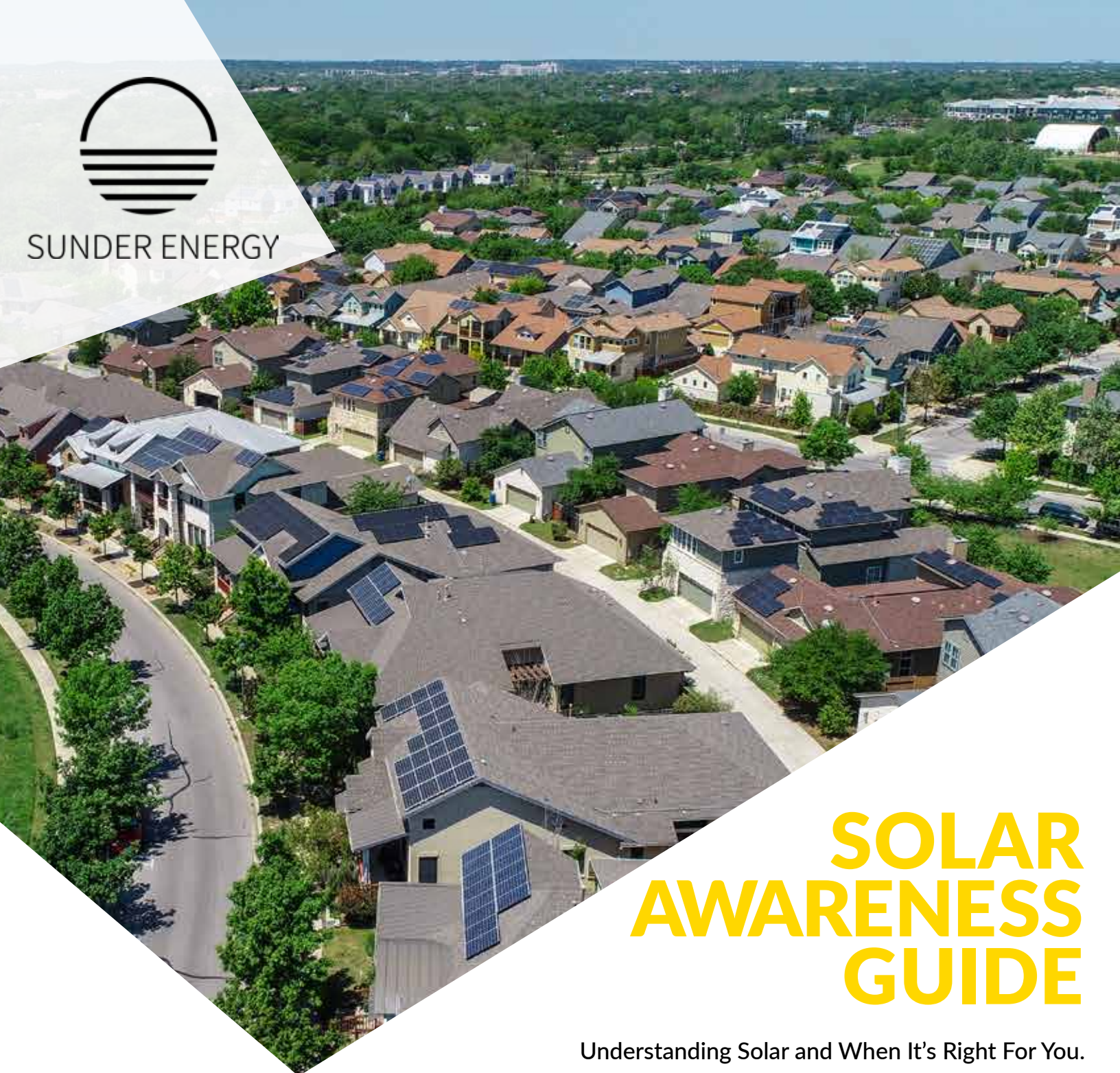




SUNDER ENERGY



SOLAR AWARENESS GUIDE

Understanding Solar and When It's Right For You.



inside:

- How Solar Energy Works, Helping You Make An Informed Decision
- Solar Myths Dispelled by the Solar Facts
- Fun Facts on Solar Power
- Simple DIY Tips to save money and energy TODAY!
- 15 Compelling Reasons to Go Solar

