



# California's Solar Cities 2012

Leaders in the Race Toward  
a Clean Energy Future



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Cover Photo: Solar panel installations at Point Loma Nazarene University in San Diego courtesy of SPG Solar

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# Executive Summary

California's solar market is thriving. Ten years ago, solar panels atop roofs were a rarity. Today, solar is taking hold in cities across the state, from coastal metropolises to agricultural and industrial hubs in the Central Valley. **In the past two years alone, the solar industry has installed more than 5,000 kilowatts of solar power in each of 10 different California cities.\***

Solar energy makes sense for California. Each new solar panel helps to clean our air, fight global warming, improve the reliability of our electricity grid, boost the economy, and create much-needed jobs.

California has just begun to tap into the vast potential of solar energy. Governments, utilities and the public should

continue to work together toward a clean energy future.

## **Solar cities are the heart of California's thriving solar market.**

- San Diego leads all California cities in terms of the number of solar installations on residential, commercial and government buildings, with more than 4,500 projects installed. San Diego also leads the state in terms of overall solar generation capacity, with nearly 37 megawatts (MW). (See Table ES-1.) If San Diego were a nation unto itself, it would rank among the top 25 nations in the world in terms of solar capacity, with more solar

\*All solar capacity figures in this report are presented in terms of alternating current watts, measured under California Energy Commission PTC test conditions, unless otherwise noted.

power than the entire nation of Mexico.

- Los Angeles ranks second, with more than 4,000 solar installations adding up to more than 36 MW of power generation capacity.
- San Jose ranks third, with more than 2,700 solar installations and 31 MW of solar electric generation capacity.
- In addition, San Francisco, Fresno, Bakersfield, Santa Rosa, Roseville, Clovis, Sacramento and Oakland all have more than 1,000 solar installations. In terms of generation capacity, Fresno, San Francisco, Bakersfield, Sacramento, and Santa Rosa all have more than 10 MW installed.



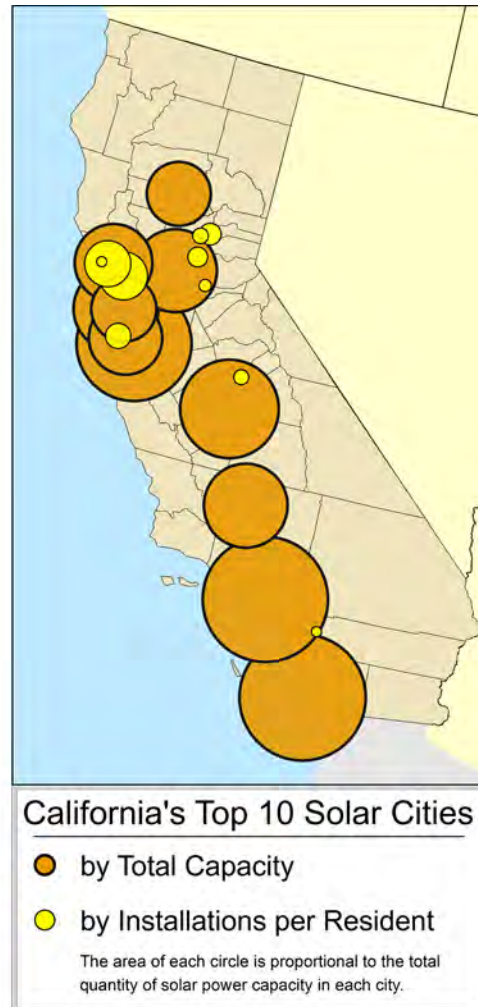
*In the past two years alone, the solar industry has installed more than 5 MW of solar panels in each of 10 California cities. The state now has more than 1,000 MW of solar power capacity, more than all but 5 countries in the world.*

**Table ES-1: California’s Top 10 Solar Cities by Generation Capacity and by Number of Installations**

City	Solar Capacity (MW <sub>AC</sub> )	Rank by Capacity	Number of Installations	Rank by Installations
San Diego	37	1	4,507	1
Los Angeles	36	2	4,018	2
San Jose	31	3	2,733	3
Fresno	22	4	2,146	5
San Francisco	17	5	2,405	4
Bakersfield	16	6	1,643	6
Sacramento	16	7	1,119	10
Santa Rosa	14	8	1,467	7
Oakland	10	9	1,010	11
Chico	9	10	615	19
Clovis	8	11	1,133	9
Roseville	3	84	1,170	8

*Cities with a larger number of installations but less capacity have more residential installations, which tend to be smaller in size than those found on top of commercial or government buildings – accounting for the differences between the top 10 lists by number of installations and overall capacity.*

Figure ES-1: California's Solar Cities



California's solar market is geographically diverse. Solar installations are taking hold from coastal urban centers to mountain communities to towns in the Central Valley. (See Tables ES-2 and ES-3.)

- Among cities with at least 50,000 residents, Santa Cruz, Clovis, Rocklin, Davis, Watsonville and Roseville have the most solar installations per resident. Chico, Woodland, Rancho Cordova, Livermore, and Petaluma have the most solar generation capacity per resident.
- Among large towns, with between 10,000 and 50,000 residents, Sonoma (Sonoma County), Grass Valley (Nevada County) and Auburn (Placer County) have the most solar installations per resident. Sonoma, Auburn and Oroville (Butte County) lead in terms of solar capacity per resident.
- Solar has reached its greatest penetration per capita in the northern Bay Area, the Sierra foothills, and the Central Valley. The small towns of Sebastopol (Sonoma County), Newcastle (Placer County),

### Calculating Cities' Solar Installations and Generation Capacity

This report documents the number of grid-connected solar electric systems installed in California and their total electric generation capacity on a city-by-city basis. It focuses on solar photovoltaic installations that by and large are owned by ratepayers or third-party financing companies, as opposed to an electric utility, and are located on or near buildings throughout the state.

The report compiles solar energy installation data from the California Energy Commission, California Public Utilities Commission, the California Center for Sustainable Energy, and the state's private and public utilities. The data represent the most recent available information from each source at the time of data collection, covering a time period through no later than the close of August 2011. For more details, see the Methodology section on page 23.

**Table ES-2: California’s Leading Solar Cities in Terms of Installations per 100 Residents**

Rank	Small Towns with 1,000 to 10,000 Residents		Large Towns with 10,000 to 50,000 Residents		Mid-Sized Cities with More than 50,000 Residents	
	City	Installations per 100 Residents	City	Installations per 100 Residents	City	Installations per 100 Residents
1	Sebastopol	10.3	Sonoma	4.5	Santa Cruz	1.4
2	Newcastle	10.2	Grass Valley	3.4	Clovis	1.2
3	Nevada City	9.9	Auburn	3.3	Rocklin	1.1
4	Penn Valley	8.0	Mill Valley	2.4	Davis	1.1
5	Coarsegold	6.3	Healdsburg	2.4	Watsonville	1.1
6	Romoland	5.6	Ladera Ranch	2.2	Roseville	1.0
7	Portola Valley	5.0	Placerville	2.2	Santa Rosa	0.9
8	Plymouth	4.6	Ramona	1.9	San Ramon	0.8
9	Kenwood	4.6	Los Gatos	1.8	Santa Barbara	0.8
10	Occidental	4.1	Rancho Mirage	1.7	Berkeley	0.8

**Table ES-3: California’s Leading Solar Cities in Terms of Capacity (Watts) per Resident**

Rank	Small Towns with 1,000 to 10,000 Residents		Large Towns with 10,000 to 50,000 Residents		Mid-Sized Cities with More than 50,000 Residents	
	City	Capacity (Watts) per Resident	City	Capacity (Watts) per Resident	City	Capacity (Watts) per Resident
1	Herald	3,845	Sonoma	507	Chico	110
2	Edwards AFB	2,078	Auburn	420	Woodland	100
3	Lebec	1,061	Oroville	313	Rancho Cordova	99
4	Maxwell	927	Healdsburg	266	Livermore	98
5	Middletown	883	Newman	205	Petaluma	97
6	San Miguel	875	Rancho Mirage	171	Hanford	95
7	Newcastle	762	Paso Robles	170	Napa	89
8	Kenwood	740	Grass Valley	151	Clovis	87
9	Sebastopol	670	Oakdale	148	Pleasanton	87
10	St. Helena	663	Placerville	138	Santa Rosa	84

and Nevada City (Nevada County) lead the state in terms of number of solar installations per resident. Herald (Sacramento County), Edwards Air Force Base (Kern County), and Lebec (Kern County) lead the state in terms of solar capacity per capita.

**Despite the development of thriving solar markets in cities across the state, California has only just begun to capture its tremendous potential for solar power.**

- The National Renewable Energy Laboratory estimates that the state could host more than 80,000 MW



of rooftop solar in total – enough to generate more than a third as much electricity as California uses in a year.

- Through 2011, California has installed more than 1,000 MW of solar capacity on residential and commercial rooftops. Despite this substantial progress, vast potential remains to be developed.

**California should continue to build the strength of its solar energy market. Key steps include:**

- Ensure that the Million Solar Roofs Initiative reaches its goal by the end of 2016.
- Increase the use of solar energy systems in new construction by requiring all new homes to include solar power or other on-site renewable electricity generation by no later than 2020, and all new non-residential buildings by no later than 2030,

through a net-zero energy building code requirement.

- Adopt a strong feed-in-tariff policy to encourage solar power installation on warehouses, parking lots and other sites with low on-site energy demands but high levels of sunshine.
- Maintain or enhance the incentive value of net metering and lift the cap on its use to allow all California ratepayers to benefit from going solar.
- Remove barriers to installing solar energy systems at the local and state levels by streamlining interconnection and permitting.
- Finally, California should continue to set ambitious clean energy goals – such as Governor Jerry Brown’s goal of installing 12,000 MW of distributed electricity generation in California by 2020 – and adopt innovative policies to achieve them.

# Introduction

As anyone who has flown into Los Angeles International Airport knows, California cities have a lot of empty rooftop space. During the day, the rays of the sun bathe those rooftops in light – and practically endless amounts of energy.

Increasingly, Californians are replacing empty rooftop spaces with solar panels. In the process, they are transforming the state’s electricity system and helping to build a brighter future for their communities.

Solar power makes sense for California. Every watt of electricity from a solar panel reduces the need for dirty, unsafe energy sources like natural gas, coal, or nuclear power. Also, every solar panel installed on a rooftop or near a building translates into jobs for Californians and fuel for the state economy.

At the state level, California’s leaders have launched incentive programs designed to turn solar power into a commonplace and affordable energy resource for average citizens. In 2006, the California Legislature created the Million Solar Roofs Initiative, now part of the “Go Solar California” campaign, to direct the investment of \$3.3 billion in small-scale solar electric power systems. The initiative is on track to reach its 2016 goal of increasing the state’s solar generation capacity by 3,000 megawatts (MW), which will help cut the cost of solar power in half and create a mainstream market for solar power.<sup>1</sup>

At the local government level, leaders have offered additional cash incentives, created programs to walk citizens through the steps needed to go solar, reduced permitting obstacles facing so-



*In 2011, Point Loma Nazarene University in San Diego had solar photovoltaic panels installed on top of this covered parking structure. San Diego is the leading solar city in California.*

lar installers, and installed solar power systems on their own properties.

