US Solar & Alternative Energy
Solar: Moving Downstream to Catch Bigger Fish

Equities

Americas
Electric Utilities

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Downward integration is the trend for large solar players

In the US and globally, many solar companies have vertically integrated in order to access different levels of the value chain. In the US, 3 of the 4 largest solar companies including Sunedison (SUNE), SunPower (SPWR), and First Solar (FSLR) started out as mainly solar equipment manufacturers, and gravitated toward project development and financing in order to obtain 'higher' margins and ownership stakes in projects to benefit from the recurring income flows. We see downward integration continuing as a trend, and believe the project development, installation, O&M, and financing spaces will become increasingly competitive – inevitably tightening margins. Most recently, we see Chinese panel manufacturer Canadian Solar's (CSIQ) trend towards integration via its acquisition of the Recurrent development platform as just the latest example. Given the limited barriers to entry on solar versus other energy development businesses, we argue structural returns in large-scale solar should prove – and are already – among the lowest in the energy space. We caution this among the defining differences between the MLP and YieldCo sectors is the underlying return profile of the assets. We suspect unlevered returns could continue to see pressure from the 7% range down into the ~6% range, in part due to the high leveragability and the cheap cost of debt financing.

What does this mean for the renewable developers today? Warning ahead

We remain constructive on the volume of near-term and longer-term renewable development opportunities, but suspect greater competition will eventually make its way into lower PPA prices for developers (effectively driving compression between the development return and YieldCo sell-down rates). That said, we see a real and persistent difference in the cost of capital between development projects and operating assets such that there will remain a meaningful difference. While YieldCo capital and similar strictly financial capital chasing renewables will drive a continued monetization premium, the like of have NEE suggested it would leverage the increasingly advantaged cost of capital of its YIeldCo, NEP to push to win a variety of deals. SUNE/TERP, NEE-NEP, and NRG-NYLD currently enjoy a competitive advantage in the low cost of capital available via their YieldCo partners, we expect to see developer margins decline from their high-teen to 20% historic range. Solar likely sees more of this compression rather than wind, providing a strong argument in favor of horizontal diversification across renewable development businesses, as evidenced by the SUNE-First Wind deal. We expect others with premium YieldCo intentions (eg- SPWR-FSLR) to follow their lead.

What does this mean? SUNE and NEE will beat others – but sacrifice margin

Amidst this rush to leverage their respective currencies, we see those with advantaged YieldCo's as likely widening their lead over peers in contract awards, just look for some margin pressure; thus far, return profiles for developers have not perceptively declined since YieldCo inception, but that may be about to change. With a slew of renewable contract wins expected in coming months ahead of the 2016 PTC & ITC expiration in the US, we suspect both of these companies to win *more* than their fair share of prospective contract awards. We reiterate our Buy ratings on both of these developers into the 1Q and 2Q award season. Expect constructive backlog updates from both.

Links to our relevant research are below:

Solar Valuations: Yield Rules

Pushing the Limits of Solar

The Next YieldCo: Charting New Waters

The State of the Jersey Solar Market

The Golden State Solar Net Metering Debate

Smaller companies have remained, focusing on local markets

While large players have moved downstream and taken major market-share, the 'tail' remains fragmented and is comprised of many small companies with local presences. These companies range from home-improvement groups with PV installation services, to residential and commercial project development/ lead generation companies. We believe there will continue to be a market for these players, and that they are prime acquisition targets for larger groups trying to expand their footprints into specific geographies. We emphasize the consolidation argument within the industry as among the most salient arguments for continued YIeldCo/parent outperformance. We suspect the slew of operating asset acquisitions could yet expand to include development platforms, and even other public companies.

Chinese companies follow US lead and are moving downstream

As discussed, US solar companies FSLR, SPWR, and SUNE have moved downstream to project development and are selling or retaining ownership of the developed projects. Now Chinese module manufacturers have followed suit and are leveraging their relationships to move into the development space as well.

Chinese module manufacturers claim that returns on projects based in China are very similar to US-based projects

CSIQ, Trina (TSL), Jinko (JKS), Renesola (SOL), Yingli (YGE) and JA Solar (JASO) have all developed completed projects or have project backlogs. The Chinese companies have primarily focused on the domestic market, Japan, and parts of Europe. CSIQ has developed several projects in Canada, but management now says that the market has dried up, so they are focusing on China and Japan in the near-term and Southern Europe in the medium-term.

