



THE HOMEOWNER'S GUIDE TO SOLAR PANELS

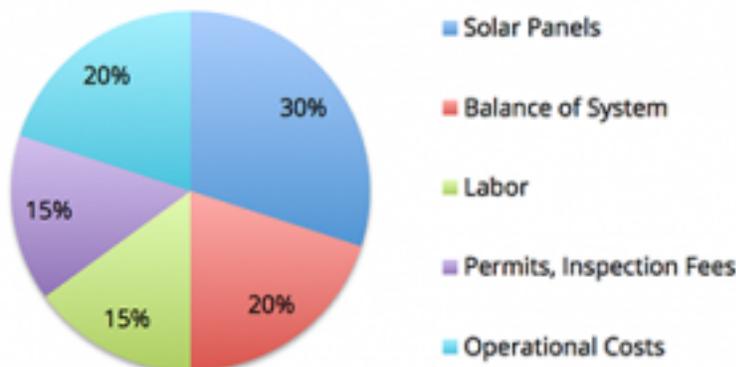
<http://energyinformative.org/solar-panels-cost/>

How Much Do Solar Panels Cost?

Last updated March 23, 2015 by [Mathias Aarre Maehlum](#)

How much do solar panels cost? This is undoubtedly the question we're asked the most, and unfortunately it has no straightforward answer. We decided to pull together all aspects of this question, and write the best resource on the costs of solar panels you will find on the entire Internet. **Residential solar systems are typically sized from 3 to 8kW and end up costing between \$15,000 and \$40,000.** The cost per watt (price inclusive of parts, labor, permitting fees, overhead, and profit) has decreased significantly over the last decade and is now between 6 and 8 (\$/W) in many parts of the U.S. Generally, the bigger the system, the lower the cost per watt.

The total costs are split into system, installation and operational costs, roughly in the following ratios:



The goal of this article is to give you an idea of how much a solar panel system will end up costing in your particular situation.

In the first part of this article we`ll be going through how much solar panels cost for a typical American single-family home. By clicking on the blue links in the overview table below, you will be taken further down on the page, to part two, for more in-depth information.

Case Study

Let`s start by evaluating the solar system costs for a single-family home in Los Angeles, California. To make things simple, this family chose to pay for their solar system in cash – you`ll learn more about other ways to finance a solar system further down on the page.

In order to supply 70% of the household`s electricity consumption, 5,600 kWh per year, we decided to install a 3 kW solar system on their roof.

5,600 kWh is the equivalent to:

- 6,000 lbs. less in carbon emissions
- Planting trees on half an acre
- Not driving your car for 7,500 miles

The calculations below are based on the following assumptions:

- Electric bill of \$100 per month
- Cost per watt at \$6.50[1]
- Electricity rate at 14.78 cents per kWh[2]
- Annual growth of electricity rate at 2.8%[3]

These numbers are all based on recent data from credible sources – see reference list at the bottom.

Costs

System	\$9,000
Solar Panels	\$6,500
Balance of System	\$2,500

Installation	\$7,500
Labor	\$3,000
Permits, Inspection Fees	\$4,500

Operational Costs **\$3,000**

Note that costs have been rounded to closest \$500 in order to generalize the case study.

LADWP Solar Incentive Program	\$4,860
30% Federal Tax Credit	\$4,392
Net Costs	\$10,248

Tax credits and other benefits that are received over time have not been evaluated. In other words, the homeowner would pay less in reality than what our calculation suggests.

