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THE SOURCE OF POWER

United States PV market becomes a global demand leader by 2012

2009-12-23

The new report by Greentech Media Research "The United States PV market through 2013" presents a comprehensive analysis of the downstream market for photovoltaic (PV) power in the United States in the next years. It considers demand, regulatory structures and project economics at the utility, state and federal level. Its primary focus is to analyze the proximity of price convergence between PV generation and grid electricity prices in three market segments: residential, commercial and utility-scale. In cooperation with GTM Research solarserver.com highlights the key findings in its December 2009 solar report.

Solar-Report as [PDF-Document](#)



PV power plant in the US. Source: Greentech Media Research.

Price convergence, which incorporates both the policy and financial variables that determine demand for PV, underpins GTM Research's bottom-up, state-by-state, segment-by-segment demand forecast of the U.S. PV market. The report seeks to identify the

highest opportunity areas for PV development in the U.S.

USA: Opportunity in Complexity

Global PV demand grew at an average rate of 51 percent per annum from 2000 to 2008, led by rapid growth in the German and Spanish markets. However, today's global PV market is experiencing difficult circumstances. As GTM Research concluded in last year's 2009 "Global PV Demand Analysis and Forecast: The Anatomy of a Shakeout II", the shift to a buyer's market for modules and components has weakened the position of suppliers, forcing them to become both more competitive in their pricing and more innovative in their product offerings. Such diversified strategies are more evident in the U.S. than any other market, owing both to a complex set of policies and to a diverse range of end-market requirements. GTM Research argues that embracing strategic diversification will be advantageous for companies competing in the U.S. market.

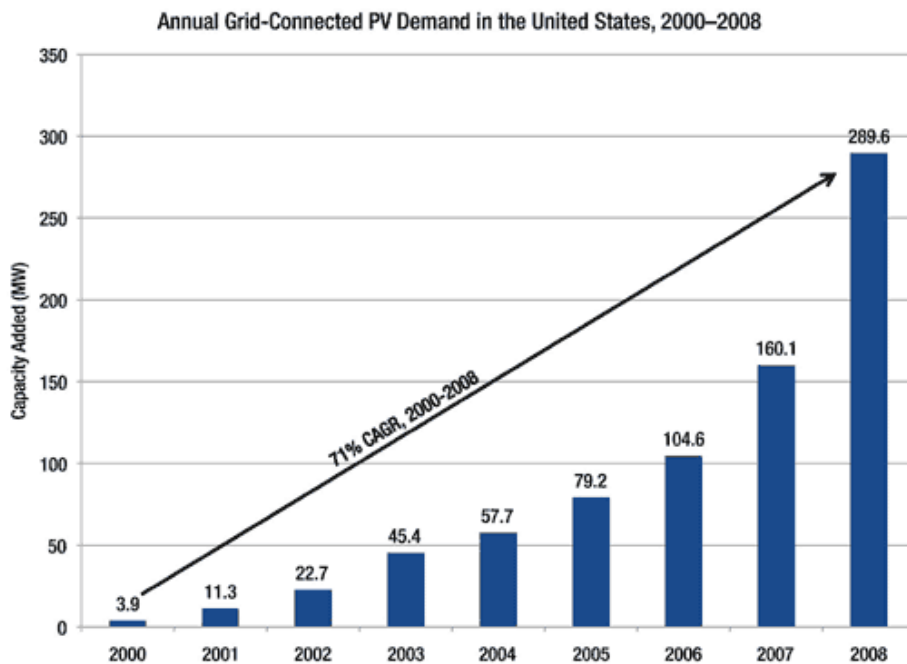


FIGURE 1-1: ANNUAL PV DEMAND IN THE UNITED STATES, 2000–2008 Source: Sherwood & Associates

Between 2000 and 2008, annual installed grid-connected PV capacity in the U.S. grew from 4 MW to 290 MW at an average rate of 71 percent per annum. This rapid growth made the U.S. the third-largest global demand center behind Germany and Spain. Only the U.S., however, has the potential to engender a truly sustainable, long-term market. With high insolation, the greatest electricity demand in the world, and ample available land for PV development, the U.S. presents an attractive longterm growth opportunity for developers, installers, financiers, and other PV service providers. Most global industry players recognize this potential and are seeking to develop and refine a U.S. market strategy.

Developing a downstream U.S. PV market strategy requires a deliberate, highly specified approach to each application, state market and market segment. Historically, deep analysis of the residential or commercial markets in California or New Jersey was sufficient to understand the brunt of the U.S. PV market. However, in recent years the market has developed into a multi-tiered demand center, with many secondary and tertiary market states supporting sufficient demand to warrant individual consideration. Over the next four years, this dynamic will expand as both regulatory targets and additional state demand markets expand.

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Left: "Sarnia Solar Project", right: Rooftop PV system in Visalia, California.
 Courtesy: Enbridge Inc.; Canadian Solar Inc.

