U.S. SOLAR MARKET INSIGHT

REPORT | Q3 2011 | EXECUTIVE SUMMARY

SEIA Solar Energy Industries Association®

GTM RESEARCH A Greentech Media Company

3RD QUARTER 2011: EXECUTIVE SUMMARY

Figure 1-1: U.S. PV Installations, 2010-Q3 2011

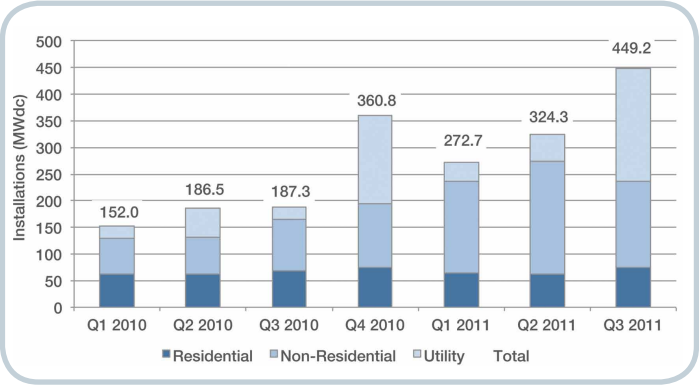

Figure 1-2: Q3 2011 PV Installations by State

SAMPLE FIGURES

Rank (Q3 2010)	State	MWdc
1 (1)	California	196.7
2 (2)	New Jersey	64.6
3 (12)	New Mexico	
4 (4)	Arizona	
5 (5)	Pennsylvania	
6 (11)	North Carolina	
7 (6)	Colorado	
8 (8)	Massachusetts	
9 (10)	Hawaii	
10 (7)	New York	
11 (17)	Nevada	
12 (22)	Tennessee	
13 (13)	Maryland	
14 (15)	Texas	
15 (9)	Oregon	
16 (20)	Delaware	
17 (18)	Wisconsin	
18 (19)	Washington	
19 (16)	Connecticut	
20 (3)	Florida	
21 (14)	Ohio	
22 (21)	Illinois	
Total		449.2

Complete Dataset by Market Segment Available in Full Report

1 INTRODUCTION

Through the third quarter of 2011, the U.S. solar market installed more than 1 gigawatt (GW) of grid-connected photovoltaics (PV) on the year, far surpassing the 2010 annual total of 887 megawatts (MW). The third quarter of 2011 was also the largest quarter for installations ever seen in the U.S., supported by utility-scale project completions and rapidly declining prices for PV modules.

Module prices have plummeted due to massive oversupply on a global scale. This is a result of tepid demand in leading European markets combined with substantial manufacturing capacity expansions. While this has been a boon for domestic installations, it has also resulted in an extraordinarily difficult year for PV manufacturers worldwide.

In addition to uncertainty surrounding module pricing, the 1603 Treasury Program is scheduled to expire at the end of the year. Unless the program is extended, we anticipate a tax-equity bottleneck in 2012, stifling some large-scale utility, commercial, and third-party owned residential projects.

In short, the U.S. PV market continues to boom, but considerable risks lie ahead. This report captures and analyzes trends in the U.S. solar market and seeks to demystify the current landscape for U.S. solar installations.

KEY FINDINGS:

Photovoltaics (PV):

- Grid-connected PV installations in Q3 2011 grew 39% over Q2 2011 and 140% over Q3 2010 to reach 449.2 MW, making it the largest quarter in the history of the U.S. market.
- More than 1 GW of PV was installed in the first three quarters of 2011, the first time the U.S. has surpassed 1 GW annually.
- Cumulative grid-connected PV in the U.S. has now reached 3.1 GW, which is ten times the size of the U.S. solar capacity in 2005.
- After two quarters of consecutive declines, the residential market grew 21% over Q2 2011.
- The utility market alone installed over 200 MW in Q3 2011, more than the entire market in every quarter through Q3 2010.
- The non-residential market shrank substantially in Q3 2011 as a result of downturns in California, New Jersey, Pennsylvania and Arizona.
- Major questions remain regarding the shape of the 2012 market, including the impacts of the potential 1603 Treasury Program expiration, potential import duties on Chinese cells/modules, and whether module prices will continue to fall.

U.S. Solar Market Insight™ is a quarterly publication of the Solar Energy Industries Association (SEIA)® and GTM Research. Each quarter, we survey nearly 200 installers, manufacturers, utilities, and state agencies to collect granular data on photovoltaic (PV) and concentrating solar power. These data provide the backbone of this Solar Market Insight™ report, in which we identify and analyze trends in U.S. solar demand, manufacturing, and pricing by state and market segment. We also use this analysis to look forward and forecast demand through 2015. As the U.S. solar market expands, we hope that Solar Market Insight™ will provide an invaluable decision-making tool for installers, suppliers, investors, policymakers and advocates alike.

See the back cover of this report for more information.

Concentrating Solar Power (CSP and CPV):

- Financing was secured in Q3 for four concentrating solar projects representing over 600 MW of capacity.
- Over 1,200 MW of concentrating solar projects are under construction.
- A project pipeline of over 4,000 MW of concentrating solar projects with signed PPAs is down from 6,000 MW as the pipeline of one the major CSP developers was sold and will switch to PV.

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2 PHOTOVOLTAICS

Photovoltaics (PV), which convert sunlight directly to electricity, continue to be the largest component of solar market growth in the U.S.

2.1 INSTALLATIONS

The U.S. installed 449.2 MW in Q3 2011, up 39% over Q2 2011 and 140% over Q3 2010. This makes Q3 2011 the largest quarter in the history of the U.S. PV market, surpassing Q4 2010 by nearly 90 MW. Still, growth across market segments was anything but uniform. While the utility market installed more than ever before, the residential market grew incrementally and the non-residential market shrank to the lowest level since 2010.

Today, the U.S. market faces more uncertainty than at any time in recent history. On one hand, module prices are falling precipitously and system prices have never been lower. On the other hand, the market faces substantial risks in the form of legislative, financing, political, and market barriers. We identify three key questions facing the market:

1. **With major markets trending downward, how much can emerging state markets ramp up?**