These efforts have opened the door for every citizen to play an important role in building a new, clean energy future for California. And the results are increasingly visible in communities across the state.

In this report, Environment California Research & Policy Center takes a snapshot of the development of Califor-

nia's solar market at the close of the year 2011. The report catalogs the amount of solar power installed by city, identifying the hubs of the state's thriving solar economy.

In the years to come, these solar cities will continue to lay the groundwork for the next great energy transition – one that will transform our economy, generate jobs, protect our health, and preserve our environment for generations to come.

# California's Solar Market Is Thriving

Solar power is taking hold in cities across California, from coastal metropolises to agricultural and industrial hubs in the Central Valley. Driven substantially by progress in California, solar is the fastest growing industry in America.<sup>2</sup>

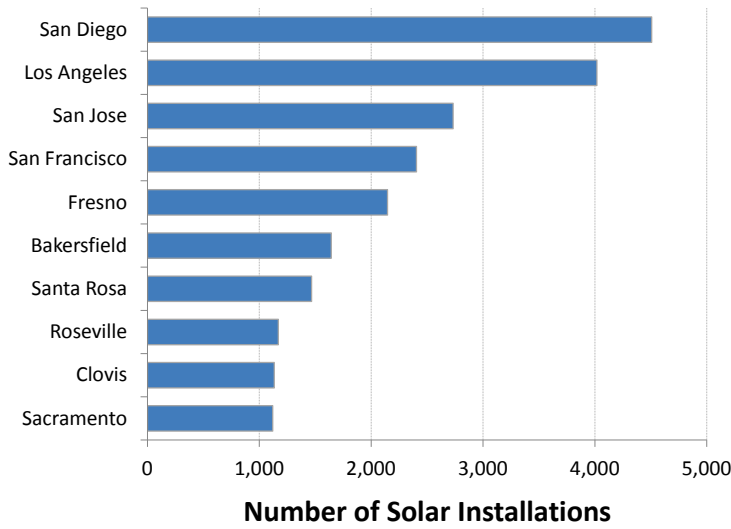
Over the last decade, the market for solar energy systems on or near homes and buildings in California grew nearly 100-fold. In 2000, California had fewer than 1,000 rooftop solar systems, with less than 10 megawatts (MW) of total electric generation capacity.<sup>3</sup> In 2011, California passed the milestone of installing 1,000 MW of distributed, or local, solar capacity, with more than 100,000 separate installations.<sup>4</sup> The state's solar market continues to grow exponentially, at a pace of up to 40 percent per year.<sup>5</sup>

## Solar Cities Are the Heart of California's Thriving Solar Market

Residents, businesses and local governments in California's leading solar cities are the center of activity for the state's rapidly expanding solar power industry. California's top 10 solar cities each have more than 1,000 rooftop solar systems with more than 5,000 kW of installed solar capacity. Not coincidentally, these cities are also among the state's most populous.

San Diego leads the state in terms of the number of solar installations, with more than 4,500 projects completed. San Diego is home to the only general-market California solar rebate program administered by a non-profit organization, the California Center for

**Figure 1: California's Top Solar Cities by Number of Installations**



Sustainable Energy, in concert with the local utility, San Diego Gas & Electric. This program has been particularly effective in driving solar power into the residential market. Confirmed projects in its service territory add up to almost two-thirds of its residential goal under the Million Solar Roofs Initiative – ahead of programs in the service territories of both Southern California Edison and Pacific Gas & Electric.<sup>6</sup>

In terms of the number of solar energy systems installed to date, San Diego is followed by Los Angeles, San Jose, San Francisco and Fresno, which have more than 2,000 solar installations each. Bakersfield, Santa Rosa, Roseville, Clovis, and Sacramento round out the top 10, each with more than 1,000 solar installations. (See Figure 1.)

The presence of Fresno, Bakersfield, Roseville, Clovis and Sacramento among the top 10 shows that the market for solar power extends to important Central Valley communities, in addition to the state's coastal population centers.

## Leading Solar Cities Have Globally Significant Amounts of Solar Capacity

Once again, San Diego leads all California cities in terms of the total capacity of its solar power systems to generate electricity – a measure of the size of solar installations. Altogether, San Diego's rooftop solar systems have the capacity to generate nearly 37 megawatts (MW) of electricity at peak output. If San Diego were a nation unto itself, it would rank among the top 25 nations in the world in terms of solar capacity, with more solar power than all of Mexico.<sup>7</sup> San Diego's solar panels produce more than \$9 million worth of electricity annually.<sup>8</sup>

Los Angeles comes in right behind San Diego in second place, with more than 36 MW of solar generation capacity. San Jose ranks third, with solar installations totaling 31 MW. In addition, Fresno, San Francisco, Bakersfield, Sacramento, and Santa Rosa all have more than 10 MW installed.<sup>9</sup> (See Figure 2.)

Cities with a larger number of installations but less capacity likely have more residential installations, which tend to be smaller in size than those found on top of commercial or government buildings – accounting for the small differences between the top 10 lists by number of installations and overall capacity.

## Santa Rosa and Clovis Stand Out

Out of California's top 10 solar cities with the most solar installations, Santa Rosa and Clovis stand out in terms of the development of their local solar markets. Each of these cities has about 10 solar installations, or about 80 kW of solar capacity, for every 1,000 residents.

In comparison, San Diego and Los Angeles – although they lead the pack overall – have much less developed solar markets. San Diego has about three solar installations for every thousand people, while Los Angeles only has one solar installation for every thousand residents.

## California’s Solar Market Is Diverse

California’s solar power market is geographically diverse. Throughout the state – in both rural and urban areas – homes, businesses, farms, schools, and other buildings are hosting solar power systems. Solar installations are happening from coastal urban centers to mountain communities to towns in the Central Valley.

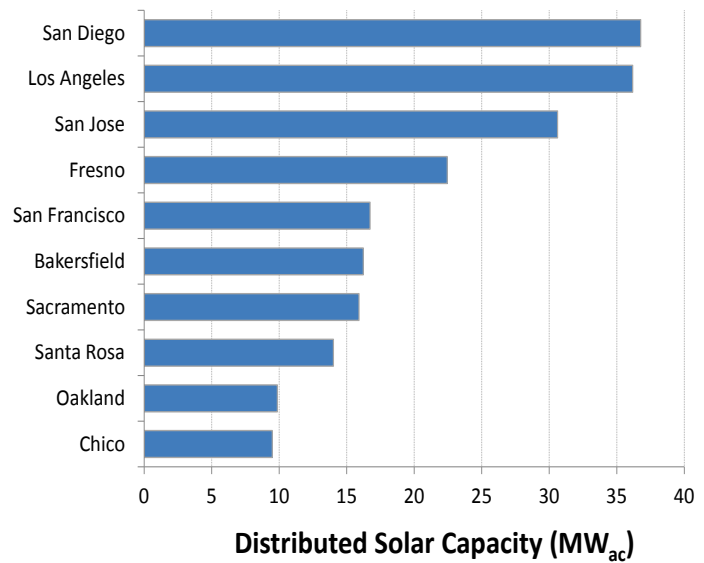
## The Most Developed Solar Markets

### Mid-Size Cities

Among cities with at least 50,000 residents, Santa Cruz, Clovis, Rocklin, Davis, Watsonville, and Roseville all have more than 10 installations for every 1,000 residents. In terms of total solar capacity, Chico and Woodland lead with at least 100 W per resident. (See Tables 3 and 4.)

If the city of Los Angeles achieved the same levels of solar penetration as Santa Cruz and Chico, it would have more than 50,000 solar rooftops and 400 MW of solar power. That would rank Los Angeles as one of the world’s leading solar markets, similar in size to the market in the nation of Australia.<sup>10</sup>

**Figure 2: California’s Top Solar Cities by Generation Capacity**



**Figure 3: California’s Solar Cities by Location**



### Large Towns

Among large towns – those with between 10,000 and 50,000 residents:

- Sonoma, the seat of Sonoma County, located in California’s wine country just west of Napa, has 4.5 installations and 51 kW of solar capacity for every 100 residents.
- Auburn, located at the foot of the Sierra Nevada on the I-80 corridor west of Sacramento, has 3.3 installa-

tions and 42 kW of solar capacity for every 100 residents.

- Grass Valley, in Nevada County, north of the I-80 corridor at the foothills of the Sierra Nevada, has 3.4 solar installations for every 100 residents.
- Oroville, located about 65 miles north of Sacramento in Butte County, has 31 kW of solar for every 100 residents. (See Tables 5 and 6.)

**Table 3: Top Mid-Size Cities – Number of Solar Installations per Capita**

Rank	City	Number of Installations per 100 Residents
1	Santa Cruz	1.4
2	Clovis	1.2
3	Rocklin	1.1
4	Davis	1.1
5	Watsonville	1.1
6	Roseville	1.0
7	Santa Rosa	0.9
8	San Ramon	0.8
9	Santa Barbara	0.8
10	Berkeley	0.8

**Table 4: Top Mid-Size Cities – Solar Capacity per Capita**

Rank	City	Solar Capacity per Capita (Watts)
1	Chico	110
2	Woodland	100
3	Rancho Cordova	99
4	Livermore	98
5	Petaluma	97
6	Hanford	95
7	Napa	89
8	Clovis	87
9	Pleasanton	87
10	Santa Rosa	84

**Table 5: Top Large Towns – Number of Solar Installations per Capita**

Rank	City	Number of Installations per 100 Residents
1	Sonoma	4.5
2	Grass Valley	3.4
3	Auburn	3.3
4	Mill Valley	2.4
5	Healdsburg	2.4
6	Ladera Ranch	2.2
7	Placerville	2.2
8	Ramona	1.9
9	Los Gatos	1.8
10	Rancho Mirage	1.7

**Table 6: Top Large Towns – Solar Capacity per Capita**

Rank	City	Solar Capacity per Capita (Watts)
1	Sonoma	507
2	Auburn	420
3	Oroville	313
4	Healdsburg	266
5	Newman	205
6	Rancho Mirage	171
7	Paso Robles	170
8	Grass Valley	151
9	Oakdale	148
10	Placerville	138

**Table 7: Top Small Towns – Number of Solar Installations per Capita**

Rank	City	Number of Installations per 100 Residents
1	Sebastopol	10.3
2	Newcastle	10.2
3	Nevada City	9.9
4	Penn Valley	8.0
5	Coarsegold	6.3
6	Romoland	5.6
7	Portola Valley	5.0
8	Plymouth	4.6
9	Kenwood	4.6
10	Occidental	4.1

**Table 8: Top Small Towns – Solar Capacity per Capita**

Rank	City	Solar Capacity per Capita (Watts)
1	Herald	3,845
2	Edwards AFB	2,078
3	Lebec	1,061
4	Maxwell	927
5	Middletown	883
6	San Miguel	875
7	Newcastle	762
8	Kenwood	740
9	Sebastopol	670
10	St. Helena	663

**Small Towns**

The most developed markets, measured by the number of installations per resident, can be found among small towns in the northern Bay Area, the Sierra foothills, and the Central Valley. Among towns with between 1,000 and 10,000 residents:

- Sebastopol, located about 50 miles north of San Francisco in Sonoma County, has 10.3 solar installations for every 100 residents.
- Newcastle, located 30 miles north of Sacramento on the I-80 corridor in Placer County, has 10.2 solar power systems for every 100 residents.
- Nevada City, located in the foothills of the Sierra Nevada just north of the I-80 corridor in Nevada County, has 9.9 installations for every 100 people.

