



Sensible Solar Az
Business ID: 1000036348
BBB Rating: A+

SENSIBLE SOLAR AZ™

SUN CITY SOLAR AZ™

SOLAR BATTERY GUIDE



Authors: Cory O'Brien Senior Director - Growth Marketing Editor Ryan Barnett SVP, Policy Market Development – Palmetto Solar – Updated July 2024

Whether considering [home solar panels](#) or already have them installed, adding battery energy storage helps you create the greenest and most sustainable renewable power solution possible.

With a solar battery, you can store the excess energy your solar panels produce, so when the sun goes down, the clouds roll in, or the power goes out, you have backup clean power on hand and savings in store.

In this guide, we outline solar batteries from every angle, including how they work, different types, costs, benefits, features, and buying considerations to help you find the best energy storage solution for your home.

How Does A Solar Battery Work?

Plain and simple, solar batteries can be charged whenever your panels generate more electricity than your property is actively consuming.

This stored energy can be discharged through your home's electrical system to run lights, appliances, and other electronics with the clean solar power produced on-site.

Consider your home's energy needs on a typical weekday. Usually, you will consume the most energy in the morning and night. Meanwhile, the most productive hours for power generation are mid-day and the afternoon especially during the on-peak rate periods.

Without a solar battery, that excess midday power is fed into the grid. This can earn you net metering credits on your energy bills, at a value determined by your utility under state regulations.

With a battery, any excess electricity is stored at home and used to run your home for free instead of purchasing grid-supplied power outside of solar production hours.

Today, it is possible to go solar with or without battery storage while interconnected to the energy grid. According to the Solar Energy Industries Association (SEIA), 13% of residential solar projects installed in 2023 included battery storage. SEIA predicts that this frequency will double to 26% by 2028.

Residential solar systems

With a home solar battery, you can use more of the electricity your solar panels generate and have more control over how and when you do.

When you're connected to the grid, you don't have to worry about running out of electricity during a stretch of cloudy days. That means grid-tied solar panels have more freedom in battery capacity and cost options. With the grid as a source of energy for your home, you can get by with smaller or cheaper battery installations.

The Benefits of Adding a Solar Battery

Adding solar battery storage to a photovoltaic (PV) system delivers four key benefits: independence, savings, environmental friendliness, and energy resilience.

Energy independence

Adding a battery enables you to decide precisely when the solar power you generate is used, stored, and shared.

This can help you reach any energy goal, like keeping the lights on, lowering utility bills, or minimizing your carbon footprint.

Savings on utility bills

By drawing power from your battery, you can avoid grid-supplied electricity consumption outside of solar production hours.

This is very important if you live in an area where electricity prices vary depending on the time of day. Batteries can help you avoid high utility electricity rates while tapping into backup reserve during peak billing hours.

Cleaner energy at home

By keeping more of your PV solar energy on-site and using it to power your home, you can avoid the carbon emissions associated with other electricity sources.

About 60% of [grid energy](#) in the US is generated by fossil fuel resources.

Even further, solar batteries can be used as an alternative to traditional gas-powered generators for homes. So when you need backup power, a solar battery can also help reduce both noise and air pollution right at home.

Energy security during severe weather and power outages

Backup batteries can improve your energy security by keeping your solar panels running and your home electrified throughout local grid power outages.

Across the country, weather-related power outages are rising as the effects of climate change increase the frequency and intensity of flash floods, cyclones, extreme heat, wildfires, and other natural disasters.

For example, consider the [February 2021 winter storm](#) which caused power outages for 4+ million Texans. In addition to losing power, some customers were left with massive utility bills, because when access was restored, [electricity rates rose more than 7,000%](#) in a matter of days.

According to [Climate Central](#), the number of weather-related power outages in the US between 2014 and 2023 was approximately double the than the first ten years of the study (2000 - 2009).

Solar Battery Costs

Solar battery costs depend on many factors, but are primarily influenced by a battery's capacity and chemistry. Typically the bigger or more advanced the battery, the higher the cost, though battery prices have [dramatically lowered](#) over the last 30 years.

Home solar batteries can cost between \$10,000 and \$15,000 to purchase and install, though smaller options may be cheaper. Tax credits can return some of that cost on your taxes (if available). With that said, many homeowners elect to "stack" multiple batteries together for greater capacity, which increases total costs.

Exact solar battery costs vary by manufacturer, installer, and project, and whether things like an electric panel upgrade are required.

The total costs of your solar battery installation will also be influenced by when you decide to add storage: upfront or after your panels are installed. If you weren't planning on adding a battery to your system, doing so later may require upgrading other parts of your solar system. That means it's usually most cost-effective to add a battery to start with.

How to Compare Your Solar Storage Options

There are many factors to consider, including capacity, efficiency, and expected lifespan.

When installing a home solar battery system, professional help is strongly recommended, both for safety and potential legal requirements in your area.