Canadian Solar (CSIQ) claims that India and Brazil are trickier markets to navigate, particularly India as land ownership is a maze and ownership is difficult to prove. Financing costs have also bottlenecked in India, further hindering development. CSIQ also has been active in Central America, Mexico, and the US via its Recurrent acquisition (1 GW backlog with an option on 3 GW in early-stage pipeline). CSIQ appears poised to launch its own YIeldCo efforts, principally launched off the recurrent portfolio and a further 606MW portfolio of projects in development in Japan. This would be the first Chinese manufacturer pursuing a formal YieldCo vehicle, formalizing its efforts to move vertically.

Trina (TSL) has a smaller development reach, with a focus on China, Japan, and the UK, having developed roughly 340 MW globally, with 80% in China. They expect to develop 700-750 MW in 2015, heavily China weighted again. TSL holds the projects located in China, but sells the UK and Japan based assets. However, TSL also claims that it has been difficult to scale the development business because it is focused on midstream module manufacturing while avoiding poly production. We note that Average Sale Prices (ASPs) on Poly dropped from ~$200/kg to the high $20s/kg, damaging many of the upstream players, and leaving them with highly levered balance sheets. The high capital cost of going truly upstream into the

commoditized manufacturing space will likely limit efforts to go truly soup-to-nuts on full vertical integration. In contrast, the latest efforts to move downstream have substantially less upfront capital requirements, with development sites and local know-how the keys.

Moving upstream into poly has proven to be the downfall of many….

The drop in poly spot prices from ~$200/kg around 2008 to ~$20/kg today drove many manufacturers out of business

Trina (TSL) opted against going further upstream into poly manufacturing and believes that the high debt that YGE currently faces as well as the Suntech bankruptcy were caused by the huge price drop in the poly spot market. Building poly capacity requires significant investment, and margin compression has proven to be difficult for many players. TSL claims it is hard to compete with the pure-play poly manufacturers, who are more capable of dealing with the price drops as a result of the scale of their manufacturing. Several module suppliers have opted to partner with poly players (i.e. CSIQ & GCL-Poly) in developing solar cell manufacturing plants. SUNE is planning to exit one poly position in its planned Pasadena plant shutdown, but will replace the supply with the SMP manufacturing facility, a JV in South Korea, where it claims to be producing poly at $10/kg. Others like TSL are more comfortable purchasing poly in the market as they claim it makes up only ~20% of their total module costs.

….but nevertheless, SCTY is swimming upstream anyway

SCTY is building a 1 GW solar cell and module manufacturing plant in upstate NY, and expects to build one or more even larger plants in subsequent years.

SolarCity (NASDAQ:SCTY) turned heads with its acquisition of Silevo, a high-efficiency solar cell and module manufacturer for $168mn in stock, $23mn liabilities, and $9mn cash in 2014 , and the announcement of ambitious module manufacturing plans. The acquisition essentially made SCTY similar to the three other fully integrated US solar companies – SUNE, SPWR and FSLR and signaled the company's intent to become vertically integrated, confirming that its previous acquisition of Zep was not a one-off (see below).

However, as noted above, *the move is in stark contrast to SUNE,* who are downsizing their upstream solar semiconductor business. We expect SUNE to sell down its remaining shares in its now spun-off SEMI subsidiary in coming quarters in order to fund expanded working capital needs. They plan to only manufacture poly by ~2016 as they ramp down the Pasadena poly & wafer plant and will only remain in the manufacturing space through their JV in the SMP poly plant. Similarly, SPWR and FSLR are focusing more of their businesses on development and ownership of projects and less on manufacturing.

But is upstream integration the way to go? Not so clear

Currently, solar module manufacturing is a low-margin endeavor. With the number of voluntary and involuntary exits in the space over the course of the past year, SCTY's entrance is all the more intriguing. We see significant subsidies playing a large role in the decision to build a $900 Mn, 1-GW panel manufacturing factory in upstate NY, with ~$750 Mn in upfront defrayed costs from the state. Additionally, they plan to add one or multiple larger plants in the subsequent years. SCTY's bet is that they will achieve low costs as a result a scale and efficient manufacturing processes. At that rate, SCTY will compete with FSLR, SPWR, and a number of large Chinese manufacturers in the fight for market share and product efficiency, which could be a potentially risky prospect. Silevo notes that they currently have above 22% efficiency cells, with the headroom to reach 24% in the next few years. SPWR has announced efficiencies of roughly 21.5% with plans to reach 23% by 2015. They are also targeting 35%, but a timeline on this is not disclosed. Clearly, Silevo doesn't have a strong advantage on the efficiency front and faces fierce competition to create low cost/ high efficient modules in the future. As it is assumed that when the manufacturing plants are up and running SCTY will only be using Silevo panels in its systems, the efficiency and cost metrics will directly tie to their installation costs and thus their ability to maintain market share.

