



# U.S. Solar Market Insight™

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## 1 INTRODUCTION

The U.S. solar market is increasingly becoming a central focus of global industry attention, but state-by-state differences in regulations, incentives, utilities, and financing structures introduce more complexities in comparison to other markets. As a result, it has long been difficult to track and understand the changing market dynamics for solar energy in the U.S.

The SEIA/GTM Research U.S. Solar Market Insight™ is our answer to this problem. Each quarter, we survey installers, manufacturers, utilities, and state agencies to collect granular data on photovoltaics (PV), concentrating solar power (CSP), and solar heating & cooling (SHC). This data provides the backbone of Solar Market Insight™, 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 over the next five years. As the U.S. solar market expands, we hope that Solar Market Insight™ will provide an invaluable decision-making tool for installers, suppliers, policymakers and advocates alike.

## 2 PHOTOVOLTAICS (PV)

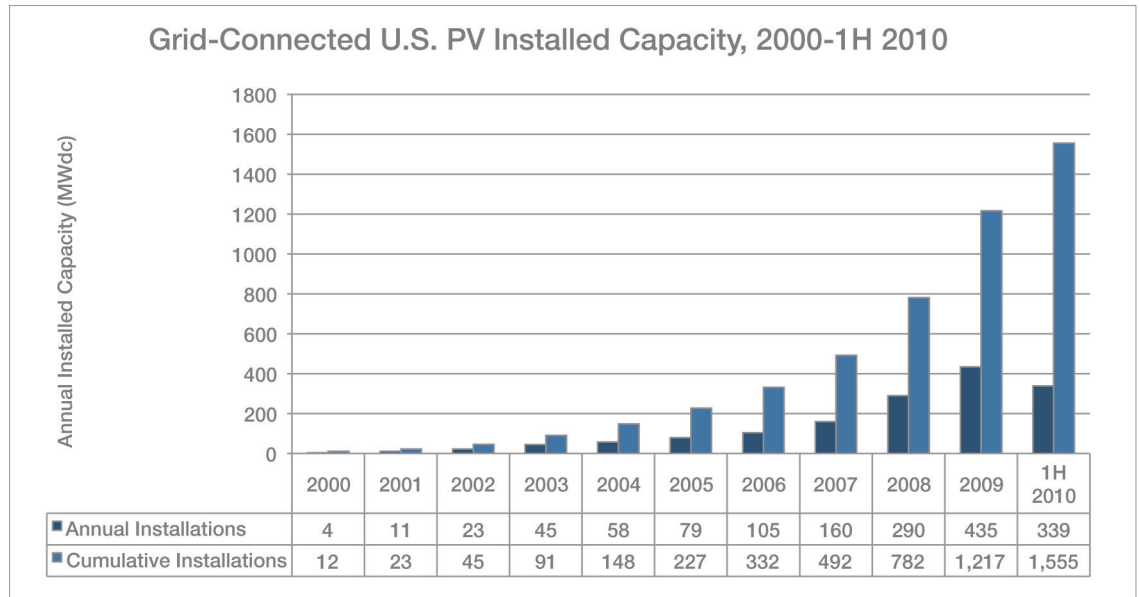
The U.S. PV market has grown at an average annual rate of 69% over the past ten years, rising from just 3.9 megawatts (MW) in 2000 to 435 MW in 2009. Despite this trend, the U.S. constituted only 6.5% of global PV demand in 2009, placing fourth in national installations behind Germany, Italy, and Japan. However, with continued pricing reductions and strong incentives the U.S. could become the next major PV growth market.

### 2.1 INSTALLATIONS

The United States is on track to experience a record year for PV installations in 2010. In the first half of the year 339 MW of grid-connected PV were installed. On an annual basis, this represents 55% growth over the 435 MW installed in 2009. Many factors contributed to this growth, including a drastic decline in 2009 module prices, continued federal support from the Section 1603 Treasury Cash Grant in Lieu of Investment Tax Credit program, and expanding state-level targets for solar power.