Savings

Total Savings **\$21,989**

Net Present Value \$2,919

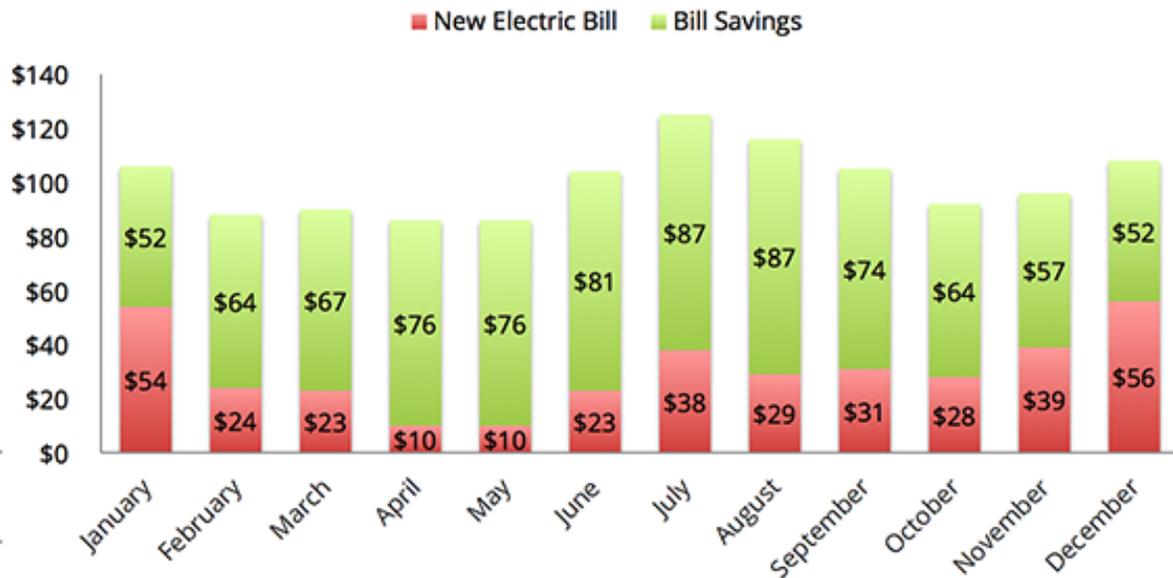
Rate of Return (ROR) 11%

Payback Time 9.5 years

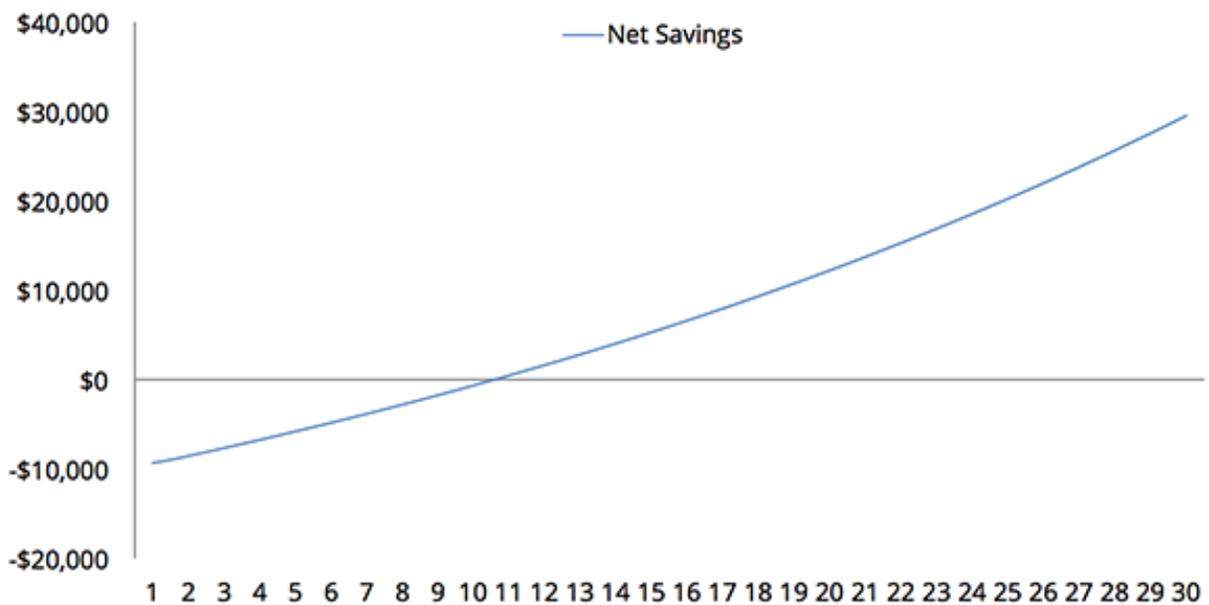
Return on Investment (ROI) 215%

Increased Property Value \$16,720

Total Savings represent the sum of electricity savings for the next 25 years – typically how long a solar panel warranty lasts. The solar system will more than likely keep generating electricity after 25 years, which will result in more savings and a higher ROI in the years to come.



