

Solyndra Privately Held

Developer and manufacturer of CIGS modules

Last updated: April 21, 2011

What you need to know

- o Cylindrical PV design specifically targets commercial flat-rooftop applications, and is selling to system integrators and installers, primarily in the U.S., Germany, and other EU countries
- o Simple mounting design reduces the combined BOS and installation labor cost by about \$0.40/W to \$1.00/W, as mounts and cable trays included with the panels
- o Has closed Fab 1, is currently ramping 300 MW Fab 2, and is in the process of moving tools over from Fab 1; expects 120 MW of 2011 production, exiting the year at close to 250 MW/year run-rate
- o Pulled IPO due to poor market valuations of solar companies and high costs; needs to draw another \$75 million from existing investors to continue ramp and drive cost reduction, and notes it has conditional commitments for funding at this time
- o Claims current total costs of \$3/W to \$4/W and cash costs below \$3/W – declining aggressively – but x-Si module prices a moving target; will need to attain cash costs below \$1.50/W as soon as possible to cover high depreciated capex burden
- o Company claims that it has a detailed cost reduction plan and that it is ahead of internal targets, but has offered little details on manufacturing yields and costs for competitive reasons; it will need to execute soon before existing investors grow weary

 **luxtake: caution**

Scorecard

Name	Score	Comment
Technology/solution value	3	Intelligently designed system reduces installation costs, but needs to prove low-cost manufacturability with high yields to be successful
Addressable market size	5	Commercial rooftop is estimated to be a \$30 billion market in 2015
Competitive landscape	2	Increasing number of commercially viable CIGS players emerging as x-Si panel prices continue to fall
Barriers to growth	2	Needs to bring down costs sharply and quickly while ramping production; in need of (another) cash infusion
IP position	4	Has four patents and more than 95 applications in the U.S. and abroad; CIGS space growing crowded, but its design is unique
Regulatory factors	5	Shaky solar subsidies continue to drive growth; ability to bundle "cool" roof subsidy a unique advantage
Management team	4	Management experience in the semiconductor and solar industry at companies such as Applied Materials
Partnerships	3	Signed contracts with major installers and integrators globally
Momentum	2	Pulled IPO and shuttering of Fab 1 have hurt the company's public perception; needs to execute and attain cash-flow positive quickly but growing installation volumes augur well for demand
Other	2	Company's future depends upon conviction of a few deep-pocketed investors

Ratings are on a 1 to 5 scale from 1 (very unfavorable) to 5 (very favorable). For full scorecard explanations, view this profile online at portal.luxresearchinc.com.

Key Metrics

Name	Category	Value	Date	Comments
Module cost	copper indium gallium diselenide	\$3.5- <i>\$4.5/Wpeak</i>	April 21, 2011	Cash cost provided by company at \$3/W to \$4/W; Lux estimate includes depreciated capex for consistency
Module conversion efficiency	copper indium gallium diselenide	10.25-10.5%	April 21, 2011	From 200 Series panel
Module nameplate capacity	copper indium gallium diselenide	300 MW	April 21, 2011	Fab 2 rated at 300 MW, but facility still coming online; Lux estimates operating at 100 MW annualized run-rate in Q2 2011

Italics indicate Lux Research estimated value

History

Solyndra was founded in May 2005 by Chris Gronet, who also developed the technology. Since the company's inception, it has raised roughly \$1.1 billion in financing from investors like Argonaut, Madrone Capital, and Virgin Green Fund. This briefing incorporates information gleaned from an onsite visit at Solyndra as well as several follow-up calls and information requests.

Technology

Solyndra's 1 m x 2 m panel consists of 40 photovoltaic tubes aligned in parallel and attached to the outer rack, but spaced a few centimeters apart (for a more detailed description of Solyndra's manufacturing process and panel design, see the [June 10, 2010 LRSJ](#)). However, since we last spoke, the company has introduced its 200 Series panel. These panels range up to 210 W per panel, or roughly 10.25% to 10.5% efficiency - with higher bins are expected in 2H 2010 - though if each cylindrical mini-module were unrolled it would produce at 15.0% to 15.2% efficiency. Further, the company has released detailed information on kWh/kWp performance, which shows that its panels perform similarly to x-Si at a slight angle, outperform in elevated temperatures and where typical panels get dirty, but slightly underperform optimally oriented x-Si panels (which sacrifice panel packing density to attain optimal tilt).

Further, since Solyndra is focused on flat, commercial and industrial rooftop applications, it has made further changes to the balance of system (BOS) components to reduce installation cost and improve addressable market size. For example, it has elevated the mounting structure to get over obstacles on the roof while optimizing the spacing between cells to improve energy yield. In addition, the 200 Series panels can install without tools, reducing installation costs. Lastly, with no ballast, no tools, and no roof penetrations, the company claims its panels are the most "roof compatible" on the market.

Since we last spoke, the company has shut down its 120-MW Fab 1 as falling crystalline silicon prices had made it uneconomical. However, it is in the process of ramping its 300-MW Fab 2 using a mix of new equipment and recaptured equipment from Fab 1. In addition to an improved process flow, Fab 2 requires one third the labor of Fab 1 due to reduced number of operators, cutting costs significantly. The cost of Fab 2 was roughly \$700 million, or \$2.33/W, not including equipment recovered from Fab 1. Currently, all of the company's production is coming from Fab 2 while Solyndra continues to move in the last pieces of equipment, eliminate variability in manufacturing, and get the installed lines running to full capacity. By year end 2011, Solyndra expects to be running at 250-MW nameplate capacity.

Strategy and markets

Solyndra is targeting its product solely for commercial rooftop applications, and has signed long-term contracts with installers and system integrators globally. Currently, its sales are roughly 60% in the EU and 40% in the U.S., but Karen expects that the U.S. will grow faster short-term, with CA, NJ, TX, OH, NY, and NJ leading sales. Further, the company sells limited product in Asia and Australia.