Furthermore, SCTY's earlier Zep acquisition strong-armed panel manufacturers looking to do business with SCTY into building Zep compatible modules. Given SCTY's market share, most manufacturers complied. Through its acquisition of Zep, SCTY was able to reduce its system installation costs via reducing racking installation costs (~40% of total residential installation costs). Also, through the use of Zep's system, a crew could install a 6-kW system 2-3X faster than through the use of conventional mounting. Nevertheless, the Zep deal still has its doubters, especially long term given the constant equipment changes in the rooftop racking space, and in comparison, the acquisition of Silevo seems all the more risky. Not only did SCTY move toward higher levels of vertical integration, they also entered a much more competitive, lower margin, and commoditized sector.

A downstream focus seems to add more value.

Our bias remains that others will *not* follow SCTY's integration up the supply chain, but rather the focus will be for manufacturers to integrate downwards given the lower barriers to entry on the development business model. We suspect this will be an additional source of competition as others continue to capitalize not just on the ~20% developer margins, but also on the potential valuation premium related to YieldCos.

Our bias remains that others will *not* follow SCTY's integration up the supply chain.

Why not keep your suppliers off-balance-sheet and let them compete?

SCTY's acquisition and future manufacturing projections are strong indications that they are looking to become autonomous in the panel manufacturing process in order to cut costs and increase product quality. It is less clear, however, why they are not willing to simply purchase the lowest priced modules, as well as let the incumbent panel manufacturers compete to produce panels with the highest efficiencies. Musk cites the need to build capacity as a result of the potential undersupply in the market over the next 10 years; while we readily acknowledge a risk of supply disruption in 2016 ahead of the ITC expiration cliff, we tend to see a surplus of supply overall. SCTY's undersupply bet depends on several unknowns,

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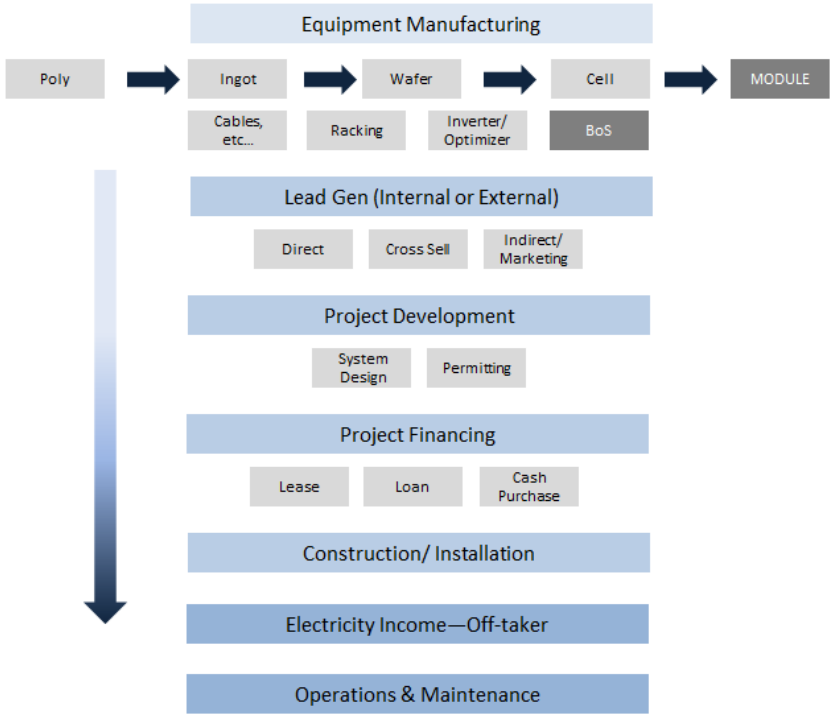
Given those factors, SCTY's decision to start manufacturing seems very risky, as many solar developers/ installers will be entering the space in the next ~5 years, and market share will largely be determined by installation costs.

Figure 1: Solar Vertical Integration Diagram



Source: UBS

How about upstream diversification into inverters?