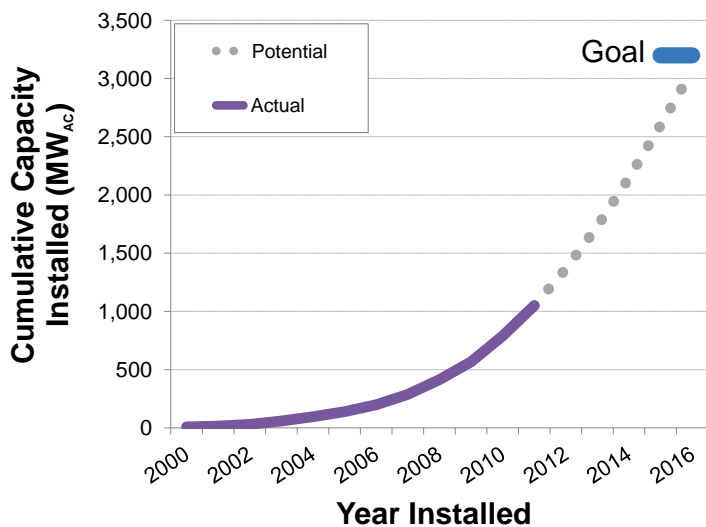
In terms of the total amount of solar capacity per capita, the leading towns

can be found in the Central Valley and near the Mojave Desert.

- Herald, a small agricultural town just southeast of Sacramento in the Central Valley, leads the state with 3,800 Watts (W) of solar capacity per resident. Herald’s two large solar arrays (1.9 MW and 1.3 MW), which were built by the Sacramento Municipal Utility District (SMUD) in the 1980s, combined with its small population (1,184) rank Herald as one of the most developed solar markets.<sup>11</sup>
- Edwards Air Force Base, a military facility in the Mojave Desert north of Los Angeles, along the border of Kern and San Bernardino counties, has just over 2,000 W of solar capacity per resident.
- Lebec, a small community just off of the Grapevine on I-5, north of Los Angeles in Kern County, has a little over 1,000 W of solar capacity per resident.



Figure 4: Actual (through 2011) and Potential (through 2016) Solar Installations in California<sup>17</sup>



## California’s Solar Market Is Growing Rapidly

Over the last decade, the market for solar energy systems on or near homes and buildings in California grew nearly 100-fold. In 2000, California had fewer than 1,000 rooftop solar systems, with less than 10 megawatts (MW) of total electric generation capacity.<sup>12</sup> In 2011, California passed the milestone of installing 1,000 MW of distributed solar capacity, with more than 100,000 separate installations.<sup>13</sup> The state is on track to achieve the goal of the 2006 Million Solar Roofs Initiative, adding 3,000 MW of distributed solar capacity by the end of 2016.<sup>14</sup> (See Figure 4.)

The state’s solar market continues to grow exponentially, at a pace of up to 40 percent per year.<sup>15</sup> In the past two years alone, the solar industry has installed more than 5,000 kW of solar power in each of 10 California cities (listed in Table 9).<sup>16</sup>

Table 9: Solar Installations 2009 Through Mid-2011 by City: Top Ten<sup>18</sup>

City	Capacity Installed Since 2009	Number of Installations Completed Since 2009
Los Angeles	23,174	2,630
San Diego	17,348	2,245
San Jose	15,167	1,400
Sacramento	10,351	427
San Francisco	9,681	1,055
Mountain View	9,427	535
Bakersfield	8,882	892
Fresno	7,906	1,118
Lancaster	7,540	173
Santa Rosa	5,061	742

# Solar Is a Critical Part of California's Clean Energy Future

Solar power makes sense for California. Each new solar panel helps to clean our air, fight global warming, improve the reliability of our electricity grid, boost the economy, and create much-needed jobs.

## Solar Power Reduces Air Pollution and Fights Global Warming

Growing concern over air pollution and global warming provide a powerful incentive for consumers and governments alike to embrace solar power as a critical part of California's clean energy future.

Solar power makes California's air cleaner. As neighborhoods get more and

more of their electricity from solar, they consume less energy from power plants fired by natural gas, helping to reduce smog. This is particularly true because solar power works best when California needs it most: hot summer afternoons when electricity demand is at its highest and smog pollution at its worst. Instead of having to rely on peaking natural gas power plants that are typically dirtier than large, base-load natural gas power plants, California can increasingly turn to solar photovoltaic systems. Every megawatt of solar power installed in the Los Angeles area prevents the emission of nearly 700 pounds of smog-forming pollution per year.<sup>19</sup>

Solar panels also reduce global warming pollution. As neighborhoods get

more and more of their electricity from solar, they consume less energy from gas-fired power plants and cut down on global warming emissions. Every megawatt of solar power installed in Los Angeles cuts global warming pollution by more than 900 metric tons per year.<sup>20</sup> For every two households that each install a 3 kW solar power system, the global warming benefit is comparable to eliminating the emissions from one car.<sup>21</sup>

### Solar Power Spurs Economic Growth and Creates Jobs

The rapid development of the solar market in California cities is helping to build a strong and sustainable solar industry. Today, California is home to about 20 percent of all solar companies in the United States. More than 3,500 firms are active in California’s solar industry, currently employing more than 25,000 people.<sup>22</sup>

California’s support for solar power helped the industry weather the recent

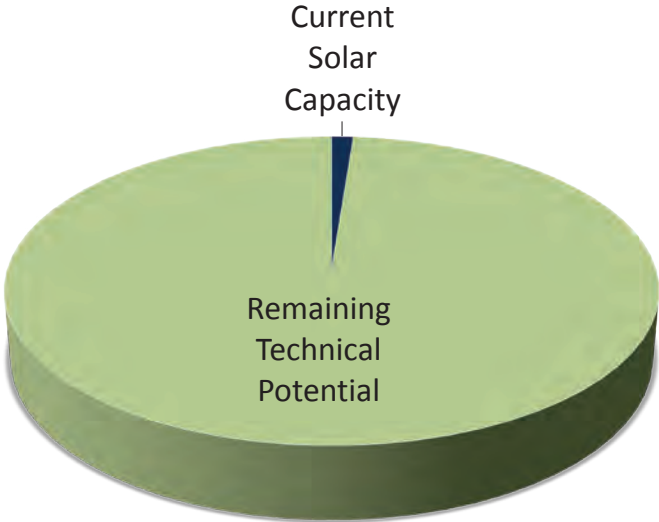
recession. While other sectors of the state economy shed jobs, overall employment in “green” sectors increased 5 percent from 2007 to 2008.<sup>23</sup> Nationwide, the solar industry grew nearly 7 percent in 2010, growing nearly 10 times faster than the overall economy.<sup>24</sup>

The solar industry projects continued explosive growth. Industry analysts predict the installation of more than 1 million residential solar projects in California by 2020, adding on the order of \$30 billion to the economy and creating more than 20,000 new jobs per year.<sup>25</sup>

### California Has Only Just Begun to Scratch the Surface of Its Solar Energy Potential

Despite this dramatic growth, California has barely tapped into its overall solar energy potential. The National Renewable Energy Laboratory estimates that the state could host more than 80,000 MW of rooftop solar energy systems.<sup>26</sup>

**Figure 5: California Has Barely Begun to Capture Its Rooftop Solar Energy Resources<sup>32</sup>**

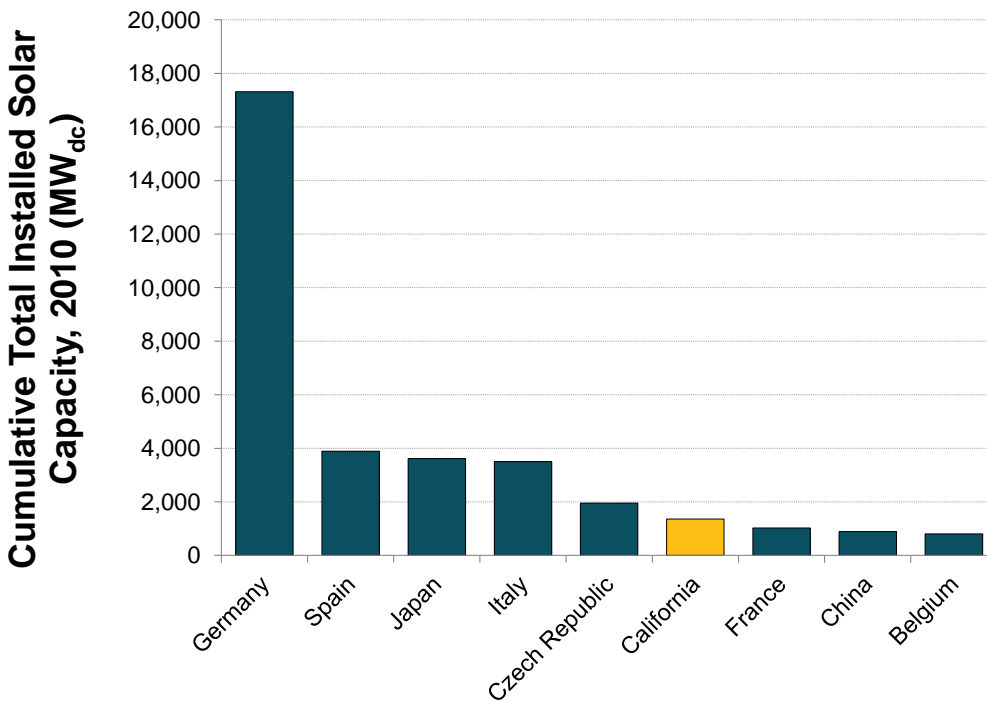


That much solar energy capacity could generate the equivalent of more than a third of the electricity that California uses in a year, statewide.<sup>27</sup> (See Figure 5.)

Other nations have shown that it is possible to achieve – and dramatically exceed – the pace of growth in the solar market necessary for California to reach its goal. Germany, for example, has already reached 17,000 MW of solar capacity – 17 times California’s current total – through

consistent and strong public policy support.<sup>28</sup> Germany is on track to increase its use of renewable sources of electricity from 20 percent of its electrical supply in 2011 to at least 35 percent by 2020.<sup>29</sup> By that year, Germany could have as much as 50,000 MW of solar power installed.<sup>30</sup> In addition to Germany, solar programs in Spain, Japan, Italy, and the Czech Republic have catapulted these markets ahead of California.<sup>31</sup> (See Figure 6.)

Figure 6: Cumulative Installed Solar Photovoltaic Capacity through 2010<sup>33</sup>



# Policy Recommendations

California's solar cities are leading the way toward a new, clean energy future. With every additional solar panel installed on a rooftop in the state, the cost of solar power is likely to decline and make solar technology increasingly accessible to everyday Californians. At the same time, each new solar panel reduces air pollution, creates local jobs and helps to stabilize the electric grid.

California's state and local leaders must support the growth of the solar industries and increase the size and depth of the solar market in communities across the state. Key steps include:

## **Ensuring that the Million Solar Roofs Initiative reaches its goal by the end of 2016.**

- State leaders should work to make sure that the Million Solar Roofs

Initiative continues to stay on track. Local leaders should work with publicly-owned utilities to ensure the effective implementation of their solar incentive programs. In particular, the Los Angeles Department of Water & Power is crucial to the success of the overall Million Solar Roofs Initiative, as the state's largest publicly-owned utility.

