

SOLAR ANNUAL 2015 Hunger Games

Photon
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EXECUTIVE SUMMARY*



**Solar Annual 2015:
Hunger Games**

**Winner-take-all
battle quickly
approaching in local
markets**

Warriors in the solar power sector realize that their battlefield is expanding to include traditional electricity. Solar companies are being pulled into an increasingly complex battle by attractive operating profits, especially close to end-customers on the turf of traditional utilities. Overall, the sector is poised for expansion with installations growing from 47GW in 2014 to 57GW in 2015 and 65GW in 2016 and revenue pool increasing from \$120bn in 2014 to \$136bn in 2015 and \$149bn in 2016. Profit growth is even faster, with sector operating profit growing from \$11bn in 2014 to \$16bn in 2015 and \$17bn in 2016, and sector operating margins expanding from 9% in 2014, 11% in 2015 and 12% in 2016. Within this expanding profit pool, most profit and the highest margins are being captured close to end-customers, drawing more players toward more local markets.

The pull of solar companies toward end-customers is being augmented by a financing value pool that is much larger and stronger than the operating profit pool of the supply chain. In 2015, there is \$136bn of financing for new solar power systems. This financing pool averages an 11.9% unlevered pre-tax IRR including 695-basis point spread of IRR over discount rates. This translates during the life of these systems to \$407bn in financing cash flows with \$237bn of spread above the cost of capital (i.e., NPV). Since 2008/2009, the amount of money searching for long-term dependable yields has exploded, providing ample capital for opportunities with favorable risk/return profiles. The emergence of vehicles to securitize lifetime cash streams of solar systems, the immediate lock-in of financial value and further compression in capital cost together pull solar players closer to end-customers and financiers. Overall, well-positioned solar companies have profitable prices and much larger financial returns by providing end-customers with more value.

Of course, solar's growth takes volume, revenue and cash flow from traditional electricity and creates downside risk for solar power. Similar to historical PV patterns (observed in Spain, Czech Republic, Italy, Germany, Greece, etc.), other markets are reaching the pain point for traditional electricity companies to fiercely react against solar. In the next few years, Australia, Bulgaria, California, Japan, Nevada, Romania and other markets will saturate. The result will be turbulence for the solar sector, with revenue pool declining -15% YoY in 2017 and -4% YoY in 2018, operating profit pool decreasing -43% YoY in 2017 and -25% YoY in 2018 and operating margin compressing to 8% in 2017 and 6% in 2018. Yet declining solar prices combined with rising grid prices will enable average unlevered pre-tax IRRs to remain >12% including >600 bps of spread above discount rates. As financiers get more comfortable in new segments and markets, solar adoption may accelerate in many markets. As a result, financiers will continue to capture very large financing pools (>\$370bn/year in 2017-2018 including >\$200bn/year above the cost of capital).

Outlook for the solar sector (2013 to 2018)

	2013	2014	2015	2016	2017	2018
Global installations (GW/yr)	41	47	57	65	61	62
Average Chinese module price (\$/W)	\$0.66	\$0.67	\$0.66	\$0.63	\$0.54	\$0.47
Global revenue pool (\$bn)	\$114	\$120	\$136	\$149	\$126	\$121
Manufacturing operating profit pool (\$bn)	-\$6	\$0	\$3	\$5	\$1	-\$1
BOS and trading operating profit pool (\$bn)	\$11	\$10	\$12	\$12	\$9	\$9
Global system operating profit pool (\$bn)	\$5	\$11	\$16	\$17	\$10	\$7
Manufacturing operating profit margin (%)	-18.9%	-1.1%	8.0%	10.2%	2.5%	-4.3%
BOS and trading operating profit margin (%)	13.1%	12.6%	12.7%	12.0%	9.8%	9.7%
Global operating profit margin (%)	4.6%	8.7%	11.4%	11.6%	7.9%	6.1%
Global weighted average IRR (%)	11.9%	11.8%	11.9%	11.9%	12.1%	12.3%
Global weighted average spread above discount rate (%)	7.1%	6.9%	6.9%	6.8%	6.6%	6.6%
Financing payments over life of new systems (\$bn)	\$340	\$357	\$407	\$441	\$380	\$372
Present value of financing over life of new systems (\$bn)	\$203	\$209	\$237	\$255	\$208	\$200

Source: PHOTON Consulting, LLC. *Note: All data are rough estimates and are subject to change.