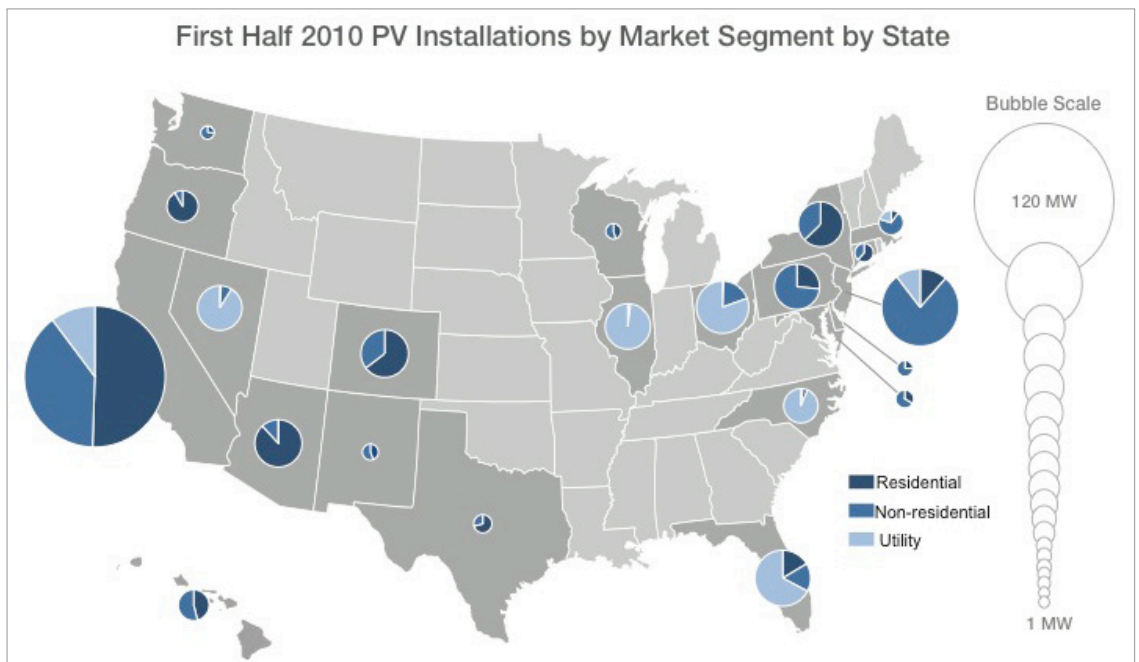
**Figure 2-1:**  
Grid-Connected U.S. PV Installed Capacity, 2000-1H 2010



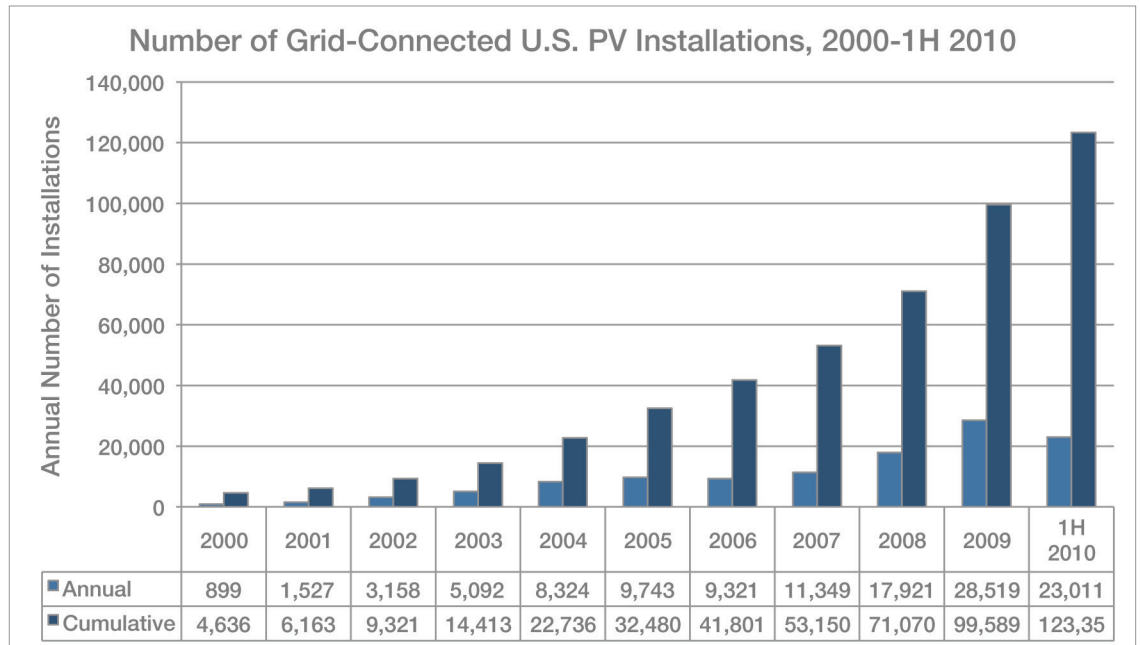
Nearly all of the top 20 states experienced demand growth in the first half of 2010, although the pace of growth varied highly from state to state. California and New Jersey remained the largest state markets, but nine other states installed at least 10 MW in the first half of the year.

We anticipate that the second half of 2010 will be even stronger than the first. Many projects will rush to commence construction in order to meet eligibility deadlines for the cash grant program, and some of these projects will ultimately be connected to the grid within the year.

**Figure 2-2:** First Half 2010 PV Installations by Market Segment by State



**Figure 2-3:** Number of Grid-Connected U.S. PV Installations, 2000-1H 2010



Both the residential and non-residential segments show continued signs of strength, and the available supply of financeable modules has increased in the second half as the German market has begun to cool off. In addition, a number of large-scale utility projects (>20 MW) are currently in construction and anticipated to reach completion by the end of 2010.