Since the last time we spoke, the company's management team has changed significantly including the addition of Brian Harrison as CEO, who brings considerable manufacturing experience from Intel, and a new sales and marketing team. The company has been investing significant resources in sales and marketing to build its sales pipeline and educate buyers on the company's unique value proposition. Its general strategy is to build relationships with strategic accounts, typically large corporations with significant amounts of owned roofspace and a commitment to sustainability - as well as governments and school districts.

Since 2008, Solyndra has installed roughly 1000 systems and shipped 1 MW in 2008, 30 MW in 2009, and 60 MW in 2010. In 2011, it anticipates shipping 115 MW from its currently ramping nameplate capacity of 300 MW - with actual production growing steadily from 15 MW in Q1 to over 50 MW in Q4. At this run rate, the company anticipates being cash-flow positive by year-end 2011, and the company stresses it expects its cash costs to fall below its pricing very soon. However, to execute on this, the company recently raised \$75 million in financing and expects to raise another \$75 million shortly from existing investors.

Key Issues

Key Issue: Total installed cost in commercial applications

What they said	What we think
<p>The team stressed that customers cite total installed cost for Solyndra systems at around \$4/W, comparing favorably to x-Si for rooftop applications.</p>	<p>Based on discussions with installers and project developers, due to continuing x-Si module price reductions, the typical x-Si commercial rooftop system today is generally on the lower end of \$4/W to \$5/W. Thus, Solyndra is certainly competitive here - especially due to labor savings on installation.</p> <p>However, Solyndra's intelligently designed system does have a number of other benefits that make an apples to apples comparison difficult. The ability to easily reconfigure or move the installation in case of roof repairs, non-penetrating mounts, and other features should save on long-term cost of ownership. More importantly, the system is designed to work well with white, "cool" roofing membranes - that currently have a 30% installation tax credit in the U.S. until 2016. That is certainly a big advantage for Solyndra, as that tax credit alone helps to finance the additional cost of its systems.</p>

Key Issue: Manufacturing costs and profitability

What they said	What we think
<p>Karen and David said that Solyndra's manufacturing costs are currently between \$3/W and \$4/W, including overhead and depreciated capital. On a cash basis, costs are currently under \$3/W and the company expects to be under \$2/W on a cash basis by year's end. Karen stressed that because Solyndra's panels include racking and wiring, and also significantly reduce installation time that the company commands a price premium over x-Si manufacturers - which Solyndra estimates at roughly \$0.70/W.</p>	<p>Total manufacturing costs between \$3/W and \$4/W are an encouraging sign, but the company still has a long way to go to be competitive with x-Si panels. This is certainly an improvement from the published numbers from the company's S-1 filing, which indicated an average COGS in 2009 of \$5.41/W and an estimated COGS in Q4 2009 of \$3.99/W (see the analysis in the June 10, 2010 LRSJ).</p> <p>To be competitive, Solyndra's average 2011 price needs to be between \$2.00/W to \$2.20/W, as we hear from x-Si vendors that they are seeing average 2011 pricing at \$1.50/W, combined with Solyndra's \$0.50/W to \$0.70/W price premium due to BOS component integration and labor savings. At below \$3/W cash cost today, Solyndra's costs are still likely higher than its price, but below \$2/W by year-end - it does indeed begin generating cash and is gross margin positive.</p> <p>However, profitability will require further cost reduction. The \$700 million, 300 MW Fab 2 is likely closer to \$900 million once the cost of reclaimed equipment from Fab 1 is factored in. Assuming that \$3/W capex and a 7 year depreciation timeframe yields roughly \$0.40/W in depreciated capex annually. Thus, to be competitive long-term, the company will need to drive cash costs well below \$1.50/W as soon as possible, and continue to drive down costs in line with x-Si players. We are still concerned about Solyndra's ability to do so and will continue to watch their progress on improving manufacturing yields and panel efficiencies as proxies for success on this front.</p>

Vital Stats

Statistic	Value	Date	Comment
Employees	1000	Mar 2010	
Revenue	<i>\$150 million</i>	2010	Estimate based off 2010 ASP of \$2.50/W and 60 MW of shipments
Cash	<i>\$25 million</i>	Mar 2011	Closed on \$75 million in financing in February 2011 but will need another \$75 million in mid 2011 to fund operating losses as it ramps and reduces costs
Profitable	No	Mar 2011	

*Italics indicate Lux Research estimated value***Key relationships**

Partner	Type	Importance	Comment
Geckologic	Customer	Minor	
Masdar Clean Tech Fund	Investor	Minor	
CMEA Ventures	Investor	Minor	
RockPort Capital Partners	Investor	Minor	
	Investor	Minor	
Redpoint Ventures	Investor	Minor	
US Venture Partners	Investor	Minor	
Phoenix Solar	Customer	Minor	Signed \$702 million contract from 2008 to 2012
Solar Power	Customer	Minor	Signed \$325 million contract from 2008 to 2012
	Investor	Minor	
Argonaut Partners	Investor	Major	
Madrone Capital Partners	Investor	Major	

Key competitors

Direct competitors: First Solar, United Solar Ovonic, Energy Photovoltaics (EPV), Miasolé, Honda Soltec, Sulfurcell, Solar Frontier, Nanosolar, HelioVolt

Analyst notes

- o The company's CIGS panels are IEC and UL certified.

Organization Information

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Stage of development: Scale

Technologies and materials: Copper indium gallium diselenide

Products: Solar modules

Processes: Co-evaporation

Applications: Commercial installations

Interviewed: Karen Alter (SVP Marketing), David Miller (Director, Marketing)

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