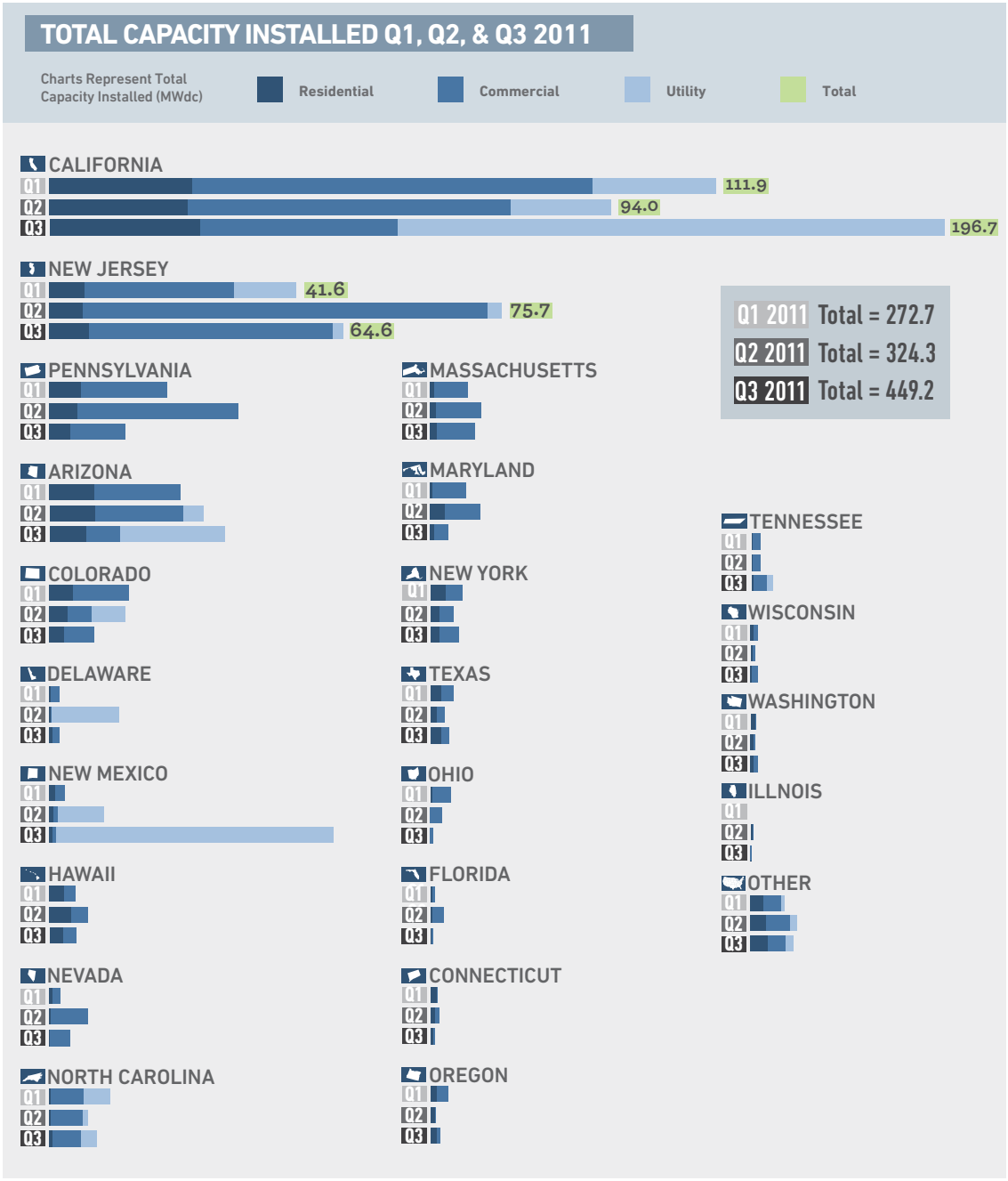
   The commercial markets in California, New Jersey, and Pennsylvania shrank in Q3, and our expectation is that the trend will continue at least through Q4 (and likely longer in New Jersey and Pennsylvania). Given that those states comprised well over 50% of installations in the first half of the year, overall market growth will necessitate substantial demand pick-up across a number of secondary states. In particular, we are closely watching trends in Massachusetts, Colorado, Ohio, Tennessee, and Hawaii – all of which could be near-term growth markets.

2. **What will be the impact of potential 1603 cash grant expiration?**

   As the year-end 2011 expiration date of the Section 1603 Treasury Program approaches, its impact remains somewhat undefined. Assuming no extension, the standard line of reasoning would suggest that the impact will be threefold. First, shipments into the U.S. will jump in Q4 2011 as a result of developers hoping to qualify for the 5% safe harbor provision. Second, installations in Q1 and Q2 2012 will also be propped up as those safe-harbored projects reach completion. Third, the market will ultimately face a tax equity bottleneck in 2012 for new projects, and a slowdown in installations could be felt as early as Q3 2012 for commercial projects and into 2013 for utility projects.

   However, the devil truly is in the details; the Full Report provides a much more in-depth discussion of the implications associated with the expiration of the Section 1603 Treasury Program.

Figure 2-1: State-Level Installations



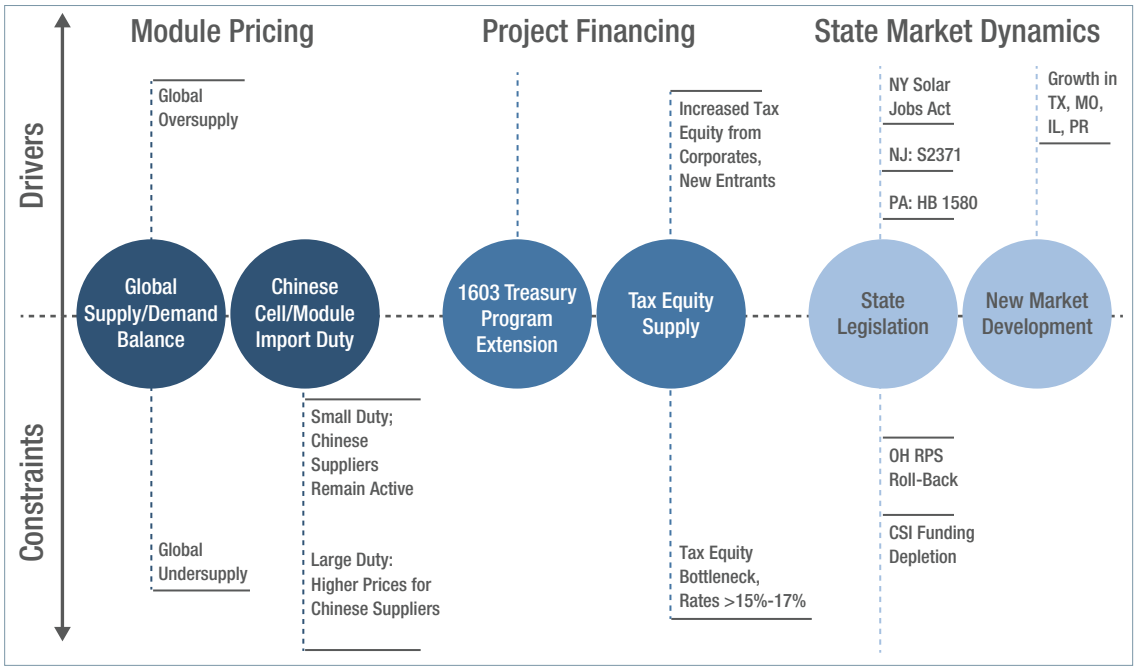
Note: Underlying Data Available in Full Report

3. How will the trade petition impact market dynamics, both in the immediate term and if duties are ultimately imposed?

Adding to the uncertainty already facing the U.S. market, there is the potential imposition of import duties on PV cells and modules originating in China. To briefly recap the issue: SolarWorld Americas, Inc. and six other unnamed petitioners, representing the newly formed Coalition for American Solar Manufacturing (CASM), filed a petition with the U.S. International Trade Commission and the Department of Commerce on October 19, 2011. The petition alleges that Chinese manufacturers of crystalline silicon photovoltaic cells have benefitted from unfair government subsidies and that they have been "dumping" product into the U.S. market. It asks for the imposition of import duties of 100% or more on the wholesale cost of Chinese cells and modules. There are two questions to be asked here in relation to both the upstream and downstream segments of the U.S. solar market: one, what will be the near-term impact as the process plays out, and two, what would be the longer-term impact if tariffs are ultimately imposed? Additional detail surrounding the trade case is available in the full report.

The makeup and size of the U.S. market in 2012 is a moving target. A number of factors that are currently in flux could substantially impact market growth for next year. We divide those factors into three major categories, with two subcategories in each. Figure 2-2 contains our assessment of the potential impact (positive or negative) that these factors could have on demand.

Figure 2-2: The Spectrum of Possibilities for 2012



Note: Full Report Contains Discussion of Each Element

After 2012, the market is even more difficult to predict, particularly in light of potential tariffs on Chinese cells/modules. The impact of these tariffs would depend on their magnitude; small tariffs might have a negligible market impact, while large tariffs would drastically alter the makeup of the supply picture. In addition, by 2013 the larger Chinese manufacturers would have time to shift some manufacturing capacity to other countries (Taiwan, Philippines, Malaysia, and the U.S. are all possibilities) and continue serving the U.S. market.