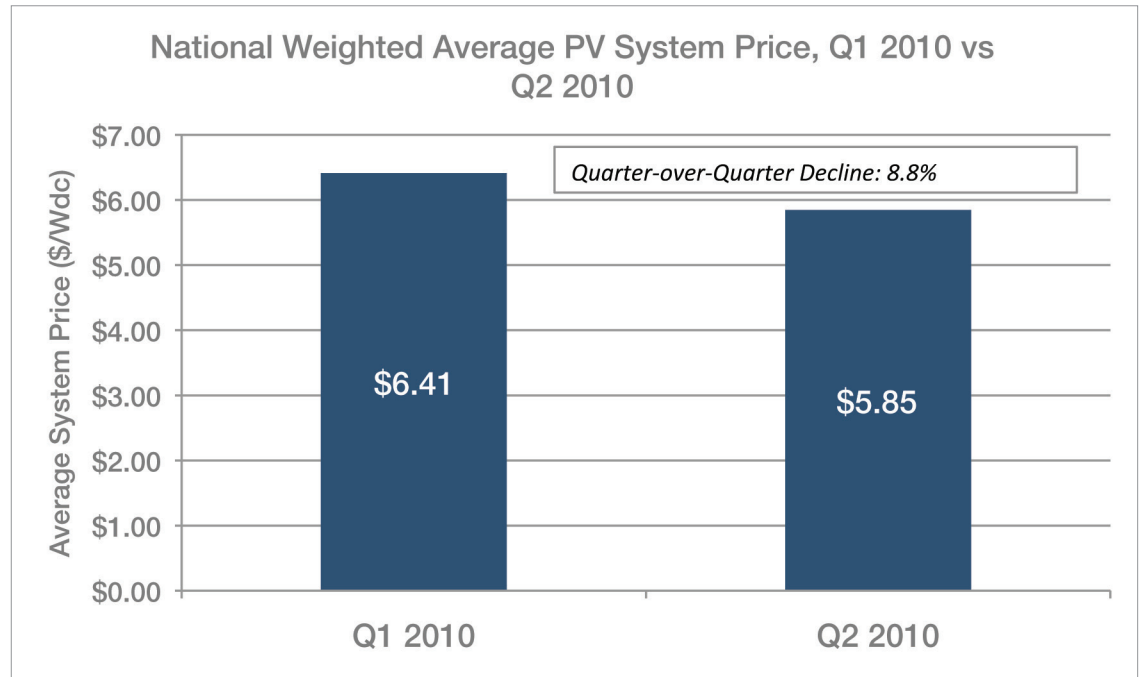
Over 23,000 PV systems were installed in the first half of the year, including an unprecedented 22 utility projects (on the utility side of the meter). This compares to roughly 28,000 systems installed in all of 2009. In total, over 120,000 systems have been connected to the grid in the United States through the first half of 2010, including over 100,000 residential systems. Five states each installed more than 1,000 systems in the first half, including Arizona, California, Colorado, New Jersey, and New York.

## 2.2 INSTALLED PRICE

In 2009, module prices fell roughly 50% over the course of the year as the global PV market reeled from the impacts of the global financial crisis and drastically reduced incentives in Spain. System prices also declined, though at a slower pace, and this enabled the U.S. market to continue growing despite financial turmoil. While component pricing stabilized in the first half of 2010 due to rapid demand growth in markets such as Germany, Italy, and the Czech Republic, some headroom remained in U.S. system prices since the 2009 decline. Consequently, increasing competition among integrators exerted downward pressure on system prices, and weighted average national system prices declined by 9% from the first to

second quarter. In part, this was a function of a transition toward larger systems, particularly the second quarter emergence of numerous utility PV projects. At the same time, price declines were experienced in smaller market segments (residential and non-residential), and with every market segment seeing a quarter-over-quarter decline of between 2% and 5%.

**Figure 2-4:** National Weighted Average PV System Price, 1H 2010



### 2.3 MANUFACTURING PRODUCTION

As mentioned above, the first six months have witnessed strong growth in global PV installations in key markets, and global demand in 2010 is expected to increase by more than 80% year-over-year. As a consequence, manufacturing activity for all “bankable” manufacturers has been robust, and many suppliers reported being sold out for 2010 as early as the first quarter. In the U.S., module production for the first half of 2010 amounted to 564 MW, already three-fourths of what was produced in all of 2009. Quarterly production rose from 265 MW in Q1 to 299 MW in Q2, a 12% increase, and growth in Q3 and Q4 is expected to be even stronger. The dominant majority of modules produced were either cadmium telluride (CdTe) or crystalline silicon (c-Si).