## **Creating a net-zero energy building code to increase the use of solar energy in new construction.**

- Incorporating solar power into new buildings at the time of construction represents an enormous opportunity to grow California's solar market.
- The failure of the legislature to reauthorize the Public Goods

Charge for renewable development threatens the long-term availability of funding for the New Solar Homes Partnership. The state needs an effective means of ensuring that all new construction includes renewable energy generation technology.

- To achieve more, California should require all new homes to include solar power or other on-site renewable electricity generation by no later than 2020, and all non-residential buildings by no later than 2030, through a net-zero energy building code requirement. Such a requirement would be consistent with the state's overall clean energy goals, as well as with steps that President Obama has ordered for federal buildings.<sup>34</sup>

**Adopting a strong feed-in-tariff policy to encourage solar power installation on warehouses, parking lots and other sites with low on-site energy demands but high levels of sunshine.**

- Currently, California's distributed solar power policies are geared toward small-scale solar energy systems (less than 1 MW) intended exclusively for meeting on-site electricity demands. California has also recently embarked on a program to support large installations (10-20 MW) through what is called a Reverse Auction Mechanism (RAM).
- A feed-in tariff policy could help drive the market for medium-sized solar projects (10 MW and under), which are typically installed on warehouses, along freeways, or in parking lots, brownfields, and other places where this is little on-site electricity demand, but ample space to install solar panels.

- A feed-in tariff would require the state's utilities to purchase all of the electricity fed into the grid from a solar energy system under a long-term contract at a set rate. Feed-in tariffs have driven the rapid growth of solar markets in Germany, Vermont, and Gainesville, Florida.<sup>35</sup>

**Allowing all California ratepayers to benefit from going solar.**

- Net metering partially compensates solar energy system owners for the substantial benefits that they provide to other users of the electricity grid, including cleaner air, less global warming pollution, less need to finance the installation of new power plants or new transmission lines, and a more stable electricity grid. State leaders should maintain or enhance the value of net metering as an incentive for installing solar power. Accordingly, the California Public Utilities Commission should reject San Diego Gas & Electric's recent proposal to separate how much it charges customers for electricity from how much it charges to transport that electricity, which would increase electricity bills for residential solar panel owners in its service territory by \$10 to \$40 per month – or more than 90 percent for a typical solar home. According to the California Center for Sustainable Energy, schools, local governments, and business currently on the most "solar friendly" commercial rates would see their bills increase by thousands of dollars annually.<sup>36</sup>
- Net metering is currently limited to 5 percent of a utility's peak aggregate demand, raised from 2.5 percent in February 2011. This cap is set too low to ensure that all solar energy system owners who participate in the

Million Solar Roofs Initiative earn fair compensation for the benefits that their systems will provide to all ratepayers. California should expand its net metering cap or eliminate it altogether.

- In July 2011, the California Public Utilities Commission expanded its virtual net metering program to allow all renters and multifamily residents to benefit from solar power and other distributed energy generation technologies.<sup>37</sup> Local and state governments should continue to design and implement innovative programs to broaden the participation of Californians in the solar market.

#### **Expanding financing opportunities for solar energy systems.**

- Other important policies can help ensure that homeowners or business owners who install solar energy systems maximize the return on their investments. Allowing on-bill collection to repay financing costs could enable potential solar customers to install systems with no money down and low interest payments, as an ongoing part of the utility bill. These programs, such as the PAYS America program (Pay As You Save), harness future savings from renewable technologies or efficiency measures to pay the up-front cost of installation. They are especially promising for multi-family dwellings because they allow the payments to be attached to the utility meter, making the program attractive to renters, as well as property owners.
- The Property Assessed Clean Energy (PACE) program, which enables property owners to finance renewable energy and energy efficiency

projects through local government loans that are paid back via property tax bills, should be reinstated. California leaders should continue to advocate for the program to be restored at the federal level.

#### **Removing barriers to going solar at the local and state levels, including minimizing challenges with interconnection and permitting.**

- State and local leaders should work to standardize procedures, minimize fees, and streamline the process of installing a new solar energy system and integrating it into the electricity grid. Different jurisdictions across the state have varying permitting and interconnection procedures and fees, which can add unnecessary friction to the process of installing solar energy systems. Industry analysts predict that reforming permitting would lead to the installation of an additional 132,000 residential solar power systems through 2020, a 13 percent increase in the pace of solar development – which would contribute \$5.1 billion to the California economy and create 3,900 full-time jobs.<sup>38</sup>

#### **Continuing to set ambitious clean energy goals and adopt innovative policies to achieve them.**

- For example, Governor Jerry Brown's goal of installing 12,000 MW of distributed electricity generation in California by 2020 is a strong step above and beyond the Million Solar Roofs Initiative. California should adopt innovative policies to ensure that the state meets this visionary goal, enabling California to continue leading the nation's transformation to a clean energy economy.

# Methodology

This report documents the number of grid-connected solar electric systems installed in California and their total electric generating capacity on a city-by-city basis. It focuses on solar photovoltaic installations that by and large are owned by ratepayers (of all customer classes) or third-party financing companies, as opposed to an electric utility, and are located on or near buildings throughout the state.

The report compiles solar energy installation data from the California Energy Commission, the California Public Utilities Commission, the California Center for Sustainable Energy, and the state's private and public utilities. The data represent the most recent available information from each source at the time of data collection. We counted all available solar installation data through no later than the close of August 2011.

Due to limitations in the data, this report does not include solar energy systems that are not connected to the electricity grid. While numerous and an important part of California's clean energy infrastructure, there is no complete source of information for these types of solar installations.

Furthermore, this report does not measure the amount of solar power installed on a utility-by-utility basis, but is focused exclusively on city-by-city calculations. This distinction is important as several cities are serviced by more than one utility. As a result, installation statistics for cities can be higher than might be apparent from looking at a single source of data alone.

Below is a detailed description of how the raw data were translated into the number of solar installations and their generation capacity city-by-city.



## Emerging Renewables Program

From 1998 through 2006, the California Energy Commission administered the Emerging Renewables Program, which provided rebates for solar power systems smaller than 30 kilowatts. The program still exists today but is limited to non-solar forms of small-scale renewable energy technologies. The bulk of the funds for this program were generated by a small surcharge on the bills of investor-owned utility ratepayers. The rest of the funds came from state appropriations after the California energy crisis in 2001. All rebates were available to consumers throughout the state, including those living within the territories of publicly-owned utilities. Solar installations for this program were calculated by removing all the installations that were either non-solar or were never completed (e.g., they applied for a rebate but never actually completed the project) from the database, and then sorting by city. The database can be accessed at California Energy Commission's website at [www.energy.ca.gov/renewables/emerging\\_renewables/index.html](http://www.energy.ca.gov/renewables/emerging_renewables/index.html).

## Self Generation Incentive Program (SGIP)

Since 2001, the California Public Utilities Commission has overseen the Self Generation Incentive Program (SGIP), which provides a rebate for customers of investor-owned utilities who install large-scale distributed generation systems over 30 kilowatts in capacity. Funding for SGIP comes from a small surcharge on gas and electric bills for customers of investor-owned utilities. Prior to 2006, this program provided rebates for solar photovoltaic, wind, fuel cells, and other forms of distributed generation. Today,

it only provides rebates for non-solar technologies. SGIP installations were calculated by removing all installations that were either non-solar or never completed, and then sorting by city. There were roughly 300 installations for which no city was listed in the database. This is an attempt by the program administrators to protect the privacy of those customers who owned the only large solar installation in a particular city. While this creates a significant gap in the data, it is unlikely to significantly change the "top ten" city-by-city analysis of this report. The SGIP database is available at California Public Utilities Commission's website at [www.cpuc.ca.gov/PUC/energy/DistGen/sgip](http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip).

## California Solar Initiative

On January 1, 2007, the California Public Utilities Commission (CPUC) began the California Solar Initiative (CSI) to provide rebates for all solar electric systems smaller than one megawatt on all existing homes, plus all new and existing commercial buildings. CSI was created by the Public Utilities Commission and supplemented by policy changes contained in the Million Solar Roofs Initiative, and is open to all solar electric technologies, though to date the program has been exclusively focused on solar photovoltaic systems. The CPUC maintains and regularly updates an online database of installations, including the cities in which the systems were placed.<sup>39</sup> This database forms the basis of much of this report. Only those systems installed by August 2011 were counted. Specifically, only those projects with an installed status of "Installed" within the database were included. All projects with an installed status of "Delisted," "Pending," "Wait List," or no installed status at all, were excluded.

## New Solar Homes Partnership

In addition to the Emerging Renewables Program, the California Energy Commission also administers the New Solar Homes Partnership program. This program was created by the Million Solar Roofs Initiative to provide rebates specifically for new homes and new housing developments built with solar electric power systems. This program only encompasses housing developments and new homes built within investor-owned utility territories. New housing projects built in municipal utility districts are included in the municipal utility data. Systems approved for payment up to September 2011 were tabulated. Data was provided by Amy Morgan in the California Energy Commission's Media and Public Communications Office.

## Municipal Utility Data

In compiling data for this report, the total number and generation capacity of solar photovoltaic systems was requested from individual municipal utilities in California for all installations in their service territories. Fifteen municipal utilities provided information, some with data going back to the early 1990s. Because different utilities responded at different times, and because of differences in the processes by which municipal utilities collect their information, the data incorporated into this report for municipal utilities is for installations through late 2010 or early to mid-2011, depending on the utility. Solar installation data from the following municipal utilities are included in this report:

- Anaheim Public Utilities
- Burbank Water & Power

- Glendale Water & Power
- City of Healdsburg
- Los Angeles Department of Water & Power
- Modesto Irrigation System
- Pacific Power
- City of Palo Alto
- Pasadena Water and Power
- Roseville Electric
- City and County of San Francisco
- Turlock Irrigation District
- Truckee Donner Public Utilities District
- Sacramento Municipal Utility District
- Silicon Valley Power

## Combining Data from California's Solar Programs

Once the number of installations and their generation capacity were tabulated by city for each solar program listed above, the data were added together across the programs. The city names of many installations were changed to match the other sources of data as well as the population statistics. For example, "San Francisco" was changed to "San Francisco," "1000 Oaks" was changed to "Thousand Oaks," and "Chatsworth" was changed to "Los Angeles" (Chatsworth is not a city, but rather a community within the city of Los Angeles).

There was some overlap between the data supplied by the municipal utilities and the data from SGIP, in which both programs would list the same installation. In these cases, the overlapping data were deducted out of the SGIP data before the data from all programs were tabulated together.

The number and capacity of solar energy systems in this report for cities covered by municipal utilities are sometimes larger than what the municipal utility reported. This is because municipal utilities solely list solar installations on homes registered through their utility and under their service area. The data from programs, such as the California Solar Initiative, that list installations on homes within

cities covered by municipal utilities, were combined with the municipal utility data and printed as the total results in this report.

To calculate the number of installations and their installed capacity per capita, the number of installations and installed capacity was divided by the city's population. The population data are from the U.S. Census Bureau, American FactFinder.