Above is an overview over how much the family from California saves every month for the first year. In the graph below, you can clearly see net savings from 1st to 30th year. The payback time is when the net savings reaches zero, about 10 years after initial investment.



Payback Time

Payback time represents the threshold where savings have exceeded costs. The family from our case study has paid back their entire solar system after nine years and six months (see graph above).

According to the U.S. Department of Energy, most solar systems pay for themselves within 5 years.[5] **In some places in the United States, the payback time can be as little as three years.**

The electricity your solar system generates beyond this point brings in long-term savings. Residents in Hawaii saves on average \$64,000 over the course of only 20 years.

Increased Home Value

U.S. Department of Energy states that a solar electric system raises the property value of a home with \$20 for every \$1 in utility savings over a year.[5]

This means that the family with the 3kW solar system from our case study instantly added \$16,720 to their home value by putting solar panels on their roof (based on the first year`s electricity savings of \$836).

What are some of the other ways you can benefit from going solar? Read our list over the most important [Benefits of Solar Panels](#).

System Costs

As mentioned in the introduction, residential solar systems are typically sized from 3 to 8kW and end up costing somewhere between \$15,000 and \$40,000. In this section, we will look at the costs of the various components of a solar system (not installation or operational costs).

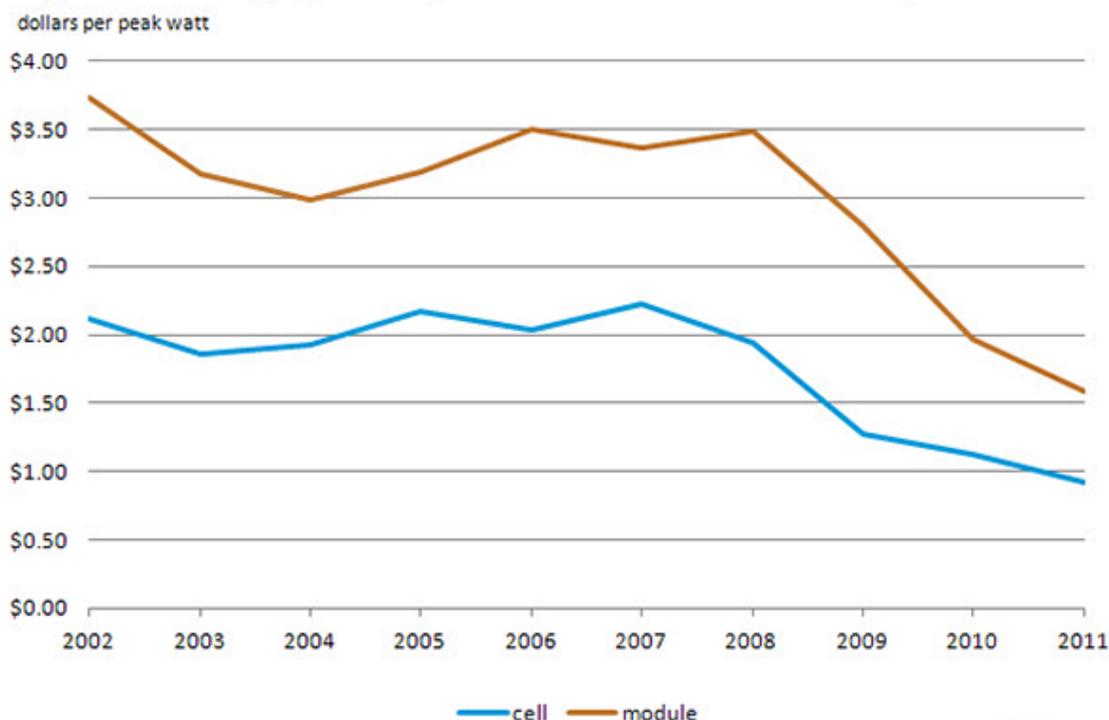
Note that all numbers discussed in this article are dependent on a boatload of different variables such as where in the country you live – they do however represent typical costs.