### 3 CONCENTRATING SOLAR POWER (CSP)

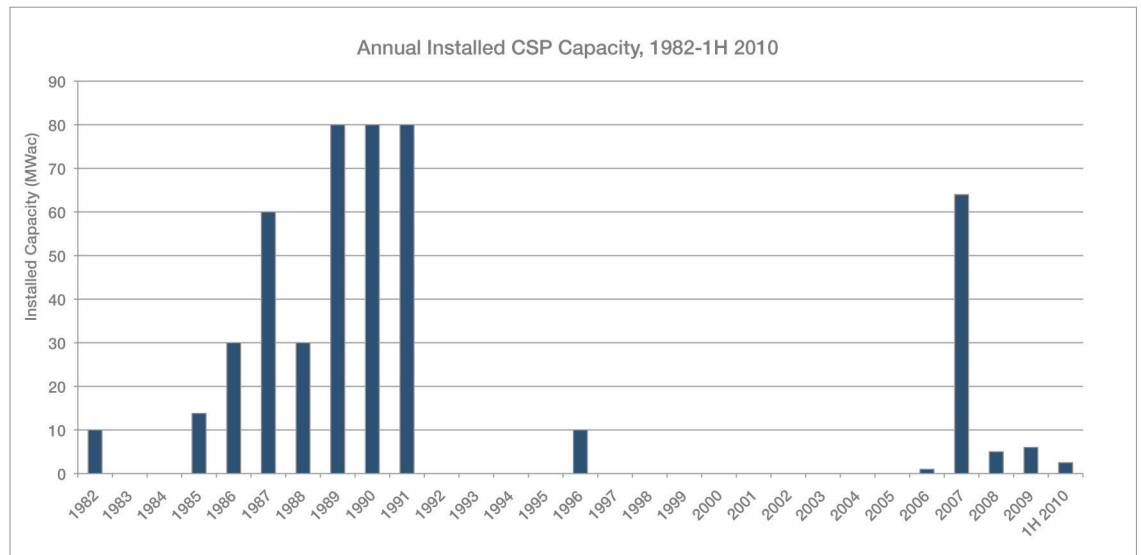
Domestic concentrating solar power (CSP) experienced a burst of projects in California in the 1980s, and then went quiet for two decades. In the last several years, Spain's feed-in-tariff has allowed it to take the reins as the CSP leader with over 400 MW operating today. But the U.S. is poised to regain leadership with a CSP project pipeline of 46 projects for a combined 10 GW under development in the southwest.

#### 3.1 INSTALLATIONS

In the first half of 2010 two CSP projects came online in the U.S. In Q1, the 1.5 MW Tessera/Stirling Maricopa Dish-Engine project was completed in Arizona. In Q2, the 1 MW Abengoa Solar Cameo Hybrid plant (also known as the Colorado Integrated Solar Project) came online in Colorado.

As shown in Figure 3-1 above, the CSP industry in the U.S. was essentially dormant from 1992 to 2006. Since 2006, there has been one project of scale - a 64 MW trough plant in Nevada in 2007. The last three years has seen small demonstration plants for various technologies: a 5 MW CLFR plant in California in 2008, a 5 MW tower plant in California in 2009, and a 1 MW micro-CSP plant in Hawaii in 2009.

**Figure 3-1:**  
CSP Annual Installed Capacity, 1982-1H 2010



#### 3.2 INSTALLED PRICE

The installed prices per watt for the two projects completed in 2010 are not particularly useful. The Maricopa plant was a demonstration facility, and its costs were not indicative

of the cost per watt that a 100+ MW facility would be able to achieve. The expected cost for a dish-engine project at utility scale is in the range of \$3.00/Wac-\$4.50/Wac. In the case of the Cameo project, the costs per watt are understated relative to standalone trough projects as the Cameo solar field acts as a booster to an existing power plant and therefore didn't require the construction of a power block. A typical cost for a trough plant with wet cooling and no storage would be in the range of \$4.50/Wac-\$6.00/Wac.

## 4 SOLAR HEATING & COOLING (SHC)

The Solar Heating & Cooling (SHC) category is composed of two distinct markets: Solar Water & Space Heating (SWH) and Solar Pool Heating (SPH). Each of these industries has its own distinct manufacturers and integrators (with limited overlap). In addition the collectors used are different, and the system and per square foot (sq ft) pricing are unrelated. In general, rebates and tax credits are only available for SWH and not for SPH systems. Accordingly, we have analyzed SWH and SPH separately.

The SWH market was in its heyday in the early 1980s. Oil prices were high, government incentives were generous, and manufacturers and installers struggled to keep up with demand. That all changed when the incentives were removed in the mid 1980s. Since then, the SWH market treaded water for two decades, but has seen healthy growth over the last several years, with 2010 shaping up to be another positive year.

The SPH market in the U.S. peaked in 2006, and has declined over the last several years - in part due to weakness in the housing market. But after three years of consecutive declines, 2010 looks likely to show annual growth. With around five million pools in the country, and 33,000 SPH systems installed in 2009, the U.S. remains the largest SPH market in the world.

