall margins as module margins remain challenged
High Concentrating Photovoltaics (HCPV)	<ul style="list-style-type: none"> • Facing pricing challenges from dropping PV module pricing • Exploiting energy efficiency advantage to counter silicon PV price disadvantage • Focusing on lower installation costs 	<ul style="list-style-type: none"> • Number of CPV suppliers will decrease • Market focus on emerging countries such as South Africa, Chile, Mexico • Contract manufacturing to lower fixed costs
Concentrating Solar Thermal (CST)	<ul style="list-style-type: none"> • Number of utility-scale projects increasing in US and Spain • Long implementation cycles due to financing, permitting, and environmental issues 	<ul style="list-style-type: none"> • Steam generation and hybrid power generation (with natural gas) could be growth markets • Potential for growth in China, Middle East, Northern Africa, and Australia

Global Solar Capacity Outlook

Region	2010 Cumulative Capacity (GW)	2020 Forecasted Capacity (GW)
Europe	32	140
Asia	6	105
North America	2	75
Africa	Negligible	20
South America	Negligible	10

Source: European Photovoltaic Industry Association, 27th European Photovoltaic Solar Energy Conference, September 2012

Future Trends:

- Global solar capacity to increase by factor of 9 from 2010 to 2020
- European capacity to decrease from 80% to 40% of total by 2020
- North American capacity to experience greatest growth rate by 2020
- Asia, primarily China, will become second largest market
- Geographic diversification of PV will be more correlated to population

2012 Solar Landscape

Positives

- ▶ Solar-powered electricity generation now exceeds 40GW worldwide, and has recently been **growing nearly 30% per year**
- ▶ Solar module pricing has dropped nearly 65% in 18 months helping the industry move away from dependence on subsidies
- ▶ Average 2011 *pre-incentive* installed cost for German PV residential installations approached **\$3.00/W**, about one-quarter less than in 2010
- ▶ Solar installations increasing in North America and Asia alleviating downturn in Europe
- ▶ Newly installed solar capacity increased by >20% in the EU in 2011, more than natural gas or wind

Negatives

- ▶ Funding institutions performing greater due diligence due to shaky health of solar module providers
- ▶ Uncertainty exists on which module suppliers will survive the solar shakeout
- ▶ Module suppliers migrating toward more project-oriented business models creating serious competition in the integration/installation space
- ▶ California's Renewable Auction Mechanism (RAM) bids trending toward \$0.08/kWh creating serious PPA margin squeeze
- ▶ Despite impressive growth rates, solar production provides only 2% of total EU electricity needs

Sources: EU Joint Research Center, SEIA, European Photovoltaic Industry Association, Lawrence Berkeley National Laboratory, Greentech Media

Summary

- ▶ Solar industry is maturing, and only the strongest module suppliers will survive the shakeout
- ▶ Largest module suppliers moving into project development and integration to offset falling module margins
- ▶ By 2020, solar projects will spread around the world with Asia and the US representing more than half of all of the new installed capacity
- ▶ Power Purchase Agreements are the vehicle of choice for most large US solar projects; PPA rates are below \$0.10/kWh in some US regions and are trending lower
- ▶ By 2015, solar should be able to compete on price with other world energy sources in several regions of the world as module and installation costs continue to decrease, and conversion efficiencies increase

Sources: EU Joint Research Center, SEIA, European Photovoltaic Industry Association, California Solar Initiative, Greentech Media

Summary

The companies that will thrive in the solar industry will demonstrate the following characteristics:

- ▶ More system-oriented product offerings with higher system efficiencies
- ▶ Emphasis on lower fixed costs and more of a variable price model
- ▶ Innovative technology and installation approaches
- ▶ Willingness to participate in project development (land acquisition, project definition and deployment) either directly or through strategic partnerships
- ▶ Ability to sell, distribute, and support products worldwide
- ▶ Open to hybrid energy applications involving other forms of energy

The RevGen Group assists high technology clients to

- ▶ Bring products to market and through transitions in the life-cycle
- ▶ Develop business based on objective, customized intelligence
- ▶ Perform technology assessment and validation
- ▶ Manage due diligence

Fields of expertise:

- ▶ Solar energy
- ▶ Wireless communications
- ▶ PC software, Web 2.0, enterprise networking
- ▶ Semiconductor equipment and technology

We deliver:

- ▶ Advice, strategies, models and tools, alternatives
- ▶ Research, analysis, evaluation, validation
- ▶ Operational assistance