Inverters and other specialty equipment may offer better prospects than poly or modules. We see new players entering the solar equipment manufacturing segment in the next ~5-10 years…but not in modules. Enphase (ENPH), SolarEdge (SEDG), and Tigo currently dominate the inverter, microinverter, and optimizer spaces, in what looks to be little competition in relation to the modules. We believe that on the residential side, microinverters could see new entrants in the next 5-10 years, becoming increasingly competitive, perhaps with lower-cost foreign operations.

Inverters and other specialty equipment may offer better prospects than poly or modules.

Residual Value: Contributing to Vertical Integration

The residual value or value of the solar asset late in the contract/ once the contract has expired is often overlooked, but potentially significant. The owner of the system keeps the residual value, so, for example with SCTY, in a lease contract SCTY retains the residual value, but under a loan product the customer does. The residual value is mainly generated in 3 capacities: by reselling the equipment to be used in another system, keeping the system and continuing to generate electricity (renewal of a lease – most common), and by selling the scrap metal at market value (at ~MW scale this can actually provide value). All methods of retaining residual value result directly from the performance/ condition of the equipment at the end of the contracted/ warrantied lifespan.

SCTY's plan to become vertically integrated and control the quality of their products seems to directly tie to the residual value discussion. In this sense, the condition of the equipment can either help or hurt SCTY's ability to add ~10 years via a renewal onto a lease contract. Replacing damaged equipment can take away from the residual value.

The condition of the equipment can either help or hurt SCTY's ability to add ~10 years via a renewal onto a lease contract

What's our bias on residual value?

We think residual value is quite real. For residential systems, we're biased to believe that the cost of removing systems and installing alternate operations will be 'too much' to ask of homeowners. Rather, the question to us really revolves back to the underlying quality of the rooftop involved and the extent to which a fix will be needed. Many developers and installers require that a roof be 7+ years away from a replacement before equipment is installed. Others are less picky, as a roof replacement will result in the solar equipment being disassembled and reinstalled, benefiting the installer.

In-house O&M incentivized by residual value

Introducing an in-house servicing business benefits a company twofold:

1. **Consistent revenue streams**, roughly $0.02/kW reflects significant value for companies with large portfolios. Allowing a third party to service projects leaves $ on the table.

2. **More control in residual value –** through maintaining projects in-house, companies have a much firmer understanding of the shape projects are in, and are able to service the projects according to their own standards. In many markets, it is believed that projects that are built correctly and with high-quality equipment will be productive for far greater than 25-30 years. Even over the course of 40-50 years, the only equipment that will be necessary to replace are the modules and inverters. Project owners are incentivized to keep their assets productive for as long as possible and offering O&M services is a great way to retain productivity.

Avoiding integration: Channel partnerships are still common practice

Just Energy's decision earlier this year to act solely as an originator of residential solar deals underlines the other business model: networking with partners while focusing on a niche, rather than attempting to tap the entire chain. Just Energy instead formed a partnership with Clean Power Finance, which will act as the financier and installer of the projects. Many of the smaller players will continue to streamline their businesses and focus on their strengths while looking to partnerships to overcome weaknesses. We believe that solar development space will continue to be largely fragmented, with a handful of players maintaining hefty market shares, but a large 'tail' of smaller regional teams picking off deals and sticking around. These small players can be seen as prime targets for companies looking to expand into specific regions. Direct Energy's acquisition of Astrum can be a larger-scale example of this, as Astrum had a solid presence in the Northeast and DE was looking to develop a solar pipeline in this region. Astrum wasn't able to develop further without a capital injection, which made the DE acquisition a favorable outcome for both parties. Given SUNE's continued expansion into the development business, we suspect this could yet continue via the acquisition of developer platforms.

We see owning the customer as the key value proposition

We suspect SUNE may reconsider its decision to simply partner as it seeks to control more of the value.

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Source: UBS. Rating allocations are as of 31 March 2015.
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UBS Securities LLC: Julien Dumoulin-Smith; Michael Weinstein; Paul Zimbardo.