### 4.1 SOLAR WATER & SPACE HEATING (SWH)

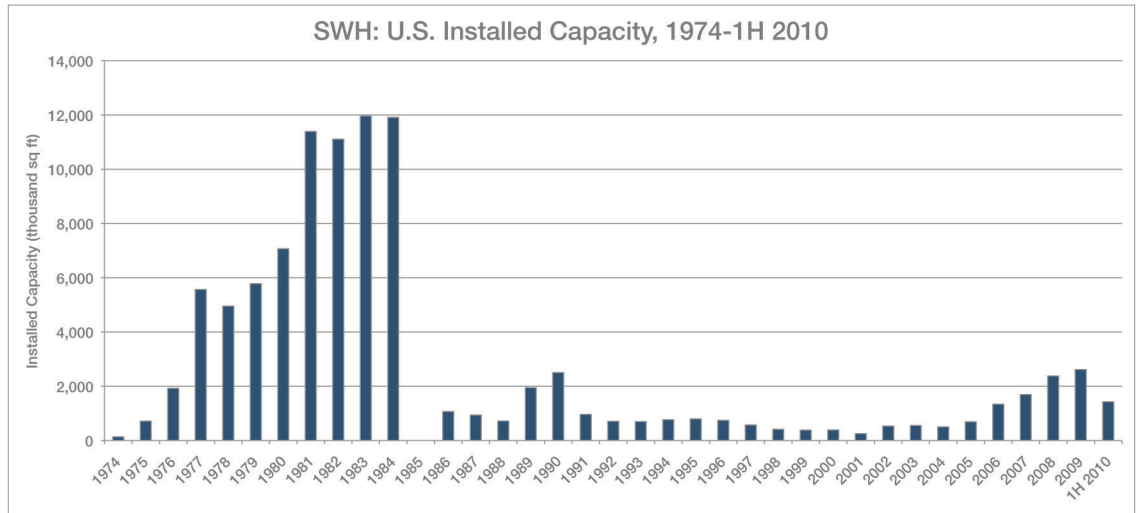
#### 4.1.1 Installations

In the first half of 2010, 1,431 thousand square feet (tsf) of solar thermal collectors were installed across the United States. Should the rate of installations remain constant during the second half of the year, the sector is on track to grow 9% over the 2,620 tsf installed in 2009. In most top markets, new installations were fueled by a combination of state tax credits, state and utility rebate programs, and, in some cases, mandatory use of solar hot water systems in new home construction.

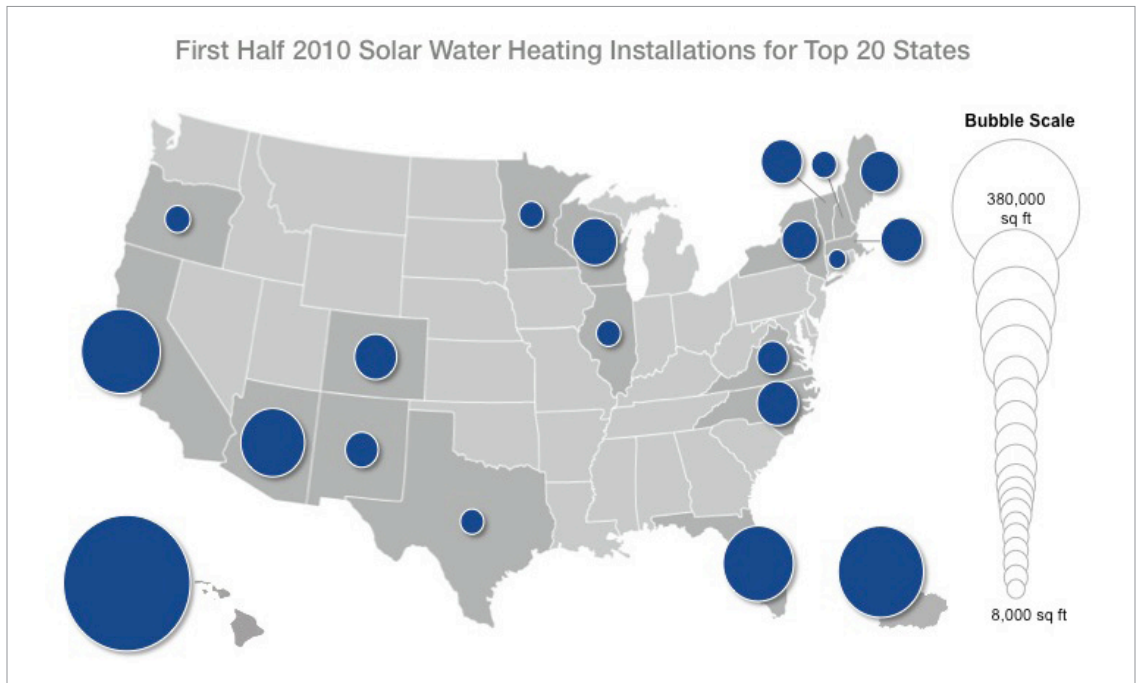
As shown in Figure 4-1 below, the U.S. SWH market boomed during the early 1980s thanks to high oil prices and government incentives - only to have the rug pulled out from

under it when federal incentives went away. The market stayed relatively flat from 1991 to 2005, but showed healthy growth over the last few years. Based on the first half, 2010 is shaping up to be another growth year for the industry.