Capacity

A solar battery's capacity determines how much solar electricity you can store at one time, measured in kilowatt-hours, or kWh.

When finding the ideal solution for your property, it is important to remember that most solar batteries can be stacked to increase your system's total storage capacity.

Power output

Measured in kW, a solar battery's power output rating references how much energy it can deliver in one load, whether to your home or the electricity grid. In general, the higher the output rating, the more devices you can power at the same time.

A battery with a low capacity and a high power rating can run many appliances at once, but for a short period of time. On the other hand, a solar battery with a high capacity and a low power rating may only power a few high-demand appliances at once, but for an extended amount of time.

Depth of discharge (DoD)

A battery's depth of discharge (DoD) is the maximum percentage of its capacity that can safely be used without the need to recharge. As draining a battery completely can damage it, DoD ratings are a good representation of a product's true usable capacity.

Like with other ratings, the higher the DoD percentage, the more of your battery storage you can actually use on a day-to-day basis.

Consider a 15 kWh peak capacity battery with a 90% depth of discharge rating.

Here, you should be careful not to use more than 13 kWh (90% of 15 kWh) of solar electricity before recharging to avoid damage or shortening your battery's lifespan.

Round-trip efficiency

Round-trip efficiency measures the percentage of energy you put into your battery that you can actually get out. Let's say that your panels send 15 kWh into your battery, but you can only get 12 kWh back. In this example, storage system has an 80% round-trip efficiency.

While some energy will always be lost in the electricity storage and use cycle, several of today's top solar batteries, Tesla, have round-trip operating efficiencies as high as 90% and more. A battery with a low capacity and a high power rating can run many appliances at once

Lifespan and warranty

Just like your cell phone battery, solar batteries slowly lose their charging capacity and efficiency over time. Most solar batteries are sold with some sort of long-term guarantee of the battery's health after a certain amount of time or number of cycles: (one cycle = one charge and discharge).

For example, your battery may come with a 10-year, 5,000-cycle warranty at 90% capacity when bought cash or financed. In this instance, your battery should retain at least 90% of its original capacity so long as it is less than 10 years old and has not been cycled 5,000 times.

With some leases the warranty is increased to 25 years guaranteed to 90% capacity.

In general, solar battery life spans range between 10 and 15 years. You may be able to prolong your battery's lifetime and long-term efficiency with proper maintenance and smart usage habits.

Solar Battery Types and Materials

In the US, lithium-ion batteries are the most common storage technology paired with home solar panels today. However, lithium systems are not the only PV storage technology on the market, and there are other solar battery types before finalizing your purchasing decisions.

LFP Battery chemistry

Like your smartphone, laptop, or electric vehicle, solar energy systems can be powered by lithium-ion batteries.

Specifically, many battery manufacturers such as Tesla have switched to lithium iron phosphate (LFP) technology for solar energy applications. Compared to non-lithium products, LFP and similar battery types come with longer lifespans, greater round-trip efficiency, and the most long-term value and now can be mounted outdoors instead of inside a garage.

As we find more efficient and sustainable ways to store solar electricity, it is important to remember that bringing viable products to market can be a long and arduous process. As such, waiting for "the next big thing in solar batteries" isn't always worth it.

How Home Solar Batteries Work with the Energy Grid

Besides the savings benefits to the battery owner, home storage batteries can work to solve the duck curve, a problem associated with solar energy capacity and the electricity grid. Depicted below the solar duck curve is a representation of how grid electricity supplies fluctuate, based on local demand and solar power generation.

THE DUCK CURVE EXPLAINED

Without integrated battery storage, solar duck curves may get worse throughout the US. Here's how they work:

- Energy demand is typically highest during the morning and evening, while solar power generation peaks from midday until the late afternoon.
- In the afternoon, too much solar power on the grid can lead to energy oversupplies and net losses.
- After solar-producing hours, utilities must ramp up energy production to meet higher electricity demand in the evening.