U.S. PV demand grows in 2009 despite the recession

Grid-connected PV demand will reach 440 MW in 2009, up from 320 MW in 2008. In an upside economic scenario, demand could reach 545 MW in 2009. The residential sector and local/state government projects drive demand growth, thanks to stimulus funding and the recently uncapped residential Investment Tax Credit. California retains its dominant market share, accounting for 205 MW in the base case scenario, or 50 percent of national demand. Secondary markets in Arizona, Colorado and New Jersey support demand growth.

U.S. PV market becomes a global demand leader by 2012

Over the next four years, the U.S. will experience the most rapid demand growth of any major PV market. Base case U.S. PV demand grows to 1,515 MW in 2012, with annual growth from 2008 to 2012 averaging 48 percent. The upside scenario sees demand reaching 2,022 MW in 2012. During this period, the U.S. surpasses Spain to become the second leading PV market in the world behind Germany.

Investment in the U.S. PV market triples by 2012 to over \$6 Billion

Base-case investment in U.S. PV projects will reach \$6.12 billion in 2012, up from \$2.35 billion in 2009. Average annual growth will be 37.6 percent. Utility-scale project investment expands the fastest at 56 percent per annum, reaching \$1.48 billion in 2012. In the upside scenario, total investment reaches \$8.17 billion in 2012 at an average annual rate of 41.1 percent.



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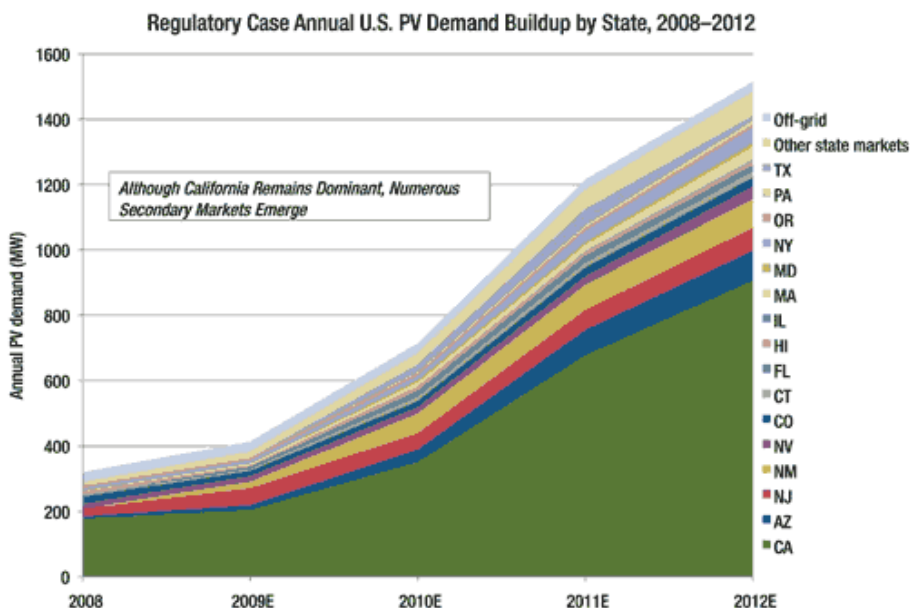


FIGURE 1-3: REGULATORY CASE U.S. PV DEMAND BUILDUP BY STATE, 2008–2012

Secondary demand markets gain increasing importance

Although California's market share remains relatively steady at around 50 percent of national capacity second-tier markets gain increasing value as their absolute size increases. By 2012, combined base case demand from leading secondary states Arizona, New Jersey, New Mexico, New York, Nevada and Massachusetts reaches 376 MW.



Mars Chocolate North America's PV plant at Hackettstown, New Jersey (left) and PV arrays at the LACOSAN Plant in north Lakeport, California. Courtesy: PSEG; SunPower Corporation.

Price convergence between PV and grid electricity already reached in high-demand locations, 11 states to follow by 2012

GTM Research modeled projects in 16 states to determine when post-incentive PV generation costs and grid electricity will converge. Each state offers an incentive package that favors some market segments over others. Price convergence in these markets is heavily sector-dependent. States with high levels of demand, such as New Jersey and California, have already experienced price convergence in particular market segments, while others stand on the precipice. By 2012, 11 of these 16 states will have surpassed price convergence in the commercial sector, and 10 will have done so in the residential sector.

New financing models drive residential sector growth

Financing models that obviate the need for direct ownership will drive residential market growth. Though GTM Research predicts residential price convergence in a number of states, the analysts maintain that up-front cost and simple payback are the two factors gating demand for residential projects. The expansion of residential solar financing through leases or power purchases agreements with little up-front cost will enable the residential sector to grow to 363 MW by 2012 in the base case.

Utility-scale demand gains market share through 2012

Utility-scale installations will be the fastest growing market segment, stealing market share from the commercial sector and reaching 466 MW in the 2012 regulatory scenario. This is a result partly of RPS requirements and a wave of new solar-specific RFPs in states with solar carve-outs. It is also a result of heightened interest in utility ownership of PV, for which there are numerous economic and operational benefits for utilities.