**Figure 4-1:** SWH U.S. Installed Capacity, 1974-1H 2010



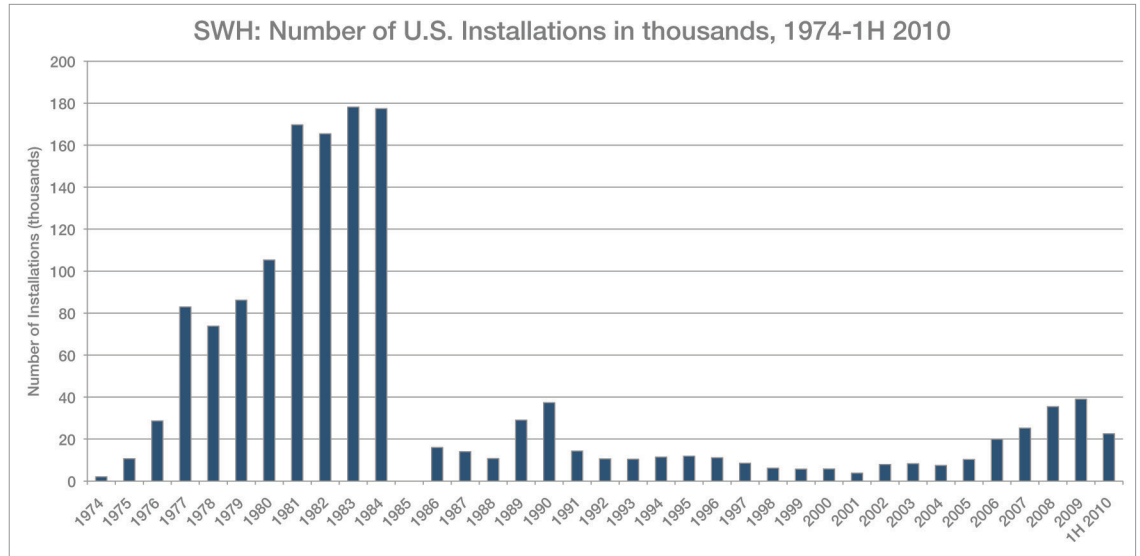
**Figure 4-2:** First Half 2010 SWH Installations by State



The total number of SWH installations in 1H 2010 was 22,567, which is on pace to exceed the 2009 level by 9%. It should be noted that the number of installations is only a quarter of the 170,000+ systems per year that the industry was completing back in the early 1980s.



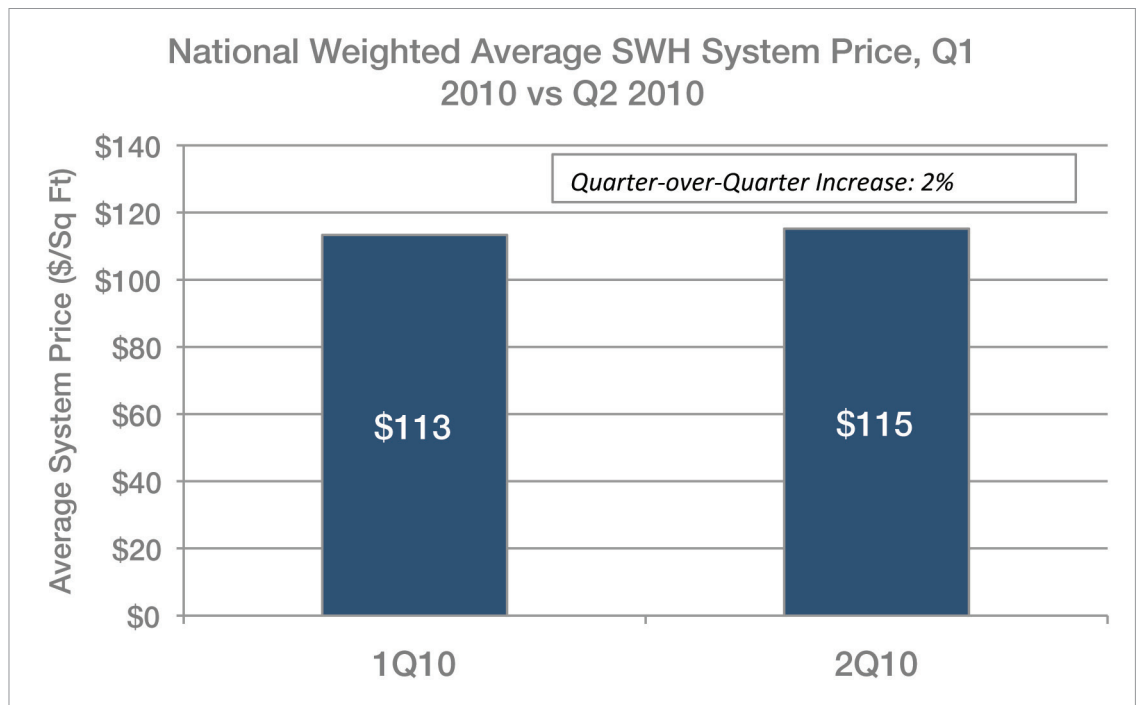
**Figure 4-3:** Number of U.S. SWH Installations in Thousands, 1974-1H 2010



**4.1.2 Installed Price**

SWH system prices per sq ft of collector area remained relatively flat with a slight increase of 2% from \$113/sq ft in Q1 to \$115/sq ft in Q2.

