



Background Article

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U.S. Solar Trends Update

By Neshama Abraham, Director of Marketing & Communications, [American Solar Energy Society](http://www.ases.org)

Overview – Solar energy is a major economic driver for the United States, creating green jobs and vigorous revenue growth for participating companies. Despite a downturn in the U.S. economy, the American solar industry posted spectacular growth numbers in solar deployment during 2009. Photovoltaic (PV) installations increased 40 percent from 2008 to 2009. ASES predicts a 50 to 100 percent increase in solar deployment in 2010.

According to ASES's pioneering report: *[Green Collar Jobs in the U.S. and Colorado – Economic Drivers for the 21st Century](#)*, the renewable energy (RE) and energy efficiency (EE) industries generated more than 9 million jobs, more than \$1 trillion in revenue, and nearly \$160 billion in federal, state, and local tax revenue in 2007. Our report determined:

“If U.S. policymakers aggressively commit to programs that support the sustained orderly development of RE & EE,” these **RE & EE industries could “generate up to \$4.3 trillion in revenue in the United States and create more than 37 million jobs by the year 2030”** – that’s 17 percent of the U.S. work force. To follow are solar electric and solar thermal installation figures.

Photovoltaics

Overview – Photovoltaic cells are semiconductor devices that generate electricity when exposed to the sun. Manufacturers assemble the cells into solar modules which can be installed on roofs or walls, or on ground-mounted arrays. PV was invented in the United States in the 1950s, and was first used to power satellites.

U.S. Deployment – Grid-connected PV installations in 2009 grew by 40 percent to 435 megawatts (MW) DC, bringing total installed grid-connected capacity to 1.25 gigawatts (GW) DC. In 2009, solar PV was installed at more than 33,000 sites, a 76 percent increase over solar electric systems installed in 2008, and four times more than the amount of solar electric installed during 2006.

Residential – Installations in homes accounted for 36 percent of solar PV growth in 2009 (see **figure 1**.) The residential sector’s market share was significantly higher than the 27 percent market share in 2008.

Non-Residential – This sector, which includes government buildings, military installations, and retail stores, accounted for 49 percent of solar installations in 2009. Unlike 2008, where non-residential installations were the largest solar sector, the non-residential sector had flat growth in 2009.

Utility-Scale – This area includes installations for bulk utility-scale power production. Utility installations tripled in 2009, comprising 15 percent of grid-connected PV systems installed in 2009. Two noteworthy PV projects installed in 2009: a 25 MW facility in Florida and a 21 MW project in California.

State View – Grid-tied PV systems installed in 2009 were concentrated in five U.S. states in order of rank: California, New Jersey, Florida, Colorado, and Arizona (see Table 1). The solar electric market more than doubled in New Jersey, Florida, Arizona, Massachusetts, and Texas, with Florida moving up from 16th place to 3rd place for installed PV installations due to the 25 MW utility-scale project mentioned above. California has the highest total PV capacity per capita of 20.8 watts -dc/person – almost five times the national average of 4.2 watts per capita (see Table 2).



Solar Thermal

Overview – Low-temperature solar thermal collectors produce heat for hot water for domestic or commercial use, for space heating to heat and cool buildings, and to heat swimming pools and spas. A variety of flat plate, evacuated tube, and concentrating collector technologies produce the heat needed for these applications.

U.S. Installations – According to the Solar Energy Industries Association (SEIA), the solar water-heating market grew 10 percent in 2009, compared to a 40 percent increase in 2008 and a 26 percent increase in 2007.

Solar Hot Water & Space Heating – Hawaii is the dominant state in the solar hot water market, accounting for 27 percent of solar hot water installations in 2009 (see Figure 3). Based on data from the Energy Information Administration (EIA), prior to 2006, about half of annual solar water heaters sold in the U.S. were in Hawaii. By 2008, installations outside Hawaii increased by seven times. After Hawaii, the leading states for solar water-heating installations are California, Puerto Rico, Florida, and Arizona (see Figure 4).

Solar pool heating – Annual installed capacity for solar pool heating systems fell by 1 percent from 2007 to 2008. This is an upswing as compared to a decline of 15 percent in solar pool heating capacity from 2006 to 2007. Florida and California are the largest markets for solar pool heating and solar pool sales have declined for three straight years due to the weakened real estate market in these two states (see Figure 5).

Concentrating Solar Power

A recognized growth area for solar energy is high-temperature solar thermal electric-generating systems, more commonly known as **concentrating solar power (CSP) plants**. These plants are based on mature technology, using mirrors and collecting receivers to heat a fluid to a high temperature (300°F to more than 1,000°F) and then run the heat extracted from the fluid through a traditional steam turbine or a Stirling engine to spin an electric generator. CSP can be paired with existing or new steam-turbine or gas-turbine power plants, providing high-temperature heat into the thermal cycle. These generating stations produce base load power on the utility side of the meter.

The Southwestern United States has several CSP plants in deployment. The 354MW SEGS (Solar Energy Generating Stations) in California's Mojave Desert have been producing power for the grid reliably and profitably since 1991. Nevada Solar One, generating 75MW, came on line in 2007. Xcel Energy commissioned a 45MW array in Grand Junction, Colo. this summer. A number of CSP plants are scheduled to go on line beginning in 2011 in the Southwest and Florida. A few of these plants incorporate molten-salt thermal storage systems to enable electric power generation late into the evening hours.

"We see CSP plant technology, with built-in storage capacity, as one of the major renewable energy solutions to sustainably replace fossil fuels and provide proven large-scale solar powered electricity to the electrical grid 24 hours a day," said Brad Collins, Executive Director of ASES.

2010 Projections

"Based on early predictors, we estimate a grid-connected PV growth of 50 to 100 percent in 2010," said Collins. "However the continued growth of the U.S. solar industry is directly tied to Congress passing supportive RE & EE government policies. Every day when the sun comes up, people know that the sun is a sustainable solution to our energy situation. American scientists started the solar energy industry. It's time for U.S. businesses and the American people to make our voices known to move solar to a mainstream energy solution in the U.S."



For ASES policy recommendations on climate reduction/ clean energy legislation and our Report Card to the 111th Congress, please visit www.ases.org. ASES grassroots solar advocacy program based in Washington, DC – [Solar Nation](#) – produces free Action Alerts to encourage grassroots response on the state and federal level.

American technology

Most of the technologies described above were invented and developed in the United States. American scientists and solar researchers were founding members of the Association for Applied Solar Energy, launched in 1954. AFASE grew to become both the American Solar Energy Society and the International Solar Energy Society.

Acknowledgments

The author credits the data, tables, and figures in this article to the 2010 Interstate Renewable Energy Council (IREC) report prepared annually by Larry Sherwood. Mr. Sherwood's report was first published in Conference Proceedings for [SOLAR 2010](#), the 39th annual ASES National Solar Conference. The full article [Solar Energy Trends](#) is available in the July/August 2010 issue of [SOLAR TODAY](#) Magazine with back issues of the magazine available digitally. Mr. Sherwood, president of Sherwood Associates, is a former Executive Director for ASES.

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