# Appendices

## Appendix A: Cities Ranked by Number of Solar Installations

The chart below contains the data for the total number of grid-tied solar systems installed in all of California’s incorporated cities in order of greatest number of solar roofs to least. Some cities have the same number of solar systems installed and therefore share a ranking.

Rank	City	Number of Installations
1	San Diego	4,507
2	Los Angeles	4,018
3	San Jose	2,733
4	San Francisco	2,405
5	Fresno	2,146
6	Bakersfield	1,643
7	Santa Rosa	1,467
8	Roseville	1,170
9	Clovis	1,133
10	Sacramento	1,119
11	Oakland	1,010
12	Santa Cruz	866
13	Berkeley	857
14	Sebastopol	759
15	Santa Barbara	718
16	Davis	715
17	Escondido	709
18	Rocklin	621
19	Chico	615
20	San Ramon	610
21	Santa Clarita	589
22	Lincoln	574
23	Long Beach	563
24	Watsonville	557
25	Livermore	553

Rank	City	Number of Installations
26	Poway	544
27	El Dorado Hills	543
28	El Cajon	533
29	Pleasanton	530
30	Los Gatos	522
31	Sunnyvale	515
32	Napa	511
33	Ladera Ranch	509
34	Rancho Cordova	492
35	Palm Desert	478
36	Sonoma	478
36	Los Altos	474
38	Temecula	473
39	Thousand Oaks	461
40	Palo Alto	450
41	Corona	447
42	Visalia	442
43	Grass Valley	441
44	Auburn	436
45	Petaluma	433
46	Huntington Beach	430
47	Vacaville	428
48	Fremont	416
49	San Rafael	415
50	Palm Springs	414

## Appendix B: Cities Ranked by Solar Capacity

The chart below contains the data for the total installed capacity of grid-tied solar systems in all of California's incorporated cities in order of greatest capacity installed to least. Some cities have the same amount of solar installed and therefore share a ranking.

Rank	City	Solar Capacity (kW)
1	San Diego	36,775
2	Los Angeles	36,174
3	San Jose	30,617
4	Fresno	22,444
5	San Francisco	16,731
6	Bakersfield	16,223
7	Sacramento	15,911
8	Santa Rosa	14,015
9	Oakland	9,860
10	Chico	9,490
11	Clovis	8,342
12	Livermore	7,909
13	Lancaster	7,885
14	Napa	6,846
15	Rancho Cordova	6,413
16	Palmdale	6,392
17	Vacaville	6,162
18	Hayward	6,135
19	Pleasanton	6,109
20	Sunnyvale	6,099
21	Visalia	5,965
22	Irvine	5,864
23	Burbank	5,709
24	Santa Clara	5,708
25	Petaluma	5,595

Rank	City	Solar Capacity (kW)
26	Auburn	5,594
27	San Bernardino	5,581
28	Woodland	5,537
29	Santa Clarita	5,506
30	Richmond	5,439
31	Sonoma	5,398
32	Hanford	5,141
33	Ontario	5,107
34	Paso Robles	5,058
35	Stockton	4,996
36	Sebastopol	4,942
37	Mountain View	4,864
38	Oroville	4,864
39	Temecula	4,857
40	Santa Barbara	4,699
41	Poway	4,698
42	Herald	4,553
43	Santa Cruz	4,543
44	Modesto	4,416
45	Corona	4,404
46	Fremont	4,376
47	Edwards AFB	4,288
48	Escondido	4,285
49	Morgan Hill	4,217
50	Chula Vista	4,200

## Appendix C: Small Towns Ranked by Number of Solar Installations per Resident

The chart below ranks small towns (population 1,000-10,000) by the number of installations per resident.

Rank	City	Number of installations per 100 people
1	Sebastopol	10.29
2	Newcastle	10.21
3	Nevada City	9.88
4	Penn Valley	7.96
5	Coarsegold	6.30
6	Romoland	5.64
7	Portola Valley	4.96
8	Plymouth	4.58
9	Kenwood	4.57
10	Occidental	4.13
11	Shingle Springs	4.11
12	Ojai	3.99
13	Palo Cedro	3.94
14	Los Altos Hills	3.82
15	Byron	3.68
16	Loomis	3.28
17	Rancho Santa Fe	3.27
18	Middletown	3.10
19	San Miguel	3.08
20	Aptos	2.97
21	Julian	2.93
22	Sonora	2.77
23	Woodside	2.72
24	Mariposa	2.72
25	Penngrove	2.54
26	St. Helena	2.48
27	Valley Springs	2.48
28	Bolinas	2.41
29	Del Mar	2.40
30	Inverness	2.38

## Appendix D: Small Towns Ranked by Solar Capacity per Resident

The chart below ranks small towns (population 1,000-10,000) by the installed solar capacity per resident.

Rank	City	KW capacity per capita
1	Herald	3.85
2	Edwards AFB	2.08
3	Lebec	1.06
4	Maxwell	0.93
5	Middletown	0.88
6	San Miguel	0.88
7	Newcastle	0.76
8	Kenwood	0.74
9	Sebastopol	0.67
10	St. Helena	0.66
11	Littlerock	0.63
12	Le Grand	0.63
13	Biggs	0.58
14	Sonoma	0.51
15	Winchester	0.47
16	Thornton	0.44
17	Auburn	0.42
18	Caruthers	0.42
19	Lakeport	0.39
20	Nevada City	0.36
21	Rancho Santa Fe	0.36
22	Penn Valley	0.35
23	Portola Valley	0.35
24	Plymouth	0.35
25	Valley Center	0.34
26	Arbuckle	0.33
27	Oroville	0.31
28	Coarsegold	0.29
29	Wilton	0.29
30	Calistoga	0.29

## Appendix E: Large Towns Ranked by Number of Solar Installations per Resident

The chart below ranks large towns (population 10,000-50,000) by the number of installations per resident.

Rank	City	# of installations per 100 people
1	Sonoma	4.49
2	Grass Valley	3.43
3	Auburn	3.27
4	Mill Valley	2.42
5	Healdsburg	2.38
6	Ladera Ranch	2.21
7	Placerville	2.19
8	Ramona	1.93
9	Los Gatos	1.77
10	Rancho Mirage	1.72
11	Los Altos	1.64
12	Arroyo Grande	1.52
13	Santa Cruz	1.44
14	Saratoga	1.36
15	Lincoln	1.34
16	Alpine	1.32
17	San Anselmo	1.30
18	El Dorado Hills	1.29
19	Lafayette	1.29
20	Oroville	1.27
21	Fallbrook	1.26
22	Granite Bay	1.26
23	Alamo	1.26
24	Malibu	1.25
25	Clovis	1.18
26	Orinda	1.18
27	Poway	1.14
28	Rocklin	1.09
29	Davis	1.09
30	Watsonville	1.09



## Appendix F: Large Towns Ranked by Solar Capacity per Resident

The chart below ranks large towns (population 10,000-50,000) by the installed solar capacity per resident.

Rank	City	Solar Capacity (kW) per capita
1	Sonoma	0.51
2	Auburn	0.42
3	Oroville	0.31
4	Healdsburg	0.27
5	Newman	0.20
6	Rancho Mirage	0.17
7	Paso Robles	0.17
8	Grass Valley	0.15
9	Oakdale	0.15
10	Placerville	0.14
11	Fallbrook	0.13
12	Blythe	0.12
13	Kingsburg	0.12
14	Los Altos	0.11
15	Mill Valley	0.11
16	Morgan Hill	0.11
17	Exeter	0.11
18	Chico	0.11
19	Clearlake	0.10
20	Woodland	0.10
21	Rancho Cordova	0.10
22	Poway	0.10
23	Ramona	0.10
24	Livermore	0.10
25	Petaluma	0.10
26	Hanford	0.10
27	California City	0.09
28	Chowchilla	0.09
29	Los Gatos	0.09
30	Malibu	0.09

## Appendix G: Cities Ranked by Number of Solar Installations per Resident

The chart below ranks cities (population 50,000+) by the number of installations per resident.

Rank	City	# of installations per 100 people
1	Santa Cruz	1.44
2	Clovis	1.18
3	Rocklin	1.09
4	Davis	1.09
5	Watsonville	1.09
6	Roseville	0.98
7	Santa Rosa	0.87
8	San Ramon	0.85
9	Santa Barbara	0.81
10	Berkeley	0.76
11	Rancho Cordova	0.76
12	Pleasanton	0.75
13	Petaluma	0.75
14	San Rafael	0.72
15	Chico	0.71
16	Palo Alto	0.70
17	Livermore	0.68
18	Napa	0.66
19	Novato	0.66
20	Walnut Creek	0.63
21	Cupertino	0.57
22	Madera	0.57
23	Encinitas	0.56
24	El Cajon	0.54
25	Woodland	0.53
26	Mountain View	0.52
27	Brentwood	0.50
28	Escondido	0.49
29	San Marcos	0.49
30	La Mesa	0.48

## Appendix H: Cities Ranked by Solar Capacity per Resident

The chart below ranks cities (50,000+ population) by the installed solar capacity per resident.

Rank	City	KW capacity per capita
1	Chico	0.110
2	Woodland	0.100
3	Rancho Cordova	0.099
4	Livermore	0.098
5	Petaluma	0.097
6	Hanford	0.095
7	Napa	0.089
8	Clovis	0.087
9	Pleasanton	0.087
10	Santa Rosa	0.084
11	Santa Cruz	0.076
12	Vacaville	0.067
13	Rocklin	0.064
14	Mountain View	0.064
15	San Rafael	0.059
16	Madera	0.058
17	Milpitas	0.057
18	Cupertino	0.056
19	Santa Barbara	0.053
20	Burbank	0.053
21	Yuba City	0.053
22	Richmond	0.052
23	Lancaster	0.050
24	Santa Clara	0.049
25	Folsom	0.049
26	Temecula	0.049
27	Visalia	0.048
28	Palo Alto	0.047
29	La Mesa	0.047
30	Davis	0.047

## Appendix I: Alphabetical Listing of All Cities

The chart below contains the data for the total number and total capacity of grid-tied solar systems installed in all of California's incorporated cities in alphabetical order.