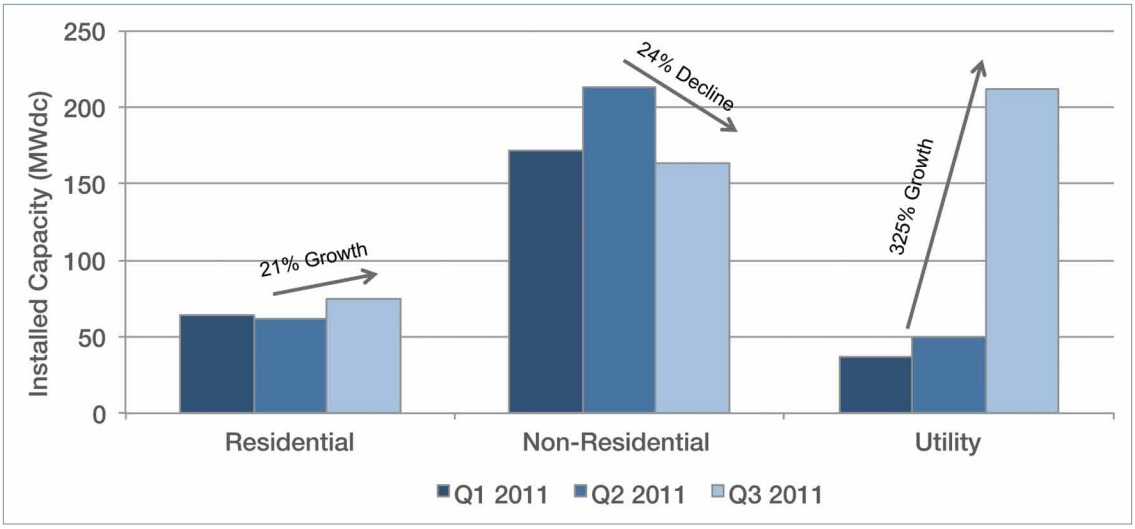
In recent years, the U.S. market has been driven primarily by the non-residential sector, which accounted for over 50% of total installations through 2008. However, the utility sector has been gaining ground (28% market share in 2010) while residential remained relatively steady around 30% of total installations. In the longer term, the U.S. market has the potential to share three vibrant, growing market segments, each contributing a meaningful share of total demand.

Residential installations grew 21% quarter-over-quarter in Q3 2011. After two consecutive quarters in which the residential market shrank, this should be considered a highly positive sign. Most of this growth came from California, where installations jumped from 23 MW in Q2 to 33 MW in Q3. As in previous quarters, third-party owned systems continued to grow. However, in Q3 the direct-ownership market also drove growth, breaking from the trend throughout the rest of 2011.

Non-residential installations fell 24% in Q3 2011. While this may be surprising on its surface, the drastic decline in non-residential installations is reasonable when considered as largely a result of the four largest non-residential state markets all shrinking simultaneously. The near-term outlook for the non-residential market remains mixed. On one hand, the rush to safe harbor projects to qualify for the 1603 Treasury Program will likely lead to a surge in installations in early 2012. On the other hand, major markets such as New Jersey and Pennsylvania remain heavily oversupplied with little prospect for a recovery in 2012.

Utility installations grew 325% over Q2 2011, by far the largest growth of any segment. In total 23 utility projects were connected in Q3, the largest of which occurred in Arizona, California, and New Mexico. Over 500 MW of utility PV is currently under construction in the U.S. with expected completion dates of 2011 or early 2012.

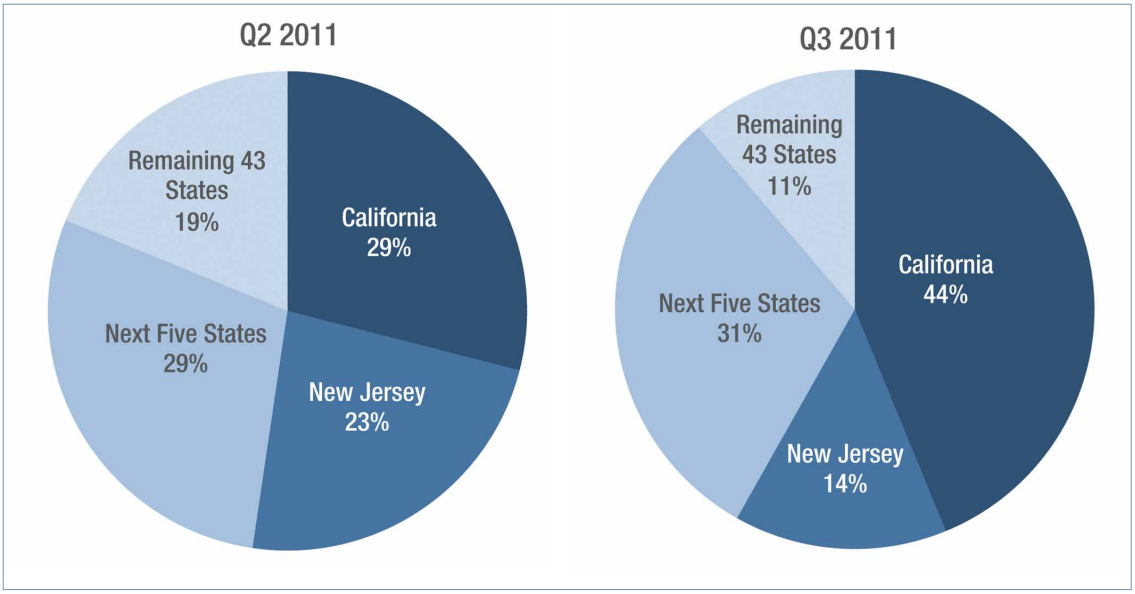
Figure 2-3: U.S. PV Installations by Market Segment, Q1 2011 - Q3 2011



Note: State-by-state market segment data is available in the full report.

The U.S. PV market remains relatively concentrated in a few key states, although the market has been experiencing rapid geographic expansion over the past few years. Whereas California accounted for around 80% of total installations in 2004-2005, by 2010 it was less than 30% of the national market. Figure 2-4 examines the state of market diversification. California's market share in Q3 increased to 44% as a result of its strong showing in utility installations. Meanwhile, New Jersey lost substantial share as its market shrank while the rest of the national market grew. On the whole, the top seven states increased their share from 81% in Q2 to 89% in Q3.

Figure 2-4: PV Installations Breakdown by Major Market, Q2 2011 vs. Q3 2011



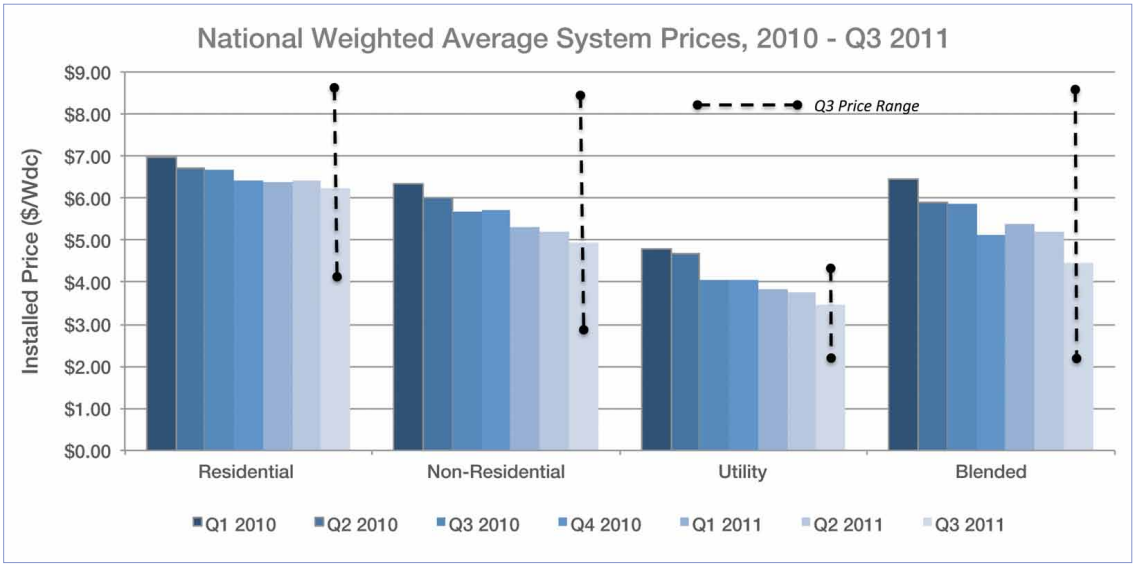
2.2 INSTALLED PRICE

Quarter-over-quarter, the national weighted-average system price fell by 14.4% from Q2 2011 to Q3 2011, from $5.20/W to $4.45/W. The average price is heavily impacted by the large volume of utility-scale systems installed July through September. It should be noted that prices reported in this section are weighted averages based on all systems that were completed in Q3 in many locations. State-by-state data is available for each market segment in the full version of the report.