Fight for monopoly with multifaceted competitors will change many local electricity markets around the globe

Diverse competitors are being drawn to the global electricity arena as a combined result of the call by end-customers for increased value, the vulnerability of traditional electricity companies and the massive available pool of capital from financiers searching for returns/yield. Solar companies, traditional electricity suppliers and other combatants (players from natural gas, mobile telecom, building security, storage and other industries) are all responding to the battle cry. This is setting the stage for an intricate, dangerous *Hunger Games* with fight-to-the-death competition emerging in local markets as a diverse set of competitors (many from outside the solar sector) attempt to displace existing monopolists. Through 2018, the defining theme for solar companies around the globe is the need to aggressively move into local markets to fight against established and new competitors wielding old and new weapons. Already, this battle is raging in a broad set of countries including Germany and Japan, with similar *Hunger Games* starting before 2018 in Australia, California and several other markets.

Our previous report, *Solar Annual 2013: Build Your Empire*, was a how-to guide for solar power executives to secure defensible positions in turbulent local markets. This year's report, *Solar Annual 2015: Hunger Games*, is a deeper dive into the intensifying battle for local market power. The core theme of *Solar Annual 2015: Hunger Games* is the rising intensity of local market battles. Within this theme are four key sub-themes:

- (1) Stronger solar profitability pulling more players downstream near end-customers
- (2) System financing value pool much larger and stronger than supply chain operating profit pool
- (3) More strain for traditional electricity players
- (4) More competitors fighting in local electricity markets

Solar Annual 2015: Hunger Games tracks the progress and forecasts the potential of >60 warriors from the solar power sector and other industries fighting for victory in local electricity markets. These potential victors include: ABB, Astronergy, Canadian Solar, CLP, Datang, Duke, DuPont, EDF, Enphase, First Solar, Flextronics, GCL, GDF Suez, Goldman Sachs, Google, Guodian, Hanergy, Hanwha Group, Hareon Solar, Hawaii Electric, Huadian, Huawei, Jinko Solar, John Hancock, L&T, Lanco, Manulife, MetLife, MidAmerican Energy, Nari Group, Norfund, NRG, NTT, OCI, Origin, Osaka Gas, Panasonic, PG&E, REC Solar, Reliance, ReneSola, Sabic, Saudi Aramco, Scatec, SFPV, Shoals, SMA, Softbank, Solar Frontier, SolarCity, Southern California Edison, Sterling & Wilson, SunEdison, Sungrow, SunPower, Talesun, Tata Power Solar, Trina, United Photovoltaics, Vivint Solar, Wacker, West Holdings and Yingli. **Learning from the successes and failures of these companies is essential for any business leader seeking victory in the complex contours of local energy markets.**

Potential victors (Examples)

ABB	Hanergy	NTT	Solar Frontier
Astronergy	Hanwha Group	OCI	SolarCity
Canadian Solar	Hareon Solar	Origin	Southern California Edison
CLP	Hawaii Electric	Osaka Gas	Sterling & Wilson
Datang	Huadian	Panasonic	SunEdison
Duke	Huawei	PG&E	Sungrow
DuPont	Jinko Solar	REC Solar	SunPower
EDF	John Hancock	Reliance	Talesun
Enphase	L&T	ReneSola	Tata Power Solar
First Solar	Lanco	Sabic	Trina
Flextronics	Manulife	Saudi Aramco	United Photovoltaics
GCL	MetLife	Scatec	Vivint Solar
GDF Suez	MidAmerican Energy	SFPV	Wacker
Goldman Sachs	Nari Group	Shoals	West Holding
Google	Norfund	SMA	Yingli
Guodian	NRG	Softbank	Your company?

Source: PHOTON Consulting, LLC. Note: All data are rough estimates.

60+ potential victors emerging including many from the solar power sector