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Acton	54	327	329	384
Adelanto	4	642	28	627
Agoura Hills	144	166	1,148	204
Agua Dulce	29	435	208	444
Aguanga	8	580	44	597
Ahwahnee	21	475	92	529
Alamo	183	134	1,267	183
Albany	92	249	263	416
Alhambra	39	385	337	382
Aliso Viejo	37	393	325	387
Alpine	188	129	1,236	187
Altadena	136	176	514	324
American Canyon	45	364	1,296	179
Anaheim	268	95	1,959	124
Anderson	67	300	1,302	178
Angels Camp	66	303	546	315
Angwin	31	426	264	414
Antelope	50	343	172	460
Antioch	164	150	1,566	146
Apple Valley	238	110	2,483	100
Aptos	185	130	876	257
Arbuckle	16	508	1,013	234
Arcadia	137	173	932	249
Arcata	170	147	413	356
Armona	3	656	14	671
Arnold	7	594	23	639
Aromas	40	381	149	479
Arroyo Grande	263	98	1,243	186
Artesia	4	642	17	658
Arvin	19	489	81	537
Atascadero	185	130	864	262
Atherton	119	197	935	246
Atwater	95	243	661	294
Auberry	32	418	182	454
Auburn	436	44	5,594	26
Avalon	13	532	30	623
Avenal	3	656	30	621
Azusa	3	656	17	657
Bakersfield	1,643	6	16,223	6
Baldwin Park	11	551	714	288
Banning	16	508	71	556
Barstow	34	406	307	398
Bay Point	6	606	13	673

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Beaumont	60	315	1,178	199
Bell	5	619	43	598
Bell Canyon	14	525	93	528
Bell Gardens	2	674	308	396
Bella Vista	10	558	46	592
Bellflower	25	449	88	534
Belmont	114	204	523	322
Belvedere	32	418	141	483
Ben Lomond	51	340	197	449
Benicia	76	279	729	284
Berkeley	857	13	3,588	59
Berry Creek	5	619	16	661
Bethel Island	2	674	8	693
Beverly Hills	76	279	609	303
Big Bear City	1	693	3	716
Big Bear Lake	20	484	67	563
Big Pine	1	693	6	700
Biggs	5	619	986	242
Bishop	85	263	760	277
Bloomington	15	516	90	531
Blue Lake	7	594	19	656
Blythe	53	330	2,526	98
Bodega Bay	15	516	75	546
Bodfish	5	619	23	641
Bolinas	39	385	324	388
Bonadelle Ranchos-Madera Ranchos	1	693	5	706
Bonita	88	255	416	351
Bonny Doon	4	642	14	669
Bonsall	40	381	313	393
Boonville	23	465	155	475
Boron	5	619	428	348
Borrego Springs	62	311	278	407
Boulder Creek	52	335	259	417
Bradbury	8	580	67	562
Brea	65	305	741	281
Brentwood	257	100	1,663	143
Brisbane	19	489	108	509
Brookdale	1	693	7	694
Buellton	11	551	68	560
Buena Park	90	252	900	254
Burbank	235	111	5,709	23
Burlingame	103	226	437	346

## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Burney	6	606	53	581
Buttonwillow	3	656	23	638
Byron	47	356	273	410
Cabazon	2	674	6	703
Calabasas	104	222	705	289
California City	38	391	1,325	173
Calimesa	7	594	35	611
Calistoga	98	238	1,472	161
Camarillo	309	77	2,664	91
Cambria	19	489	79	542
Cameron Park	176	141	1,345	171
Camino	18	499	126	493
Campbell	176	141	1,025	232
Campo	8	580	37	605
Canyon Lake	81	271	474	337
Capitola	43	372	185	453
Carlsbad	380	60	3,421	65
Carmel	116	201	728	285
Carmel Valley Village	104	222	609	304
Carmel-By-the-Sea	3	656	9	687
Carmichael	105	221	413	355
Carpinteria	53	330	290	404
Carson	25	449	1,612	144
Caruthers	15	516	1,037	229
Castaic	93	247	472	338
Castro Valley	226	115	1,197	196
Castroville	7	594	42	600
Cathedral City	157	157	868	259
Cayucos	24	460	80	540
Ceres	7	594	29	625
Cerritos	71	289	895	256
Challenge-Brownsville	5	619	22	645
Cherry Valley	9	568	44	596
Chico	615	19	9,490	10
Chino	137	173	3,433	64
Chino Hills	185	130	1,346	170
Chowchilla	37	393	1,746	137
Chualar	2	674	21	649
Chula Vista	306	79	4,200	50
Citrus Heights	122	192	865	261
Claremont	314	76	1,073	218
Clayton	78	274	363	372
Clearlake	44	368	1,597	145
Clearlake Oaks	25	449	73	551

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Cloverdale	123	191	1,561	147
Clovis	1,133	9	8,342	11
Coalinga	14	525	60	572
Coarsegold	116	201	538	319
Cobb	13	532	36	608
Colfax	46	358	226	433
Colma	5	619	13	674
Colton	18	499	103	514
Columbia	7	594	36	606
Colusa	25	449	240	426
Commerce	2	674	141	484
Compton	22	472	800	273
Concord	303	81	2,392	102
Copperopolis	28	439	142	482
Corcoran	18	499	111	506
Corning	41	378	391	362
Corona	447	41	4,404	45
Coronado	108	215	489	333
Corralitos	12	542	71	557
Corte Madera	70	291	608	305
Costa Mesa	173	145	2,060	117
Cotati	53	330	371	370
Coto De Caza	36	400	225	434
Cottonwood	70	291	386	365
Covelo	21	475	94	527
Covina	82	269	842	265
Crest	1	693	7	697
Crestline	2	674	9	688
Crockett	5	619	19	654
Cudahy	3	656	15	665
Culver City	121	195	1,010	235
Cupertino	334	70	3,275	70
Cutler	3	656	16	660
Cypress	113	205	405	359
Daly City	24	460	1,033	230
Dana Point	50	343	225	435
Danville	396	55	2,055	118
Davis	715	16	3,068	76
Deer Park	1	693	15	664
Del Mar	100	234	504	327
Del Monte Forest	15	516	62	569
Del Rey Oaks	1	693	2	722
Delano	11	551	2,076	115
Delhi	4	642	52	585
Denair	27	444	715	286

## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Descanso	17	506	104	512
Desert Hot Springs	74	283	417	350
Diablo	13	532	161	468
Diamond Bar	66	303	635	298
Diamond Springs	4	642	16	659
Dinuba	42	374	1,233	188
Discovery Bay	29	435	153	476
Dixon	77	276	1,268	181
Dos Palos	4	642	54	579
Downey	51	340	545	316
Duarte	31	426	670	293
Dublin	195	127	1,926	127
Dunnigan	6	606	31	620
Durham	48	351	1,174	200
East Palo Alto	45	364	362	373
East Rancho Dominguez	1	693	74	548
Edwards AFB	9	568	4,288	47
El Cajon	533	28	3,925	53
El Cerrito	265	97	1,091	214
El Dorado Hills	543	27	2,359	105
El Granada	33	410	117	502
El Monte	23	465	835	267
El Paso de Robles (Paso Robles)	305	80	5,058	34
El Segundo	41	378	1,115	211
El Sobrante	69	294	247	424
Elk Grove	318	74	1,311	175
Elverta	36	400	139	486
Emeryville	12	542	150	478
Empire	2	674	6	702
Encinitas	336	69	1,538	154
Escalon	62	311	479	335
Escondido	709	17	4,285	48
Esparto	23	465	123	496
Eureka	77	276	439	345
Exeter	98	238	1,148	203
Fair Oaks	118	198	453	343
Fairfax	84	266	413	353
Fairfield	164	150	3,930	52
Fallbrook	385	58	3,922	54
Farmersville	69	294	165	464
Felton	39	385	234	431
Ferndale	8	580	32	619
Fillmore	28	439	199	447
Firebaugh	7	594	73	552

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Folsom	176	141	3,504	63
Fontana	198	125	3,032	79
Forest Ranch	11	551	63	567
Forestville	56	321	240	427
Fort Bragg	73	285	340	379
Fort Irwin	3	656	35	610
Fortuna	16	508	36	609
Foster City	46	358	198	448
Fountain Valley	144	166	1,091	215
Fowler	24	460	164	465
Frazier Park	16	508	53	582
Freedom	15	516	21	646
Fremont	416	48	4,376	46
French Camp	2	674	9	689
Fresno	2,146	5	22,444	4
Fullerton	194	128	1,040	227
Galt	39	385	221	437
Garden Grove	122	192	645	296
Gardena	32	418	349	376
Georgetown	19	489	74	547
Gerber	3	656	12	678
Gilroy	230	113	2,585	95
Glendale	257	100	1,267	182
Glendora	101	230	1,376	167
Gold River	2	674	10	685
Goleta	108	215	1,079	216
Gonzales	37	393	1,058	222
Grand Terrace	14	525	61	571
Granite Bay	257	100	1,557	149
Grass Valley	441	43	1,945	126
Graton	13	532	38	604
Greenfield	14	525	412	357
Greenville	7	594	27	631
Gridley	13	532	71	554
Grizzly Flats	1	693	7	696
Grover Beach	27	444	101	518
Guerneville	34	406	235	430
Gustine	7	594	34	612
Hacienda Heights	56	321	250	423
Half Moon Bay	68	297	310	395
Hamilton City	6	606	27	630
Hanford	174	144	5,141	32
Hawaiian Gardens	3	656	4	711
Hawthorne	32	418	1,524	158
Hayward	164	150	6,135	18

## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Healdsburg	268	95	2,992	80
Hemet	249	105	1,334	172
Herald	23	465	4,553	42
Hercules	23	465	98	521
Hermosa Beach	71	289	315	391
Hesperia	76	279	772	275
Hidden Hills	8	580	98	520
Hidden Valley Lake	21	475	96	523
Highland	110	211	933	248
Hillsborough	111	209	754	278
Hollister	101	230	621	300
Homeland	19	489	111	507
Hughson	10	558	120	501
Huntington Beach	430	46	1,847	132
Huntington Park	5	619	122	497
Huron	3	656	1,058	221
Hydesville	9	568	23	637
Idyllwild-Pine Cove	12	542	49	587
Imperial Beach	52	335	138	487
Indian Wells	72	288	626	299
Indio	1	693	2	717
Inglewood	30	432	691	292
Interlaken	5	619	22	644
Inverness	31	426	132	490
Inyokern	23	465	121	500
Ione	33	410	186	452
Irvine	280	89	5,864	22
Irwindale	1	693	4	712
Jackson	25	449	132	489
Jamestown	28	439	190	451
Jamul	144	166	823	269
Joshua Tree	46	358	360	374
Julian	44	368	161	467
Kelseyville	74	283	279	406
Kensington	62	311	235	429
Kentfield	128	182	846	263
Kenwood	47	356	761	276
Kerman	29	435	158	470
Kernville	11	551	45	594
Keyes	5	619	14	668
King City	8	580	48	589
Kingsburg	76	279	1,325	174
Knightsen	8	580	55	578
La Cañada Flintridge	199	124	1,149	202

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
La Crescenta-Montrose	73	285	1,030	231
La Habra	64	307	1,352	169
La Habra Heights	37	393	214	440
La Mesa	276	93	2,690	90
La Mirada	68	297	2,207	107
La Palma	35	402	116	503
La Puente	10	558	214	439
La Quinta	1	693	2	721
La Selva Beach	5	619	15	663
La Verne	97	241	754	279
Ladera Ranch	509	33	1,052	225
Lafayette	308	78	2,116	112
Laguna Beach	104	222	510	325
Laguna Hills	101	230	537	320
Laguna Niguel	115	203	1,703	139
Laguna Woods	15	516	56	576
Lagunitas-Forest Knolls	8	580	21	648
Lake Arrowhead	15	516	64	565
Lake Elsinore	99	235	733	283
Lake Forest	152	161	996	237
Lake Isabella	26	447	107	510
Lake Los Angeles	1	693	3	714
Lake Sherwood	1	693	6	704
Lakeport	112	206	1,865	131
Lakeside	179	138	843	264
Lakeview	1	693	2	723
Lakewood	103	226	1,698	141
Lamont	2	674	25	635
Lancaster	241	107	7,885	13
Larkspur	65	305	294	402
Lathrop	21	475	79	543
Laton	10	558	61	570
Lawndale	9	568	42	599
Laytonville	25	449	100	519
Le Grand	18	499	1,048	226
Lebec	3	656	1,558	148
Lemon Grove	42	374	157	473
Lemoore	204	122	975	244
Leona Valley	4	642	14	670
Lexington Hills	1	693	1	724
Lincoln	574	22	2,600	93
Linden	22	472	176	457
Lindsay	42	374	195	450
Littlerock	16	508	873	258

## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Live Oak	127	185	2,152	109
Livermore	553	25	7,909	12
Livingston	9	568	1,053	224
Lockeford	20	484	145	481
Lodi	89	253	1,671	142
Loma Linda	59	318	606	306
Loma Rica	4	642	15	666
Lomita	26	447	97	522
Lompoc	40	381	227	432
Long Beach	563	23	2,952	82
Loomis	211	117	1,744	138
Los Alamitos	110	211	925	251
Los Alamos	10	558	56	577
Los Altos	474	37	3,273	71
Los Altos Hills	303	81	1,830	133
Los Angeles	4,018	2	36,174	2
Los Banos	31	426	2,107	113
Los Gatos	522	30	2,739	86
Los Molinos	12	542	68	561
Los Olivos	16	508	73	550
Los Osos	73	285	266	413
Lost Hills	2	674	12	677
Lower Lake	25	449	80	541
Lucerne	6	606	27	629
Lucerne Valley	20	484	79	544
Lynwood	1	693	2	719
Madera	351	64	3,538	61
Magalia	5	619	23	640
Malibu	158	155	1,129	206
Mammoth Lakes	9	568	27	628
Manhattan Beach	166	149	736	282
Manteca	277	92	2,506	99
Maricopa	1	693	5	709
Marina	18	499	1,411	165
Marina Del Rey	1	693	495	331
Mariposa	59	318	221	438
Martinez	147	163	927	250
Marysville	108	215	538	318
Mather	8	580	30	622
Maxwell	6	606	1,022	233
Mcfarland	8	580	898	255
McKinleyville	45	364	132	488
Meadow Vista	55	326	337	381
Mendota	3	656	102	517
Menifee	94	245	455	341

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Menlo Park	344	66	1,530	157
Mentone	13	532	41	601
Merced	132	180	2,167	108
Mesa Verde	1	693	11	682
Middletown	41	378	1,168	201
Midpines	5	619	22	643
Midway City	4	642	10	684
Mill Valley	337	68	1,549	152
Millbrae	45	364	179	456
Milpitas	99	235	3,830	56
Mira Loma	35	402	596	308
Mira Monte	2	674	9	692
Mission Viejo	280	89	1,252	184
Modesto	102	228	4,416	44
Mojave	6	606	26	633
Monrovia	60	315	490	332
Montara	21	475	114	504
Montclair	20	484	599	307
Monte Rio	8	580	28	626
Monte Sereno	28	439	174	458
Montebello	14	525	384	367
Montecito	8	580	26	632
Monterey	111	209	565	311
Monterey Park	34	406	650	295
Moorpark	91	251	715	287
Morada	1	693	16	662
Moraga	99	235	470	339
Moreno Valley	168	148	1,972	122
Morgan Hill	372	61	4,217	49
Morongo Valley	19	489	89	532
Morro Bay	53	330	180	455
Moss Beach	19	489	68	559
Mount Hermon	1	693	4	710
Mountain House	6	606	33	615
Mountain Ranch	31	426	109	508
Mountain View	397	54	4,864	37
Murphys	48	351	313	394
Murrieta	393	56	3,568	60
Napa	511	32	6,846	14
National City	18	499	65	564
Nevada City	303	81	1,117	210
Newark	48	351	314	392
Newcastle	125	189	933	247
Newman	12	542	2,093	114
Newport Beach	184	133	1,895	130



## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Nice	4	642	11	683
Nipomo	122	192	455	342
Norco	85	263	415	352
North Highlands	49	347	263	415
North Tustin	2	674	11	680
Norwalk	25	449	74	549
Novato	343	67	1,755	136
Nuevo	24	460	128	492
Oak Hills	12	542	59	573
Oak Park	25	449	103	513
Oak View	38	391	171	461
Oakdale	201	123	3,066	77
Oakhurst	33	410	167	462
Oakland	1,010	11	9,860	9
Oakley	62	311	298	400
Occidental	46	358	242	425
Oceano	5	619	11	679
Oceanside	278	91	2,034	120
Ojai	298	85	1,457	163
Olivehurst	12	542	45	595
Ontario	83	268	5,107	33
Orange	317	75	2,040	119
Orange Cove	3	656	21	650
Orangevale	180	137	483	334
Orcutt	3	656	6	705
Orinda	208	120	991	240
Orland	60	315	354	375
Orosi	8	580	45	593
Oroville	197	126	4,864	38
Oxnard	85	263	2,074	116
Pacheco	5	619	88	535
Pacific Grove	28	439	84	536
Pacifica	117	200	991	239
Pajaro	5	619	29	624
Palermo	1	693	5	707
Palm Desert	478	35	3,957	51
Palm Springs	414	50	3,633	57
Palmdale	154	159	6,392	16
Palo Alto	450	40	3,050	78
Palo Cedro	50	343	342	378
Palos Verdes Estates	30	432	156	474
Paradise	145	164	1,222	190
Paramount	4	642	382	368
Parlier	5	619	1,003	236

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Pasadena	345	65	3,210	73
Patterson	11	551	407	358
Pauma Valley	15	516	321	389
Penn Valley	129	181	569	310
Penngrove	64	307	328	386
Perris	98	238	915	253
Petaluma	433	45	5,595	25
Phelan	32	418	166	463
Pico Rivera	12	542	1,517	159
Piedmont	109	213	457	340
Pine Grove	27	444	141	485
Pine Mountain Club	1	693	7	698
Pine Valley	6	606	22	642
Pinole	43	372	162	466
Pioneer	13	532	62	568
Piru	1	693	3	713
Pismo Beach	30	432	104	511
Pittsburg	56	321	2,822	85
Pixley	1	693	3	715
Placentia	127	185	546	314
Placerville	227	114	1,437	164
Planada	2	674	5	708
Pleasant Hill	128	182	1,305	177
Pleasanton	530	29	6,109	19
Plumas Lake	40	381	113	505
Plymouth	46	358	347	377
Pollock Pines	9	568	32	616
Pomona	69	294	1,550	151
Port Hueneme	5	619	95	526
Porterville	92	249	1,120	209
Portola Valley	216	116	1,514	160
Poway	544	26	4,698	41
Prunedale	9	568	34	613
Quartz Hill	13	532	224	436
Quincy	16	508	95	525
Rainbow	2	674	9	686
Ramona	391	57	1,983	121
Rancho Cordova	492	34	6,413	15
Rancho Cucamonga	321	72	3,419	66
Rancho Mirage	296	86	2,939	83
Rancho Murieta	7	594	33	614
Rancho Palos Verdes	178	139	804	272
Rancho Santa Fe	102	228	1,124	207

## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Rancho Santa Margarita	87	260	614	301
Red Bluff	87	260	867	260
Redding	172	146	2,225	106
Redlands	276	93	2,726	87
Redondo Beach	112	206	441	344
Redway	8	580	24	636
Redwood City	352	63	2,383	103
Redwood Valley	37	393	158	471
Reedley	108	215	496	330
Rialto	49	347	1,550	150
Richgrove	1	693	7	699
Richmond	208	120	5,439	30
Ridgecrest	137	173	1,190	197
Rio Dell	1	693	2	718
Rio Linda	33	410	103	515
Rio Vista	56	321	146	480
Ripon	32	418	1,197	195
Riverbank	21	475	272	412
Riverdale	9	568	614	302
Riverside	262	99	3,382	69
Rocklin	621	18	3,632	58
Rodeo	7	594	21	652
Rohnert Park	121	195	1,073	219
Rolling Hills	34	406	297	401
Rolling Hills Estates	25	449	122	499
Romoland	95	243	250	422
Rosamond	29	435	103	516
Rosemead	19	489	89	533
Roseville	1,170	8	2,889	84
Ross	31	426	273	411
Rossmoor	10	558	54	580
Rowland Heights	35	402	152	477
Rubidoux	2	674	12	675
Running Springs	3	656	9	690
Sacramento	1,119	10	15,911	7
Salida	6	606	48	590
Salinas	164	150	1,092	213
San Andreas	20	484	124	495
San Anselmo	160	154	1,039	228
San Bernardino	154	159	5,581	27
San Bruno	33	410	92	530
San Buenaventura (Ventura)	255	103	1,816	134
San Carlos	210	118	916	252
San Clemente	142	171	1,463	162

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
San Diego	4,507	1	36,775	1
San Dimas	63	309	1,067	220
San Fernando	10	558	52	583
San Francisco	2,405	4	16,731	5
San Gabriel	46	358	158	472
San Jacinto	63	309	828	268
San Joaquin	4	642	12	676
San Jose	2,733	3	30,617	3
San Juan Bautista	15	516	128	491
San Juan Capistrano	86	262	428	347
San Leandro	127	185	1,905	128
San Lorenzo	39	385	556	312
San Luis Obispo	358	62	2,639	92
San Marcos	410	51	2,569	97
San Marino	48	351	275	409
San Martin	52	335	370	371
San Mateo	240	109	1,540	153
San Miguel	44	368	1,249	185
San Pablo	13	532	400	360
San Rafael	415	49	3,398	68
San Ramon	610	20	2,571	96
Sanger	138	172	812	271
Santa Ana	300	84	3,267	72
Santa Barbara	718	15	4,699	40
Santa Clara	241	107	5,708	24
Santa Clarita	589	21	5,506	29
Santa Cruz	866	12	4,543	43
Santa Fe Springs	78	274	520	323
Santa Margarita	18	499	63	566
Santa Maria	106	219	2,123	111
Santa Monica	290	88	2,702	88
Santa Paula	33	410	1,205	193
Santa Rosa	1,467	7	14,015	8
Santa Rosa Valley	7	594	48	591
Santa Ynez	82	269	583	309
Santee	158	155	2,150	110
Saratoga	408	52	2,364	104
Sausalito	70	291	339	380
Scotts Valley	106	219	550	313
Sea Ranch	21	475	59	574
Seal Beach	88	255	539	317
Seaside	24	460	1,055	223
Sebastopol	759	14	4,942	36
Selma	56	321	328	385

## Appendix I: Alphabetical Listing of All Cities (continued)

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Shafter	33	410	496	329
Shandon	3	656	21	651
Shasta	5	619	25	634
Sheridan	5	619	39	603
Shingle Springs	182	135	1,123	208
Shingletown	22	472	80	539
Sierra Madre	48	351	199	446
Signal Hill	6	606	19	655
Simi Valley	322	71	3,102	75
Solana Beach	89	253	385	366
Soledad	101	230	1,137	205
Solvang	44	368	211	443
Sonoma	478	35	5,398	31
Sonora	136	176	815	270
Soquel	152	161	1,207	192
Soulsbyville	4	642	15	667
South El Monte	4	642	32	617
South Gate	10	558	956	245
South Lake Tahoe	1	693	20	653
South Pasadena	79	272	413	354
South San Francisco	49	347	381	369
Spring Valley	124	190	476	336
Squaw Valley	19	489	77	545
St. Helena	144	166	3,852	55
Stanford	54	327	301	399
Stanton	6	606	36	607
Stevenson Ranch	53	330	286	405
Stockton	382	59	4,996	35
Stratford	2	674	11	681
Strathmore	12	542	80	538
Suisun City	39	385	1,217	191
Summerland	3	656	13	672
Sun City	68	297	275	408
Sunnyvale	515	31	6,099	20
Sutter	16	508	122	498
Sutter Creek	35	402	253	420
Taft	23	465	704	291
Tehachapi	52	335	212	442
Temecula	473	38	4,857	39
Temple City	33	410	124	494
Templeton	118	198	636	297
Terra Bella	11	551	330	383
Thornton	1	693	500	328