- **RESIDENTIAL** system prices fell by 2.7% from Q2 2011 to Q3 2011, with the national average installed price decreasing from $6.41/W to $6.24/W. This is largely a result of price decreases in major markets, including California, Colorado, New Jersey and Pennsylvania, but costs did generally fall across the board. It was not uncommon to find residential systems being installed for less than $5.00/W in major markets. A significant residential price driver, as we will see in other market segments, has been falling module costs. Though it has taken longer for these falling costs to affect the residential space, it is likely that large installers have been utilizing cheaper modules in major markets. While module cost decreases have affected the overall residential installed price, reducing non-component costs associated with residential systems could bring down average system prices even further.
- **NON-RESIDENTIAL** system prices fell by 4.9% from Q2 2011 to Q3 2011, from $5.20/W to $4.94/W. As on the residential side, major markets factored heavily into this change. Arizona, California, Massachusetts, New Jersey and Pennsylvania all saw significant decreases in installed costs. The latter three states had averages below $5.00/W. Plummeting module prices were certainly a key component in these prices drops, but increasingly aggressive bidding was a factor, as well. With SREC prices falling in some major East Coast markets, developers must continually lower quotes to keep projects attractive to investors. Similarly, in California, developers have been bidding lower and lower to make projects feasible outside of the CSI program, for which payments have been significantly reduced. In some cases, these payments are no longer necessary to finance a project.

  Other cost improvements come via streamlining project development and installation procedures. Many panel suppliers have been adopting integrated or modular racking systems. These systems significantly reduce installation time and effort, thus cutting costs. This streamlining of processes, coupled with declining module costs, will affect market dynamics through the end of 2012.
- **UTILITY** system prices declined for the seventh consecutive quarter in a row, dropping from $3.75/W in Q2 2011 to $3.45/W in Q3 2011. This 8% reduction in installed prices is a direct result of historically low domestic module prices, especially when purchased in large quantities, and more efficient project development and construction processes.

Figure 2-5: National Weighted Average System Prices, 2010-Q3 2011



2.3 MANUFACTURING

In general, the persistent global wafer, cell, and module oversupply and inventory buildup have had the following impact on manufacturers:

1. Starting in Q3, plant utilization rates have been lowered significantly.
2. Significant amounts of existing capacity have been taken offline, either temporarily or permanently. In conjunction with this, a number of firms have announced worker layoffs.
3. For the most part, capacity expansions that were planned for 2011 and 2012 have been placed on hold, postponed, or canceled.
4. In an attempt to generate short-term cash flow and stay solvent, many lower-tier manufacturers have been selling products on the spot market at prices below cash costs, which has placed more established producers, especially those in high-cost locations, under severe pressure. The free-fall in prices has resulted in significant margin erosion and heavy net losses for most manufacturers in Q3; wafer and cell firms have been most adversely affected, although module manufacturers have struggled as well.
5. Some less competitive plants have been closed, and a number of smaller, less established firms have exited the market.

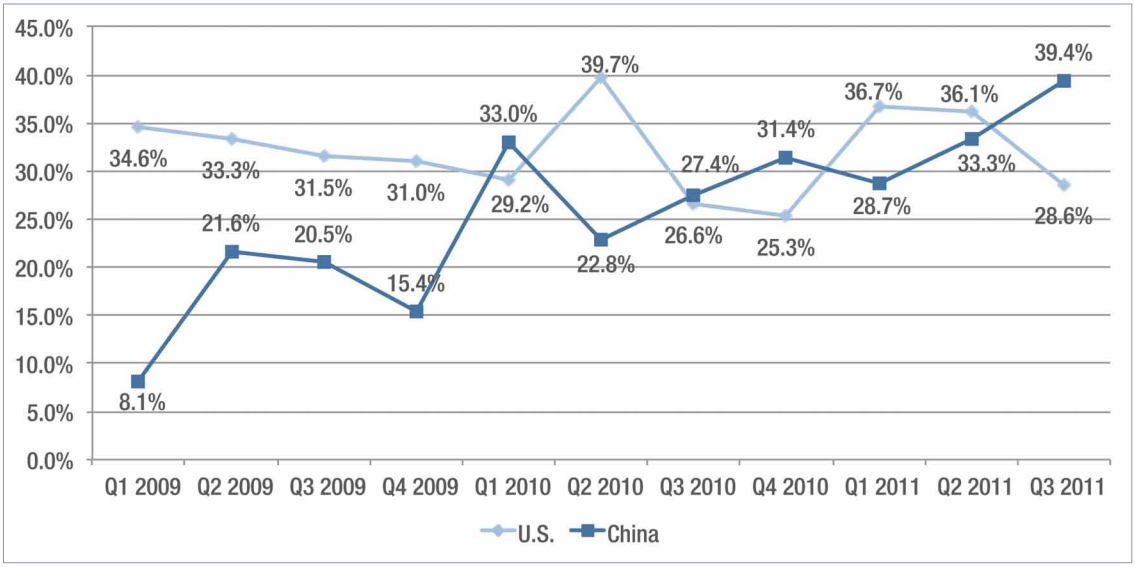
In short, the manufacturing industry has entered a consolidation phase, as a persistent imbalance between supply and demand has induced voracious competition between producers and a phasing out of less competitive firms and facilities. Since a large portion of U.S. PV manufacturing serves the export markets and since component pricing in the U.S. is closely

tied to that in Europe, the twin malaises of inventory buildup and price erosion have taken their toll on domestic producers as well, particularly those that are export-oriented.

On the other hand, plants owned by firms that have managed to penetrate the domestic market enjoyed healthier utilization of manufacturing capacity in the first half of 2011, given a relatively robust demand environment in the U.S. However, this state of affairs is anything but stable. The cooling off of historically prominent feed-in tariff markets (Germany, Italy, France) in 2011 has forced manufacturers to look towards other regional markets for sales, and as a relatively mature market that has been growing rapidly in recent quarters, the U.S. is at the top of most manufacturers' lists. In particular, the most bankable China-based suppliers have made significant gains in market share in recent months, in large part due to their lower cost structures that allow them to price modules at levels significantly below most domestic or non-Chinese foreign peers. This has gained them significant traction in the more price-sensitive commercial and utility-scale market segments. Figure 2-6, which shows module market share for domestic vs. China-based suppliers for systems installed under the California Solar Initiative program from Q1 2009 to Q3 2011, illustrates this point. In particular, domestic market share in 2011 has dipped from 37% in Q1 2011 to around 29% in Q3 2011, while China-based suppliers have registered gains, from 29% in Q1 2011 to 39% in Q3 2011.

Source: California Solar Initiative, GTM Research

Figure 2-6: Module Market Share by Manufacturing Location, California Solar Initiative Installations, Q1 2009 - Q3 2011