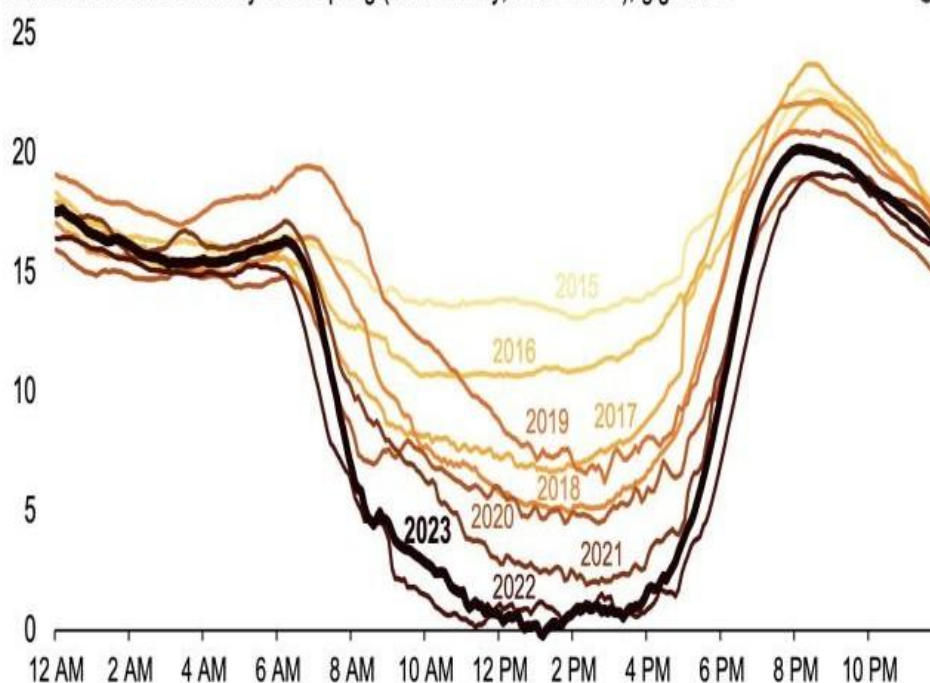
Here, solar batteries can mitigate grid stress in two ways: by capturing excess solar power generation in the afternoon and offsetting utility energy consumption throughout the evening and overnight.

With this, solar batteries can help flatten the curve and help balance local power supplies and prepare for peak periods of demand.

By drawing power from dispersed home solar batteries, local utilities can reduce the total amount of electricity that needs to be locally generated in the morning, evening, and overnight. Mitigating the need to build additional electricity generation facilities, solar battery storage sharing programs are often nicknamed **virtual power plants**.

California's duck curve is getting deeper

CAISO lowest net load day each spring (March–May, 2015–2023), gigawatts



Solar battery economics: Net billing

When your solar power system sends excess electricity to the grid, your utility may add credit to your [energy bills](#) through [net billing program](#). The value of this bill credit will vary depending on where you live and will rarely be equal to retail energy rates.

For example, a utility might charge \$0.18 per kWh for power drawn from the grid, but your net billing credits may only be worth \$0.06 per kWh. Without a battery, this means that every time you export solar energy to the grid, you may be compensated at a rate less than what you expect to pay for electricity later that evening.

In this scenario, battery storage could make your home's solar energy system more economical with the ability to capture and use more of the electricity you generate in place of utility power.

Solar battery economics: How time-of-use rates work

Utility companies are implementing time-of-use [\(TOU\) rates](#), in which the price of grid electricity depends on the time of day it is consumed, known as demand-based pricing, rates are usually highest in the early morning or late afternoon and evening.

While TOU prices affect electricity rates for all utility customers, they can also influence the value of your solar net metering credits throughout the day.

In areas with TOU rates, you can maximize the economic benefits of your renewable energy system by storing, using, and sharing your solar electricity from battery strategically in line with grid electricity rates.

Can You Go Off-Grid With a Solar Battery?

Yes, you can go off-grid with a solar battery. However, if you are installing solar panels on a property already connected to utility power lines, however going completely [off the grid](#) is not advised, as there are extra costs, complexities, downsides, and legal considerations.

How to Get a Solar Battery

Getting a home battery, is a process that will likely require professional help and you'll need permission from your utility and permits from your city.

A reputable installer should be able to help you navigate those steps, as well as get your battery installed safely.

Improper installation can lead to an ineffective battery or a dangerous one, you'll want to have it installed right. After the permitting and paperwork is done, installation is done in average of one day. If it's paired with a solar installation going on a complicated roof, it may take longer.

How much energy can be stored in a solar battery?

Solar energy storage is measured in kilowatt-hours (kWh).

Sizes range up to 13 kWh and higher.

To increase the storage capacity of your solar energy system, solar batteries can be linked together or installed in an interconnected battery bank.

Can solar batteries be recycled?

Yes, many materials in solar batteries are being now being recycled.

Where can I get the best solar battery?

You can get the best solar battery for you by working closely with a reputable installer.

By letting a professional install your battery, you guarantee manufacturer warranties and overcome legal requirements from local building codes and electric utilities.

SERVICES AND SERVICE ENHANCEMENTS



Solar Service



Solar + Battery
Storage Service



Add-on Battery
Service



Protection Service



ROOF
REPLACEMENT



EV CHARGERS



STANDBY GENERATORS

SENSIBLE SOLAR AZ™ SUN CITY SOLAR AZ™

CARL JOHNSON
Energy Specialist & Expert
480-399-1462 cell & text

Founder and Owner
info@sensiblesolaraz.com

SENSIBLESOLARAZ.COM



SCAN QR CODE
View our Solar Programs



Business ID: 1000036348

BBB Rating: A+



Free Appointment



Use this QR code or go to our website
Use the 'Get a FREE Quote' link.
Fill out the 1 minute form.
We will contact you and start
you on your solar journey.