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Thousand Oaks	461	39	2,971	81
Three Rivers	37	393	159	469
Tiburon	145	164	797	274
Tipton	2	674	7	695
Topanga	94	245	530	321
Torrance	127	185	1,970	123
Tracy	251	104	1,948	125
Truckee	42	374	240	428
Tulare	128	182	1,189	198
Tuolumne City	21	475	96	524
Turlock	51	340	290	403
Tustin	96	242	1,110	212
Twain Harte	10	558	71	555
Twentynine Palms	57	320	258	418
Ukiah	93	247	1,296	180
Union City	49	347	982	243
Upland	157	157	1,537	155
Upper Lake	14	525	52	584
Vacaville	428	47	6,162	17
Valinda	1	693	9	691
Vallejo	133	178	2,697	89
Valley Center	210	118	3,160	74
Valley Springs	88	255	506	326
Vandenberg Village	1	693	2	720
Victorville	109	213	2,423	101
Villa Park	67	300	388	363
Visalia	442	42	5,965	21
Vista	321	72	1,901	129
Walnut	84	266	388	364
Walnut Creek	404	53	2,587	94
Walnut Grove	10	558	72	553
Wasco	19	489	1,382	166
Waterford	9	568	705	290
Watsonville	557	24	1,802	135
Weldon	13	532	48	588
West Covina	67	300	318	390
West Hollywood	17	506	57	575
West Sacramento	112	206	3,517	62
Westlake Village	104	222	1,310	176
Westminster	88	255	987	241
Westwood	2	674	6	701
Wheatland	37	393	206	445
Whittier	133	178	743	280

## Appendix I: Alphabetical Listing of All Cities

City	Number of Solar PV Installations	Rank by Total Installations	Total Solar PV Capacity (kW)	Rank by Total PV Capacity
Wildomar	77	276	396	361
Williams	9	568	1,076	217
Willits	79	272	307	397
Willow Creek	6	606	40	602
Willows	32	418	251	421
Wilton	50	343	1,532	156
Winchester	54	327	1,200	194
Windsor	181	136	1,352	168
Winters	88	255	838	266
Winton	25	449	214	441
Wofford Heights	9	568	50	586
Woodacre	21	475	70	558
Woodbridge	5	619	32	618
Woodlake	32	418	173	459
Woodland	296	86	5,537	28
Woodside	144	166	1,228	189
Wrightwood	5	619	21	647
Yorba Linda	246	106	1,699	140
Yountville	14	525	418	349
Yuba City	231	112	3,417	67
Yucaipa	177	140	994	238
Yucca Valley	52	335	254	419

# Notes

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2. Solar Energy Industries Association and Vote Solar, *U.S. Solar Industry Achieved Record Cost Reductions in 2010 According to DOE Report; Solar Advocates: National Lab Study is Latest Indicator that Solar is Ready to Repower America* (press release), 15 September 2011.

3. Todd Lieberg and James Lee, California Energy Commission, *Grid-Connected PV Capacity (kW) Installed in California* (excel file), downloaded from [www.energy.ca.gov/renewables/emerging\\_renewables/GRID\\_CONNECTED\\_PV\\_12-31-07.XLS](http://www.energy.ca.gov/renewables/emerging_renewables/GRID_CONNECTED_PV_12-31-07.XLS) on 22 December 2011.

4. California Energy Commission & California Public Utilities Commission, *California Solar Statistics: California Leads the Nation*, updated 21 December 2011.

5. See note 1.

6. California Energy Commission & California Public Utilities Commission, *CSI Budget Report*, downloaded from [www.californiasolarstatistics.ca.gov/reports/budget\\_forecast/](http://www.californiasolarstatistics.ca.gov/reports/budget_forecast/) on 28 September 2011.

7. BP, *Statistical Review of World Energy*, June 2011.

8. Evaluated using an assumed value of electricity of 12.5 cents per kWh and the NREL PV Watts Calculator, per National Renewable Energy Laboratory, *PVWatts Viewer 2.0*, accessed at [mapserve3.nrel.gov/PVWatts\\_Viewers/index.html](http://mapserve3.nrel.gov/PVWatts_Viewers/index.html), 20 October 2011.

9. In addition to investor-owned utility activity in San Francisco covered in the California Solar Initiative database, the city

itself has installed 7.2 MW of solar in a total of 9 installations. Charles Sheehan, Publicly Owned Utility of San Francisco City and County, Personal Correspondence, September 2011.

10. Australia had 500 MW (direct current) of solar energy capacity in 2011. See note 7.

11. 1.3 and 1.9 MW: provided by SMUD, see Methodology; Built by the Sacramento Municipal Utility District: Erik Nelson, "Only One Ray of Hope Glimmers for Solar Energy Industry," *The Miami Herald*, 30 November 1986.

12. See note 3.

13. See note 4.

14. See note 1.

15. Ibid.

16. This data was derived by subtracting solar installation totals developed for this report from totals developed for the 2009 version of this report (Bernadette Del Chiaro, Environment California Research & Policy Center, *California's Solar Cities: Leading the Way to a Clean Energy Future*, July 2009), which covered solar installations approximately through January 2009.

17. Presents actual data through 2011, including installations from the California Solar Initiative, per California Energy Commission & California Public Utilities Commission, *California Solar Initiative Working Data Set*, 7 September 2011, available at [www.californiasolarstatistics.ca.gov/current\\_data\\_files](http://www.californiasolarstatistics.ca.gov/current_data_files); data from the New Solar Homes Partnership, per California Energy Commission & California Public Utilities Commission, *Find a New Solar Homes Partnership Community*, 23 September 2011, available at [www.gosolarcalifornia.org/communities/nsphp.php](http://www.gosolarcalifornia.org/communities/nsphp.php); and data from publicly-owned utility programs, per California Energy Commission, *Publicly Owned Utilities'*

*SB1 Solar Program Status Reports: Publicly Owned Utilities Life of Program and Yearly Statistics, 2009-2010*, 23 June 2011, available at [www.energy.ca.gov/sb1/pou\\_reports/](http://www.energy.ca.gov/sb1/pou_reports/). Potential data through 2016 represents a hypothetical scenario where California's solar market grows more than 30 percent in 2012, with the rate of growth steadily declining to 18 percent in 2016, illustrated to represent one possible trajectory for the solar market to reach the 3,000 MW goal by the end of 2016.

18. See note 16.

19. Based upon estimated solar electricity generation in Los Angeles per National Renewable Energy Laboratory, *PVWatts Viewer 2.0*, accessed at [mapserve3.nrel.gov/PVWatts\\_View/Viewer/index.html](http://mapserve3.nrel.gov/PVWatts_View/Viewer/index.html), 20 October 2011, and the non-baseload emission rate for NOx pollution in California from 2007, per U.S. Environmental Protection Agency, *eGRID2010 Version 1.1*, 20 May 2011.

20. Based upon estimated solar electricity generation in Los Angeles per National Renewable Energy Laboratory, *PVWatts Viewer 2.0*, accessed at [mapserve3.nrel.gov/PVWatts\\_View/Viewer/index.html](http://mapserve3.nrel.gov/PVWatts_View/Viewer/index.html), 20 October 2011, and the non-baseload emission rate for carbon dioxide pollution in California from 2007, per U.S. Environmental Protection Agency, *eGRID2010 Version 1.1*, 20 May 2011.

21. An average California car emits six tons of carbon dioxide per year, according to California Air Resources Board figures. 1 kilowatt of solar power capacity can prevent 0.9 tons of carbon dioxide emissions per year. Divide the second number by the first, and you get 1 kW of solar preventing emissions equivalent to the output of 0.15 cars. Multiply by three for a typical residential solar system of 3 kilowatts and you get 0.5 cars per year. Therefore, two solar homes prevent the annual carbon dioxide emissions of one car.

22. The Solar Foundation, *National Solar Jobs Census 2011: A Review of the U.S. Solar Workforce*, October 2011.

23. Mary D. Nichols, "Climate Policies

Drive California's Economic Future," *Sustainable Industries*, 31 May 2010.

24. See note 22.

25. Alexander Quinn, Christine Safriet, and Christopher Clement, AECOM, *Economic and Fiscal Impact Analysis of Residential Solar Permitting Reform*, July 2011.

26. J. Paidipati et al, Navigant Consulting, Inc. for the National Renewable Energy Laboratory, *Rooftop Photovoltaics Market Penetration Scenarios*, Subcontract Report NREL/SR-581-42306, February 2008. This figure doesn't even begin to account for utility-scale solar power systems. A giant solar farm on a hundred square mile patch of the desert could technically generate as much electricity as the entire nation uses in a year: Bernadette del Chiaro, Tony Dutzik and Sarah Payne, Environment America Research & Policy Center, *On the Rise: Solar Thermal Power and the Fight Against Global Warming*, Spring 2008.

27. Assuming an average 1kW system generates more than 1,100 kWh of electricity per year. California uses about 270 million MWh of electricity per year, per U.S. Energy Information Administration, *State Electricity Profiles: California*, DOE/EIA-0348(01)/2, April 2011.

28. See note 7.

29. Paul Gipe, "Germany Aims for 35-40% Renewables by 2020," *Solar Today*, 25 July 2011.

30. Ibid.

31. See note 7; Note: Market size is based on all forms of solar, both from rooftops and utilities.

32. Existing solar from California Energy Commission & California Public Utilities Commission, *California Solar Statistics: California Leads the Nation*, updated 20 October 2011, available at [www.gosolarcalifornia.com](http://www.gosolarcalifornia.com); Remaining technical potential per note 26.

33. See note 7.

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35. J.R. DeShazo and Ryan Matulka, UCLA Luskin Center for Innovation and Los Angeles Business Council, *Designing an Effective Feed-in Tariff for Greater Los Angeles*, April 2010.

36. Eric Wolff, "Energy: Solar Customers Furious with Utility over Proposed Rate Change," *North County Times*, 8 October 2011; California Center for Sustainable Energy, *SDG&E Proposes New Rates for Solar Customers*, downloaded from [energycenter.org/index.php/component/content/article/2902-xxx-](http://energycenter.org/index.php/component/content/article/2902-xxx-draft-sdgae-proposes-new-rates-for-solar-customers)

[draft-sdgae-proposes-new-rates-for-solar-customers](http://energycenter.org/index.php/component/content/article/2902-xxx-draft-sdgae-proposes-new-rates-for-solar-customers) on 22 December 2011.

37. California Public Utilities Commission, *Decision 11-07-031*, July 2011.

38. See note 25.

39. California Energy Commission & California Public Utilities Commission, *California Solar Initiative Working Data Set*, 7 September 2011, available at [www.californiasolarstatistics.ca.gov/current\\_data\\_files](http://www.californiasolarstatistics.ca.gov/current_data_files).