**Figure 4-4:** SWH National Weighted Average SWH System Price, 1H 2010



### 4.1.3 Manufacturing Production

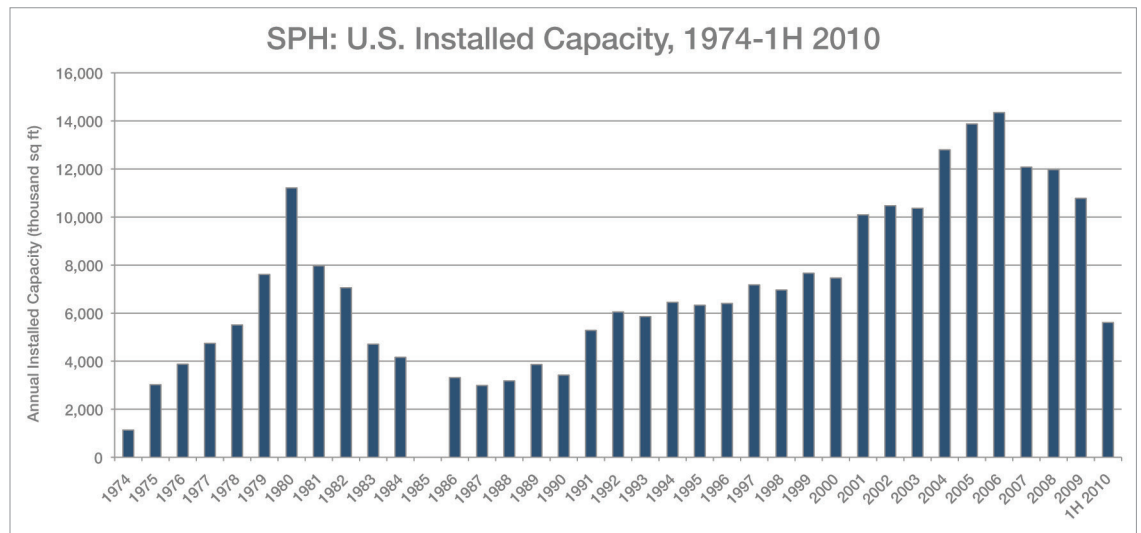
Total SWH collector manufacturing production in 1H 2010 was 1,254 tsf – for an annualized rate of 2.5 million sq ft. This is lower than the expected level of SWH installations at 2.9 million sq ft, as the U.S. is a net importer of SWH collectors. The U.S. imports about 700 tsf of SWH collectors per year, and only exports about 100 tsf. There was no significant change in U.S. production of SWH collectors from Q1 to Q2 2010.

## 4.2 SOLAR POOL HEATING (SPH)

### 4.2.1 Installations

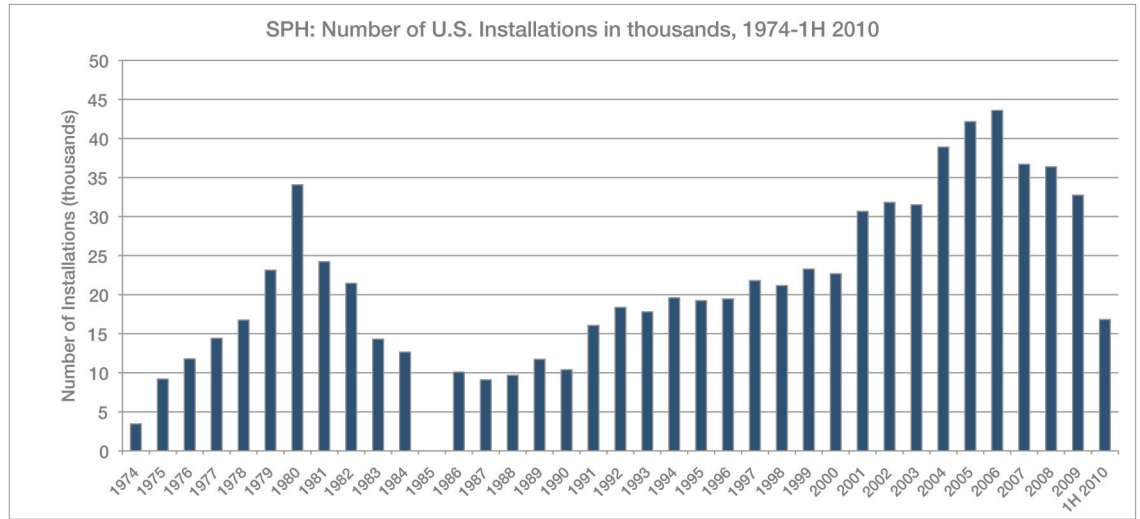
In the first two quarters of 2010, over 5.6 million sq ft of solar pool heating collectors were installed in the United States. On an annualized basis, this represents a 4% increase in the amount of solar pool heating installations. Non-residential applications have increased at a higher rate – closer to 50% annually. After peaking in 2006 at around 14 million sq ft, installed capacity of SPH systems declined for the last 3 years, although 2010 may reverse this trend.