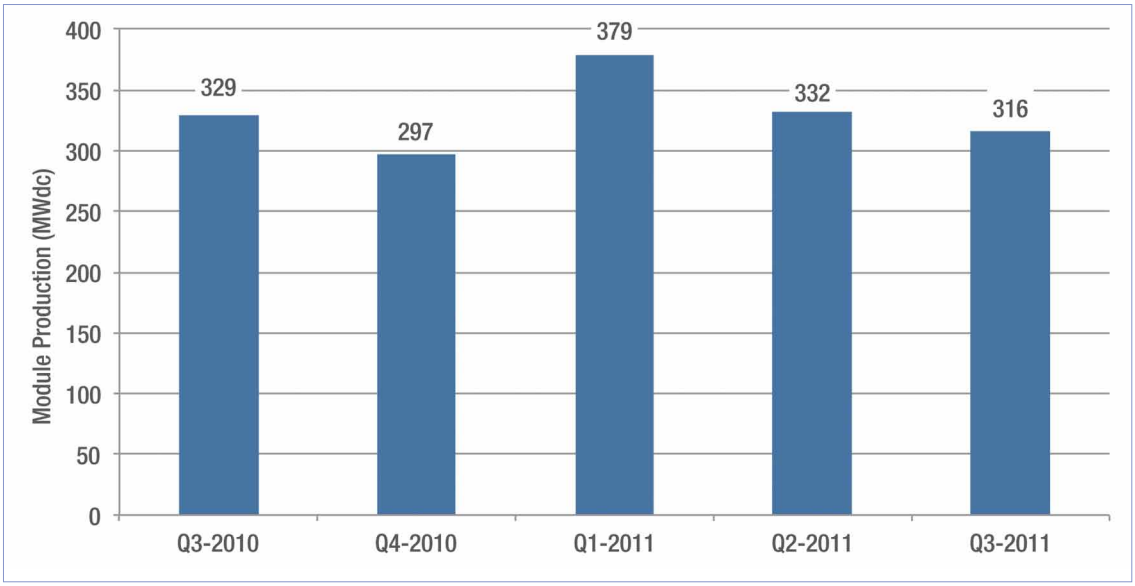
Note: Modules produced by Suntech Power Holdings were categorized as originating from the U.S. in 2011, and from China prior to 2011 for the purpose of this analysis, as the company's module assembly facility in Arizona came online towards the end of 2010.

More Detailed Manufacturing Data by State and Component Available in Full Report

Moreover, the 39% top-line growth of U.S. installations in Q3 2011 masks underlying segment trends that point to a difficult environment for domestic suppliers during this period. Of the 449 MW installed in the U.S. in Q3 2011, 212 MW (or 47%) was from the utility-scale segment, which, with the exception of one U.S.-located manufacturer (First Solar), has largely been dominated by foreign suppliers. On the other hand, non-utility installations actually dropped by 14% in Q3, and it is in this segment that domestic suppliers have traditionally had the most success. More firms are targeting the U.S. market than ever before and the outlook for non-residential market is for relatively flat growth for 2012. Domestic suppliers, whose business has hitherto hinged on success in the U.S. market, are therefore expected to face challenging times. Such firms will need to contemplate options such as product differentiation (e.g., non-standard module design or aesthetically appealing exterior), technology differentiation (e.g., smart modules), business model differentiation (e.g., downstream integration, strategic partnership with installer/leasing provider) or enabling growth in second-tier markets with less established distribution channels to continue growing share in the domestic market.

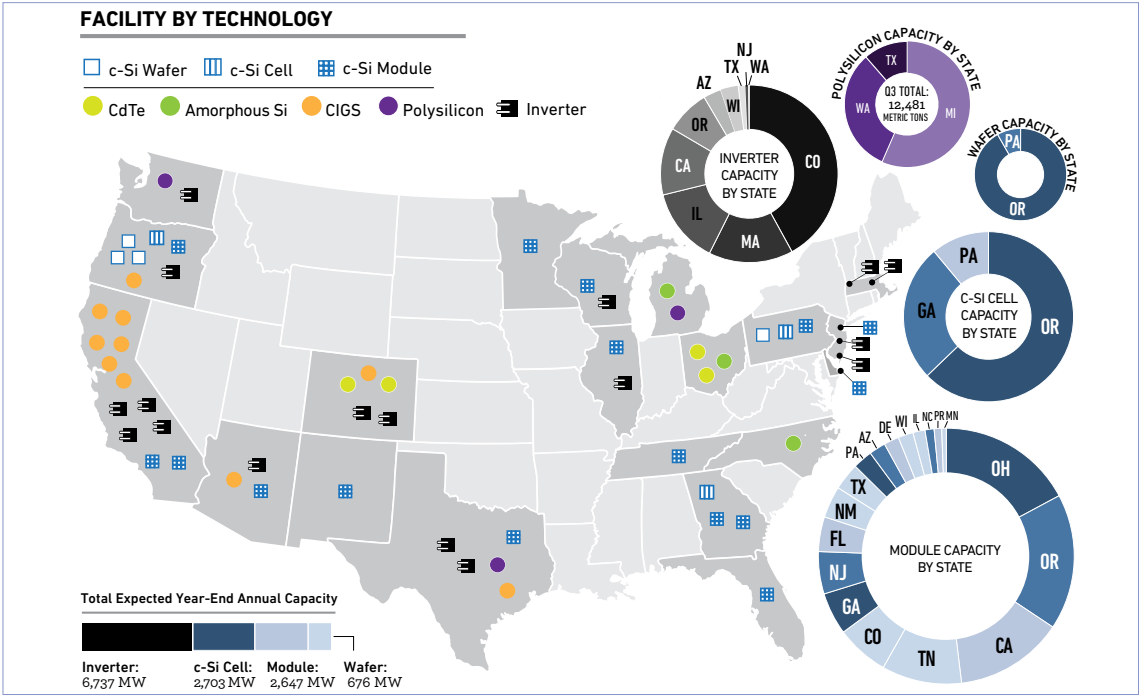
However, the outcome of the trade petition could have a meaningful impact on this subject. As a caveat, it is highly challenging to predict the exact impact at this time given the uncertainties around the imposition of import duties, their magnitude in the event they were to be levied, and the response from China-based suppliers (which could potentially avoid tariffs by shifting production to other lower-cost locations such as South Korea and Taiwan). Still, it is safe to say that if meaningful import duties were indeed imposed on China-based cell and module suppliers, this would have the effect of making domestic suppliers more price-competitive, at least in the near-term, and could result in a material increase in domestic market share for U.S.-manufactured modules in 2012 and beyond. The trade petition thus remains a potential wild card in terms of influencing competitive dynamics in the U.S., and it is critical to monitor the development of this issue going forward.

Figure 2-7:
U.S. PV Module Production, Q3 2010 - Q3 2011



Domestic module production in Q3 2011 amounted to 316 MW (capacity utilization of 62%), 5% below Q2 2011 output of 332 MW and 4% below Q3 2010 output of 329 MW. As discussed, export-oriented firms and facilities witnessed a significant slowdown in production due to the global demand slump and inventory pile-up. While domestically oriented producers were marginally better off, they experienced challenging circumstances related to the decline of the U.S. non-utility market segment and increasing competition from foreign suppliers. Much like cells, the module manufacturing landscape is quite fractured, with 30 active facilities and 18 states having some share of capacity and production. The most prominent of these are California (8), Ohio (3), and Oregon (home to SolarWorld's giant vertically integrated wafer-cell-module facility). There is a high degree of overlap between the list of states containing cell plants and those containing module facilities, given the high concentration of thin film in the U.S. and the integrated nature of most thin film manufacturing, where cell definition and module assembly are performed in a continuous process. Oregon and Ohio led U.S. states in module production output, accounting for 148 MW, or 47% of the national total. Other notable states included Tennessee (37 MW) and California (34 MW).

Figure 2-8:
U.S. Manufacturing Map



2.3.1 Research Highlight: Inverters

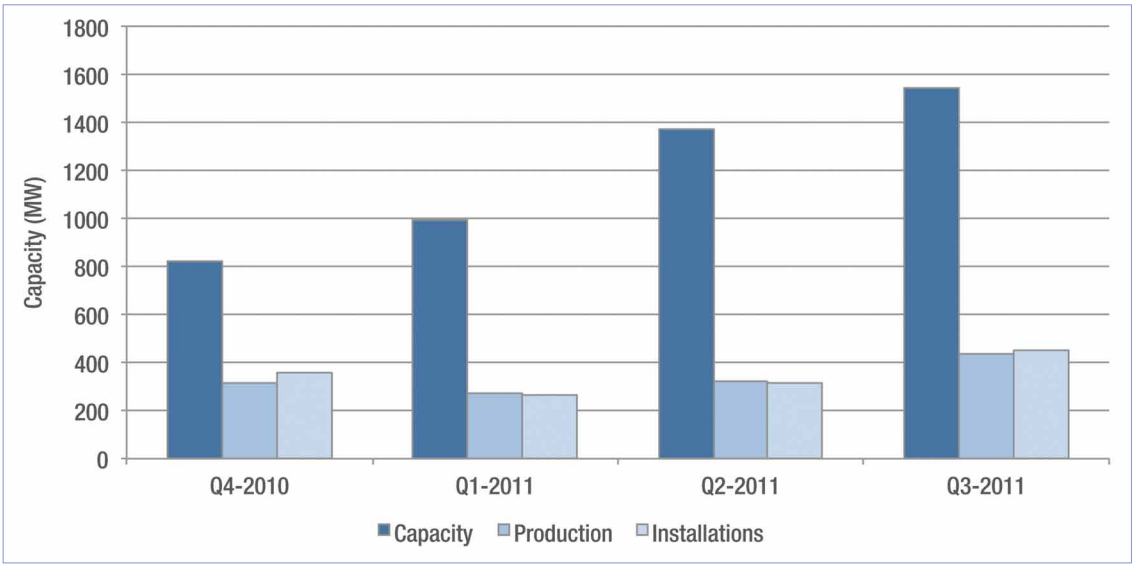
This quarter, instead of highlighting our analysis of a specific state, we feature a portion of the inverters section of the Full Report.