Company Disclosures

Company Name	Reuters	12-month rating	Short-term rating	Price	Price date
NextEra Energy[2, 4, 6, 16]	NEE.N	Buy	N/A	US$103.29	22 Apr 2015
SunEdison Inc.[13, 16]	SUNE.N	Buy	N/A	US$27.27	22 Apr 2015

Source: UBS. All prices as of local market close.
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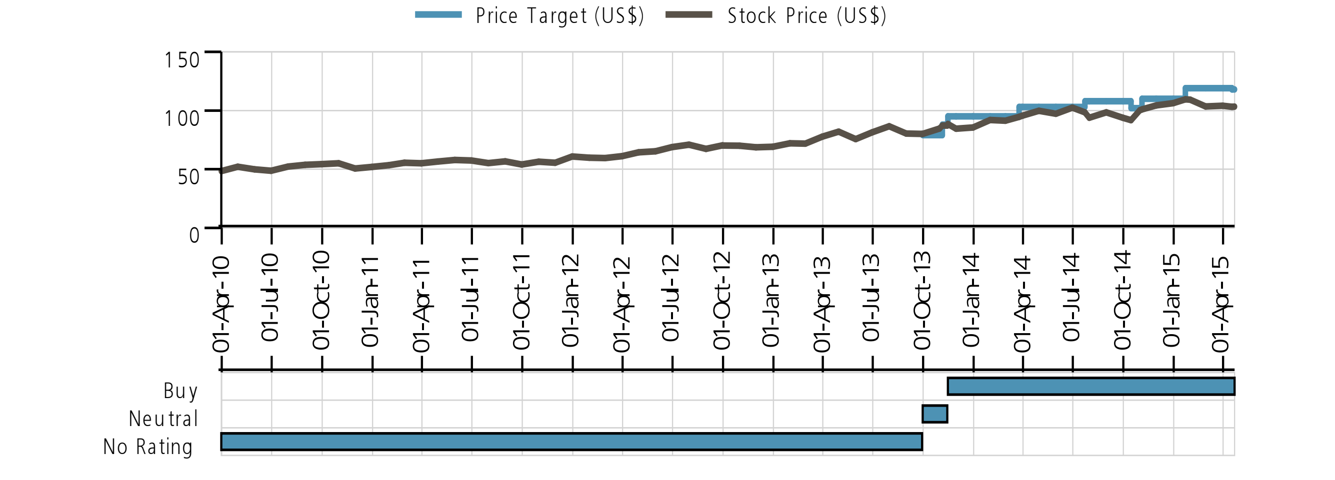
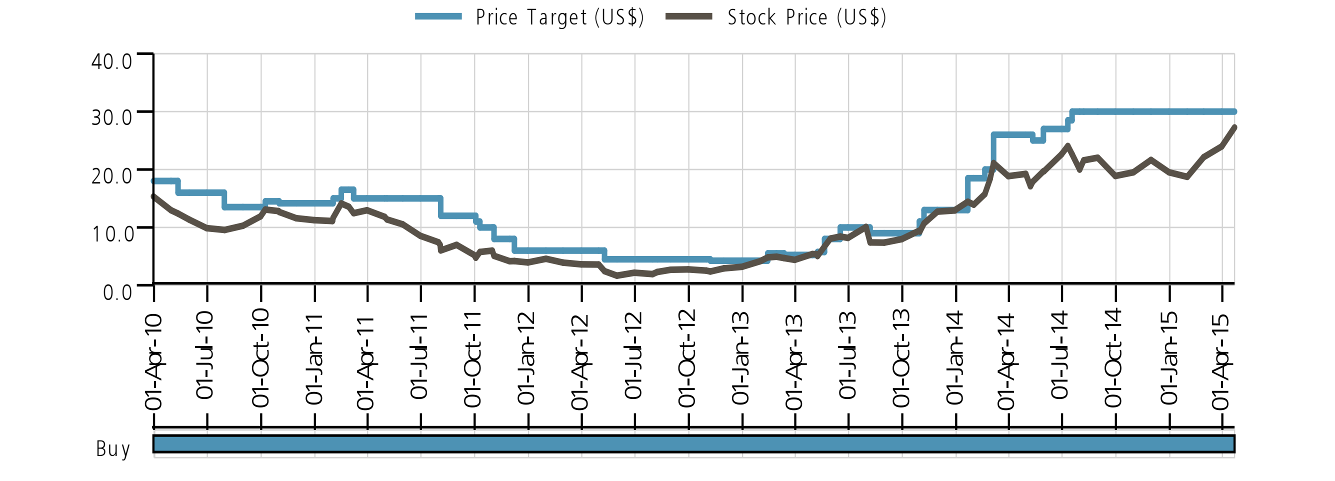


Source: UBS; as of 22 Apr 2015

SunEdison Inc. (US$)



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