**Figure 4-5:** U.S. SPH Installed Capacity, 1974-1H 2010



The total number of SPH systems installed in the U.S. in 1H 2010 was 16,821 – which equates to an average system size of 333 sq ft. At this pace, there would be 34,000 SPH systems installed in 2010, which would be up 3% over the 33,000 installed in 2009.

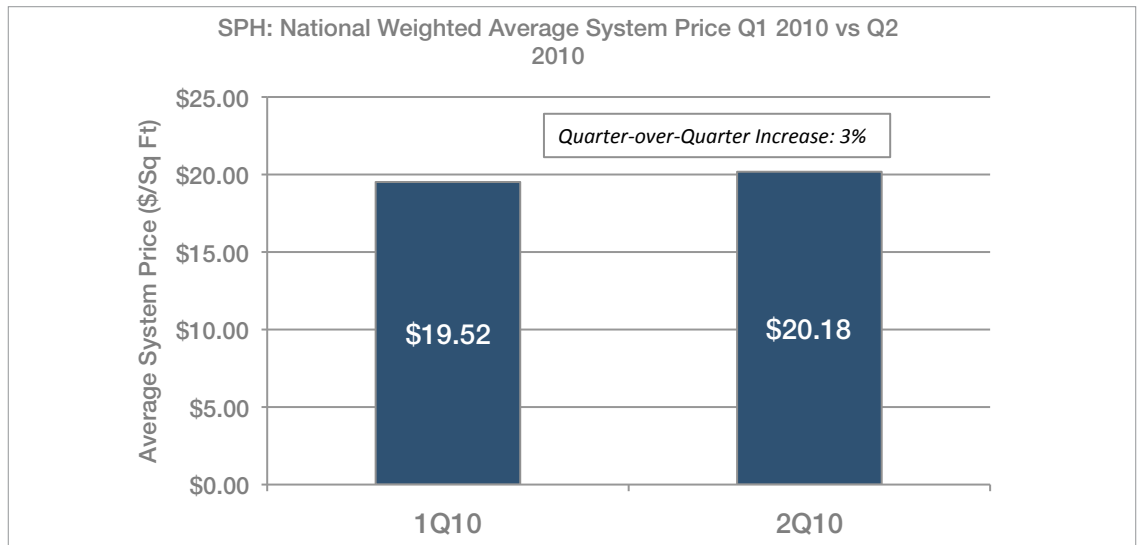
**Figure 4-6:** Number of U.S. SPH Installations, 1H 2010



**4.2.2 Installed Price**

For the first two quarters of 2010, the installed price per square foot of solar pool heating systems remained relatively flat at around \$20/sq ft.

**Figure 4-7:** National Weighted Average SPH System Price, 1H 2010



**4.2.3 Manufacturing Production**

Total U.S. manufacturing capacity for SPH collectors is estimated at 5.7 million square feet per quarter. The estimated production for Q1 2010 was 1.985 million square feet. This represents a 35% capacity utilization. Estimated production in Q2 was up over 40% versus the previous quarter. This significant increase is one obvious sign of the turnaround in the SPH market in 2010. For Q2, the estimated capacity utilization was 50%.

All figures source SEIA/GTM Research. For more detail on methodology and sources, visit [www.gtmresearch.com/solarinsight](http://www.gtmresearch.com/solarinsight)

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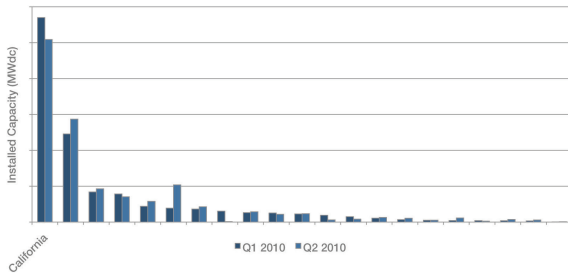
## 2nd Quarter 2010

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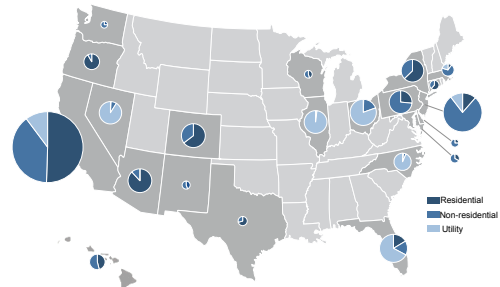
BRIEF REPORT

FULL REPORT

Non-Utility PV Installed Capacity by State, Q1 2010 and Q2 2010



First Half 2010 PV Installations by Market Segment by State



### + MARKET SEGMENTATION AND STATE DATA:

- › Total installed capacity and number of installations in the top 20 states
- › National installations by market segment
- › Blended installed cost by state (no market segmentation)
- › National 5-year demand projections by technology (PV, CSP, SHC) and market segment

### + DEEPER DATA AND COMPONENT DATA:

- › Installed capacity by market segment in each of the top 20 states
- › Installed cost by market segment for each state and national installed cost by system size
- › National component pricing (polysilicon, wafer, cell, module, inverter, thermal collectors, thermal BOS)
- › Manufacturing capacity and production by component by state
- › Installed capacity by ownership model type

### REPORT PRICING

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