Domestic inverter manufacturing capacity continues to climb upwards, which, as usual, necessitates the warning that manufacturing capacity is a poor gauge for the actual growth of the U.S. inverter industry. Owing primarily to the completion of Siemens' annualized 850 MWac facility in Illinois, quarterly U.S. inverter manufacturing capacity jumped from just under 1.4 GWac to 1.5 GWac from Q2 to Q3. The implied 6 GWac of annualized capacity will continue to grow as a few European-headquartered manufacturers seek to establish a U.S. beachhead, including Delta Energy and LTi Reenergy's planned joint venture facility in California, intended to serve the U.S. large commercial and utility markets.

Production jumped to 439 MWac for the third quarter, implying a utilization rate of below 30%. However, many of these facilities are neither fully staffed, nor ramped up yet. Excess manufacturing capacity continues to be cheap, with depreciation representing less than 1% of the typical inverter plant's cost structure. The flexibility to respond to an unexpected upwards shift in inverter demand more than pays for the additional manufacturing capacity, which really only represents a combination of space, capacity for additional shifts of temporary employees,

and testing equipment. Regardless, the growth of actual production from 326 MWac to 439 MWac shows continued momentum in domestic manufacturing, especially in anticipation of the 1603 Treasury Program expiration.

Figure 2-9: Domestic Inverter Manufacturing Capacity, Production and Installations, Q4 2010 – Q3 -2011



While the biggest stories in U.S. PV manufacturing came from plant closures in the module manufacturing space, domestic inverter producers were not unaffected. Global publicly-traded inverter manufacturers announced missed targets across the board. While this was primarily the result of weak European demand, manufacturers also overestimated the extent to which North America would absorb weak global demand. The result could pave the way for small tremors in inverter manufacturing as suppliers scale back capacity build-outs, or even, as is the case with Advanced Energy, begin to consolidate North American manufacturing or move offshore to China.

Nevertheless, as the utility PV sector continues to boom, near-term domestic manufacturing—or at least the final assembly of inverters—will remain strong, as large-scale inverter solutions are too large to be shipped overseas economically at current cost points. In the medium and long term, a growing acceptance of low-cost Asian products remains a looming threat to domestic production of inverters.

On the state level, manufacturing capacity and production remained relatively consistent. The only notable changes include the aforementioned opening of an 850 MWac (annualized) facility in West Chicago and Advanced Energy's planned, though vague, consolidation of manufacturing. Note that Siemens' capacity expansion cost only $10 million in upgrades, representing $0.01/Wac of capital expenditure, compared to vertically integrated module manufacturing capex on the order of $1.00/Wdc.

Figure 2-10: Domestic Inverter Manufacturing Capacity and Production by State, Q1 2011 – Q3 2011

State	Q1-2011		Q2-2011		Q3-2011	
	Capacity	Production	Capacity	Production	Capacity	Production
AZ	25	15	50	15	50	30
CA	163	25	190	43	190	37
CO	375	125	650	140	650	210
IL	38	15	38	10	213	30
MA	238	35	238	50	238	64
NJ	9	6	8	6	8	5
OR	125	50	125	60	125	62
TX	20	0	20	0	20	0
WA	3	1	3	1	3	1
WI	0	0	50	0	50	0
Total	**994**	**272**	**1371**	**326**	**1546**	**439**

One of the unique opportunities in the U.S. market—in fact, a large threat to European entrants that are heavily invested in residential string inverters—is the growing acceptance and adoption of distributed optimization, which includes low voltage inverters, microinverters, and DC power optimizers. Enphase continues to dominate the microinverter market globally and the distributed optimization space in the U.S., but competitors are quickly latching on to the wave of growing U.S. demand. Together, the distributed optimization space rose to 13.4 MW, accounting for 18% of residential installations. While the market share of distributed optimization is down from 20% last quarter, there are still many opportunities for continued growth. In Q3, the industry saw product announcements from multiple module vendors showcasing "smart modules," which replace the back-of-module junction box with either a DC optimizer or microinverter.