Solar Panels

The solar panels themselves usually account for about 30% of total costs. Residential solar panels with a combined capacity of 3-8kW typically cost between \$4,000-\$16,000.

The [best solar panels](#) are not necessarily the most expensive. Cost per watt (\$/W) is a more convenient way of looking at the costs of solar panels. This metric indicates costs relative to electrical power output. The cost of solar panels have decreased significantly over the last decade and are currently selling for under \$0.70/W in industrial quantities. For homeowners, this translates to about \$1.5/W.

Figure 2. Average price of photovoltaic cells and modules, 2002-2011



Source: U.S. Energy Information Administration (EIA), Form EIA-63B, "Annual Photovoltaic Cell/Module Shipments Report." 

Balance of System

Balance of system (BoS) refers to all components of a solar system except the solar panels themselves. This typically includes one or several inverters, mounts, wiring and other electrical components. Balance of system makes up for about 20% of total costs – homeowners should expect to pay somewhere between \$3,000-\$10,000 for these components.

Inverter

Inverters convert direct current (DC) from your solar panels into alternating current (AC), which is used by home appliances and enables you to grid-tie your system. **Inverters typically account for 10% (\$1,000-\$4,000) of total costs.**

Also note that solar panels usually come with a warranty of 20-25 years, but conventional central inverters will need replacement before this.

If you choose to go with [micro-inverters instead of a central \(string\) inverter](#), the costs will increase along with a boost in power output and an extended warranty.

Installation Costs

In this category we've included labor costs (15%), as well as permits and inspection fees (15%). The cost of both categories are highly dependent on what state you live in, but in most cases end up between \$2,000-\$5,000 per installation.

Here`s a few things you might have to take into account:

- Building and electrical permits at Department of Buildings
- Neighborhood covenant requirements
- Approval from homeowners association

Your solar installer might not be educated on what is involved in obtaining the various permits where you live. Choosing a reputable and large installer is often the best choice.

Operational Costs

Operational costs include monitoring, maintenance, repair, insurance and overhead costs – typically \$4,000-\$8,000 (20%).

This is a cost category where there is a lot of potential to cut costs. Not everyone will need monitoring and you can probably get away with little maintenance. You will hopefully never need any repairs.

Incentives

The solar market flourishes when there are financial incentives in place – even in places that aren't particularly rich in sunlight. The final costs of a solar system is highly dependent on where you live and what rebates, tax credits and grants you are eligible for.

In some situations, total costs can be cut well above 50%, and homeowners are able to go solar for only few thousand dollars. Everyone receives at least a 30% federal tax credit.

To find out what other incentives you are eligible for, search the Database of [State Incentives for Renewables & Efficiency \(DSIRE\)](#). Alternatively, get in touch with us and let us evaluate your situation for free.

Some incentives are capped at a certain power and cost thresholds. Going with a system size that maximizes this potential is usually what we recommend.

Solar for \$0 Down

If you've been following the solar industry the last couple of years you've probably heard of power purchase agreements (PPAs), as well as third-party-owned and pay-as-you-go solar. These are essentially all financial models to reduce or eliminate upfront costs. Their arrival is the single biggest reason for why solar is has grown with a tremendous rate in the last couple of years.

Homeowners can now go solar for \$0 down and get savings from day 1.

Here`s how leasing works: Instead of paying the electrical utility company for power, you lease a solar system, and pay a fixed rate for the electricity it produces. These new electricity rates are cheaper and typically locked in for 15 years, as opposed to utility rates that have been on the rise for decades.

Where to go from now? The goal of this article was to give you an overview over the different expenses that come with a residential solar system, and give you an idea about how much it would cost in your situation. For a cost/savings estimate, get in touch with solar experts below:

References: [1] [California Solar Statistics](#), [2] [U.S. Energy Information Administration](#), [3] [California Energy Commission](#), [4] [U.S. Department of Energy](#).