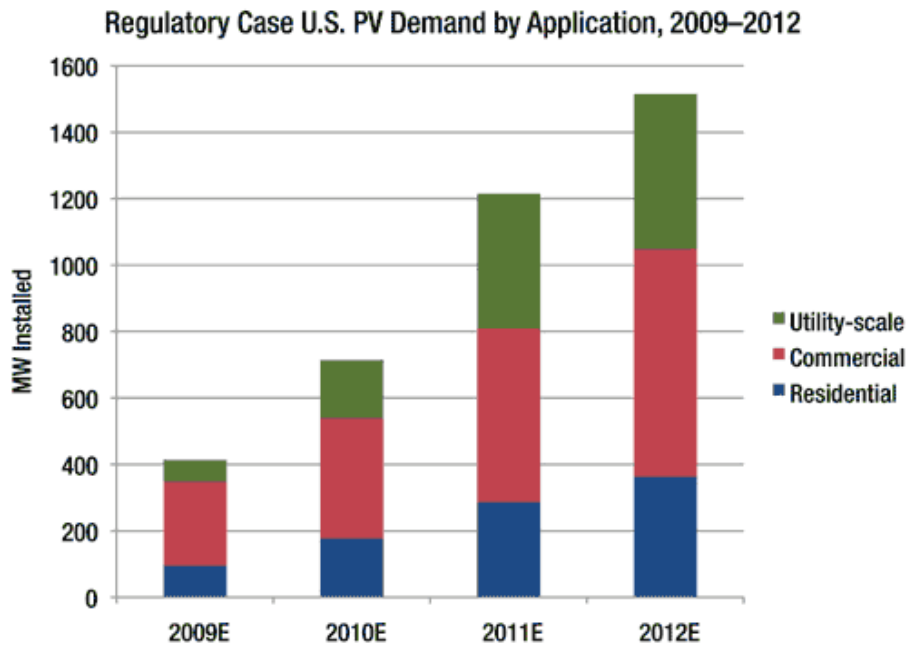


FIGURE 1-5: U.S. PV DEMAND PERCENTAGE BY APPLICATION, 2009–2012

Successful project developers build adaptation into their market strategy

Unlike Germany, Spain or Japan, the U.S. is comprised of 50 differentiable PV markets. With changes occurring both over time and by location, addressable markets are in a constant state of flux. Successful project developers will build adaptation into their market strategy, rather than seeking to minimize its necessity. By doing so, they will turn the complexity of the U.S. market into an advantage, rather than a limitation.

Anders als in Deutschland, Spanien oder Japan können in den USA 50 unterschiedliche PV-Märkte ausgemacht werden, die sich sowohl im Laufe der Zeit als auch von Ort zu Ort stetig ändern. Erfolgreiche Projektentwickler passen ihre Marktstrategie eher an, als sie die Notwendigkeit einer Anpassung herunterzuspielen. So können Sie die Komplexität des US-Marktes zu ihrem Vorteil nutzen.

Sample State Profile Arizona

Electricity Sector

Electricity Production in Arizona comes from a blend of coal, hydro power and natural gas, together accounting for 94 percent of statewide generation. Much of the hydro power in Arizona comes from the Hoover Dam, once of the largest hydro power stations in the world at 2.08 GW. Arizona is a net exporter of electricity, with 143.8 TWh of generation in 2007, compared to retail electricity sales of only 91.8 TWh. Arizona ranks 15th among states in peak generating capacity at 25,579 MW, but 35th among states in terms of carbon dioxide emissions per MWh. This is due to the significant proportion of natural gas and nuclear power in its fuel mix. Average retail electricity prices in Arizona are around \$0.085/kWh.

Two utilities, Salt River Project and Arizona Public Service (APS), dominate retail sales in Arizona. The largest is APS, an investor-owned utility that sold 29,171 GWh in 2007 and accounting for 38 percent of state sales. Salt River Project, a publicly owned utility, is slightly smaller with 27,694 GWh sold in 2007.

Insolation

Arizona's insolation is among the highest in the nation, with average annual insolation in Phoenix at latitude reaching 6.5 kWh/m²/day. Insolation varies somewhat within the state, with Flagstaff insolation falling to 6 kWh/m²/day, but as a rule insolation in Arizona is higher than almost all other states.

INSOLATION, FLAT-PLACE COLLECTOR FACING SOUTH AT FIXED TILT (KWH/M2/DAY)			
City	Latitude - 15	Latitude	Latitude + 15
Flagstaff	5.8	6	5.8
Phoenix	6.4	6.5	6.3
Tucson	6.3	6.5	6.3

Source: NREL

FIGURE 8-3: ARIZONA AVERAGE INSOLATION.

PV Market Development

Arizona stands fourth in the nation in cumulative grid-tied PV capacity, with 34 MW installed as of the end of 2008, and 3 percent of total U.S. capacity. Arizona's PV market is more mature than most, having grown at only 22 percent per annum since 2004. However, 2008 installations reached 6.4 MW, seventh among all states.

About the Authors

Shayle Kann is an Energy Analyst with GTM Research, focusing on downstream solar markets and carbon markets. Daniel Englander heads GTM Research's downstream markets practice. His expertise covers utility regulation and economics, renewable energy project development and project finance, and energy policy, with a specific emphasis on solar power.

About the Study

Further information and purchasing: www.gtmresearch.com.

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