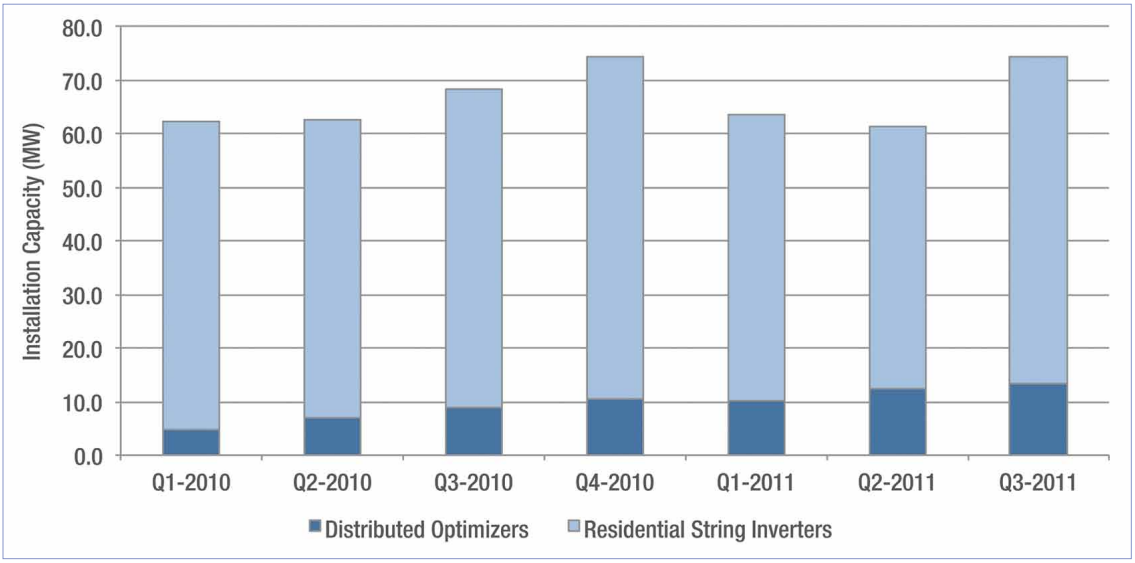


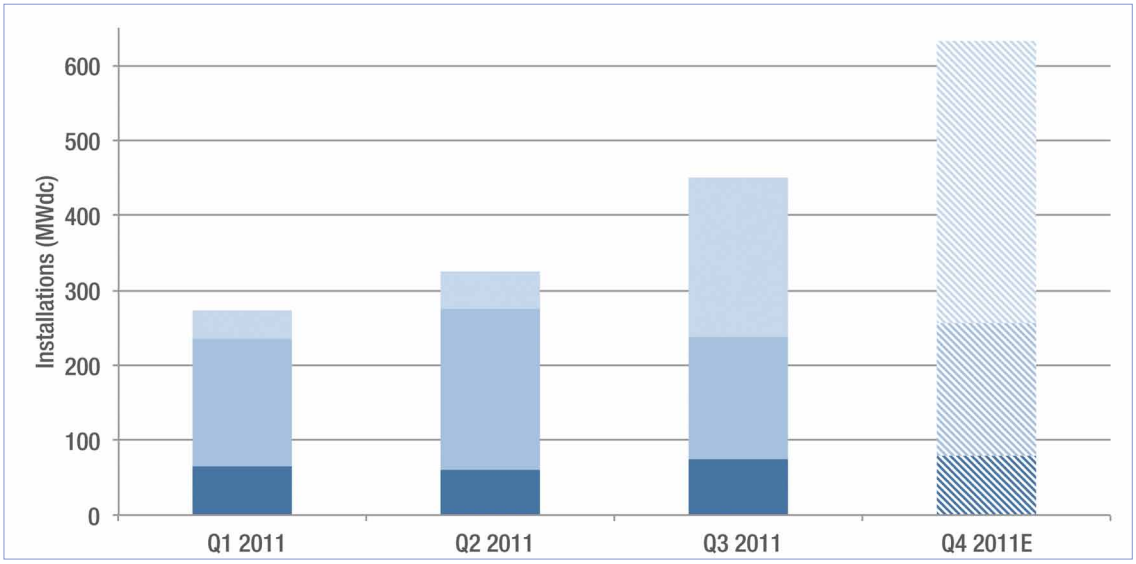
Figure 2-11: Residential inverter Installations by Type, Q1 2010 – Q3 2011

Venture capital and general investment continues to pour into the distributed optimization space, with SolarEdge closing an additional $37 million round in early Q4 and a slew of SunShot Awardees receiving funds in September, promising to deliver integrated distributed optimization solutions to drive lower system costs. While incumbents like SolarBridge and Tigo Energy received funding, new entrants like automotive electronics supplier Delphi and General Electric were awarded grants as well. In total, well over $500 million of private investment and at least $26 million of public funds have been directed into distributed optimization companies. Individual company investments and funding are covered in greater detail in the Full Report.

2.4 MARKET OUTLOOK

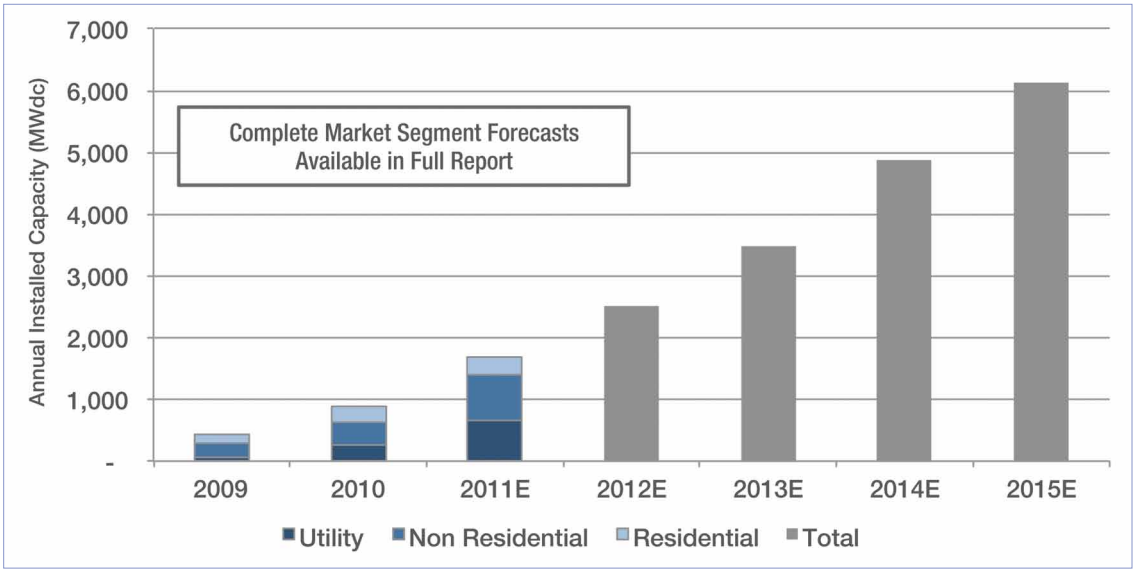
Our 2011 installation forecast has been revised downward from 1.8 GW to 1.7 GW. As we had anticipated, Q3 installations in the U.S. were propped up by a number of utility market completions. However, the downturn in major commercial markets (California, New Jersey, and Pennsylvania) occurred slightly faster than we had anticipated. While the residential market looks to be stable for Q4, the commercial market continues to experience woes in larger states. We continue to anticipate a boom in utility installations in Q4 that will drive annual growth up to 89%, but we no longer expect a doubling of the U.S. market.

Figure 2-12: U.S. PV Installations by Market Segment, Q1 2011-Q4 2011E



On the whole, the U.S. remains one of the strongest growth markets for PV. This is reflected both in the numbers and in the chatter from global suppliers, distributors, and developers, all of whom are bullish on near-term U.S. demand – if concerned about the risks already mentioned. By the end of 2011, the U.S. market has the potential to nearly double its global market share.

Figure 2-13: Base Case Installation Forecast by Market Segment, 2009-2015



Note: Full report contains market forecast through 2015 by market segment

3 CONCENTRATING SOLAR

Concentrating solar includes both concentrating solar power (CSP) plants, which convert thermal energy to electricity, and concentrating photovoltaic (CPV) systems. Whereas CSP systems concentrate sunlight to heat water or another fluid that subsequently generates steam to power a turbine, CPV systems focus the sun's light on a photovoltaic cell to generate electricity directly. In the U.S., concentrating solar experienced a burst of project activity in California in the 1980s, and then went quiet for two decades. But there is great potential for concentrating solar in the U.S., which is reflected in the project pipeline of more than 6 GW (both with and without PPAs) that is now under development. Should the growth of concentrating solar continue, the U.S. could once again be at the top of the global market, retaking the title from Spain, which has led all others in installations in recent years.

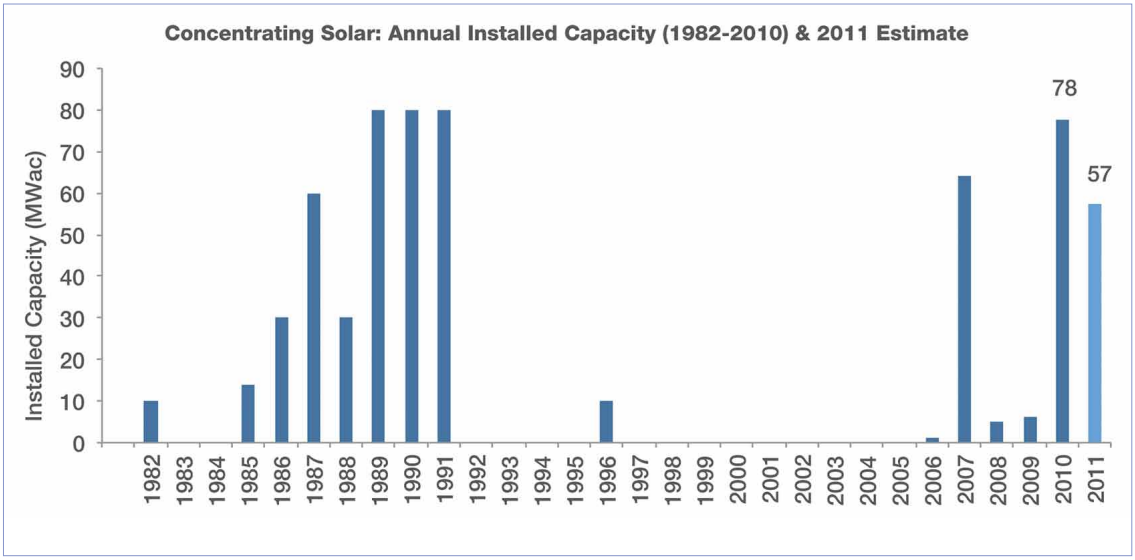


Figure 3-1: Concentrating Solar Installed Capacity, 1982-2011

3.1 INSTALLATIONS

While there were three CPV projects completed in Q2 2011, in Q3 2011 there were no CPV or CSP projects completed. However, during the quarter, there was additional progress on several of the large concentrating solar projects under development.

Figure 3-2: Concentrating Solar Project Development Highlights

MAJOR US CONCENTRATING SOLAR PROJECT DEVELOPMENT HIGHLIGHTS							
	Project	State	Tech.	Capacity (MW-ac)	Construction	Expected Completion	Project Status Update
	Blythe	CA	CSP/PV	1000	Dec-10	?	Announced switch to PV from trough in August
	Ridgecrest	CA	CSP/PV	250		?	Announced switch to PV from trough in October
	Palen	CA	CSP/PV	500		?	Announced switch to PV from trough in October
	Amargosa Farm Road	CA	CSP/PV	500		?	Announced switch to PV from trough in October
	Ivanpah	CA	CSP	370	Oct-10	2012-2013	Closed DOE loan guarantee for $1.6 billion in April 2011
	Solana	AZ	CSP	250	Dec-10	2012	Construction underway as of Q4 2010
	Mojave Solar Project	CA	CSP	250	Dec-10	2013	Loan Guarantee closed September 2011
	Rice Solar Energy	CA	CSP	150	Sep-11	2013	Approved by California CEC December 2010
	Crescent Dunes Solar Energy Project	NV	CSP	110	Jun-11	2013	DOE Loan Guarantee for $737 million closed in Sept
	Genesis	CA	CSP	250		2013	Loan Guarantee closed September 2011
	U. of AZ Tech Park	AZ	CSP	5		4Q 2011	
CPV	Alamosa Solar	CO	CPV	30	May-11	4Q 2011	Under construction
CPV	Hatch	NM	CPV	5		Jun-11	In Operation
CPV	Questa	NM	CPV	1		Apr-11	In Operation
CPV	Nichols Farm	CA	CPV	1		Apr-11	In Operation
CPV	U. of AZ Tech Park	AZ	CPV	2		Apr-11	The nation's largest CPV installation was completed at the University of Arizona's Solar Zone
CPV	Imperial Solar Energy Center West	CA	CPV	150		2015	Long term PPA signed with California utility

While there were no concentrating solar installations in Q3 2011, some significant developments occurred:

- Solar Trust of America sold its 2.25 GW CSP pipeline to Solarhybrid – who plans to use PV for the four projects
- Several concentrating solar projects closed DOE loan guarantees in Q3 including:
  - 250 MW Mojave Solar trough CSP project
  - 110 MW Crescent Dunes tower CSP project
  - 250 MW Genesis trough CSP project
  - 30 MW Alamosa CPV project

3.2 OUTLOOK

In 2011, it is expected that 57 MW of CSP and CPV projects will come online in the U.S., down from 78 MW in 2010. Most of the capacity expansion will come from the 30 MW CPV Alamosa Solar project and 5 MW CSP University of Arizona Solar Tech Park project.

It should be noted that we have significantly reduced our concentrating solar forecast in light of the announcement that Blythe would be switched from trough to PV for economic reasons. The dramatic improvements in PV panel costs has put trough at a significant cost disadvantage, and puts many of the planned trough projects at risk, as they may be difficult to finance or fail to receive regulatory approval.

2012 should see the completion of at least one of BrightSource's Ivanpah towers, and in 2013, several large plants are scheduled to come online. In later years, greater uncertainty regarding financing, permitting and approvals surrounds the pipeline. The current pipeline of concentrating solar projects is over 6,000 MW, of which more than 4,000 MW have signed PPAs.

4 SOLAR HEATING AND COOLING

The solar heating and cooling (SHC) category comprises two distinct markets: solar water and space heating (SWH) and solar pool heating (SPH). The domestic SWH market has grown on an annual basis since 2004. The SPH market hit a peak in 2006, and while it shrank significantly from 2007-2009, it made a slight recovery in 2010 with indications that this upward trend will continue through the end of the year.

4.1 MARKET UPDATE

As 2011 unfolds, it is the commercial side of the SWH industry that has been carrying the mantle. Despite generous residential incentives, including the relatively new CSI Thermal initiative in California, it has been business owners recognizing the value of solar thermal. In particular, users of large quantities of hot water, such as hotels, food processing facilities and universities, have been seeking out SWH applications.

As mentioned in previous iterations of the SEIA/GTM Research U.S. Solar Market Insight report, third party ownership of SWH systems has been an emerging trend. A few SWH development firms have pushed heavily into the space, recruiting investors to fund projects and then selling the hot water to an end user at a lower rate than natural gas, heating oil, or propane can provide. Massachusetts, which released a pilot residential program earlier in the year, has now implemented a pilot commercial program that will fund a feasibility study up to $10,000 with no requirement to actually install the system. Construction grants up to $30,000 came online late in Q3. With the 30% ITC still available, increased interest from states, and SWH systems fulfilling some states' RPS goals (AZ, MD, NC, NV, NY, and Washington D.C.), we should see continued growth in the non-residential SWH market.

Interest in the domestic market is also growing amongst foreign manufacturers, which is a good sign for improving market health. Established European players and Chinese start-ups have had a greater presence at U.S. tradeshows. Chinese manufacturers, in particular, have been importing a large quantity of evacuated-tube collectors, touting the technology as superior to flat-plate collectors, which have remained relatively unchanged since the 1970s. In practice, the relative merits of each technology are project specific. U.S. installers have been slow to adopt these foreign products, preferring to source components from a small group of domestic manufacturers that owns a lion's share of the market.

The main competitor to SWH, however, is the price of natural gas. For as long as the price of natural gas remains low, it is difficult for many to see the long term value in installing a system.

References, data, charts or analysis from this Executive Summary should be attributed to the SEIA/GTM Research *U.S. Solar Market Insight*

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All figures sourced from GTM Research. For more detail on methodology and sources, visit www.gtmresearch.com/solarinsight.

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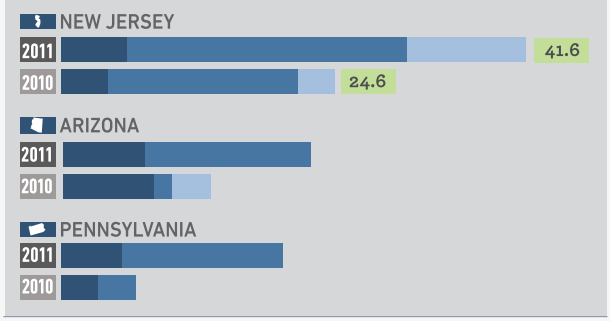

- Installations by market segment for the top 20 states
- Installed cost by market segment for each state
- State-by-state market analysis
- Component pricing across the value chain
- Manufacturing capacity & production by component by state
- Demand projections to 2015 by technology, market segment & state

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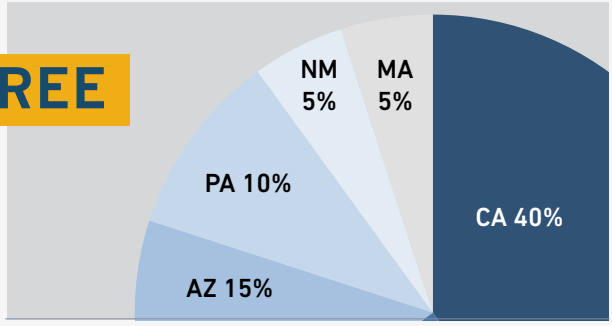

- National aggregate capacity additions
- National aggregate number of installations
- National weighted average installed price
- National aggregate manufacturing production

Please find a more detailed content and pricing matrix on the reverse side of this page.

U.S. SOLAR MARKET INSIGHT

TABLE OF CONTENTS

PHOTOVOLTAICS (PV)

- Installations + Market Analysis
  - By Market Segment
  - By State
  - By Ownership Structure
- Installed Price
- Manufacturing
  - Polysilicon
  - Wafers
  - Cells
  - Modules
  - Inverters
- Component Pricing
  - Polysilicon, Wafers, Cells and Modules
  - Inverters
- Demand Projections
  - By Market Segment
  - By State

CONCENTRATING SOLAR POWER (CSP)

- Installations + Market Analysis
- Installed Price
- Manufacturing Production
- Demand Projections

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