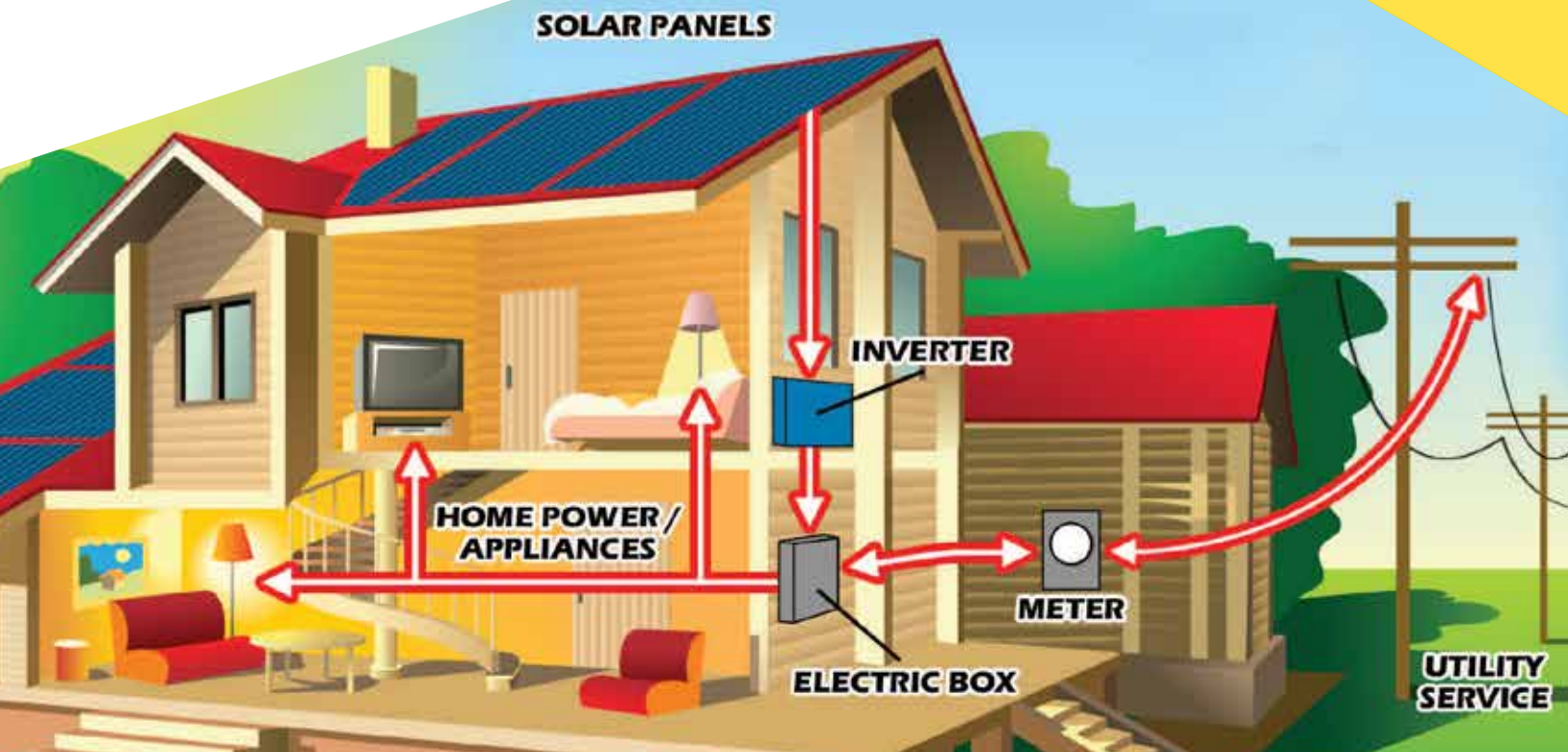
HOW DOES A SOLAR ELECTRIC (PV) SYSTEM WORK?

The solar panels (also called photovoltaic panels or PV panels) that are fitted on your roof consist of a large number of small solar cells. These are all composed of two layers. Under the influence of daylight, a difference in voltage arises between these two layers. As soon as the two layers are connected, an electric current starts to flow. The solar panel converts those photons into electrons of direct current ("DC") electricity. The electrons flow out of the solar panel and into an inverter and other electrical safety devices. The inverter converts that "DC" power (commonly used in batteries) into alternating current or "AC" power. AC power is the kind of electrical that your television, computer, and toasters use when plugged into the wall outlet. Solar panels generate power as soon as there is sunlight, even if there is just a little sunlight. Therefore, a solar energy system works even when it is cloudy, or if the solar panels are in partial shade. Naturally full sunlight would produce the most energy production.

Any solar energy your system produces that you don't simultaneously consume, is added back to the utility grid, by a process known as net-metering.

WHAT IS NET METERING?

Net metering is a billing arrangement between you and your utility company that credits you for the electricity your solar system adds to the grid. Your solar system produces electricity during the daylight hours, which for many households is when families are at work or school. Therefore, typically your system is producing more energy than you are consuming and as a result, your electric meter spins backwards as it adds that energy to the grid. Once the sun sets and you begin to consume energy, your meter spins forward in the normal manner and you simply pay for the "net" energy use. This is basically the difference between the excess energy you were credited for during the day and the actual energy you consumed.



SOLAR MYTHS

Solar power doesn't work in colder, cloudy climates.

Germany isn't known for being a warm and sunny place but its solar power plants produce between 20-30% of all its energy daily. Germany also shattered a record, producing 50% of the energy used by the entire country in May of 2012. New Jersey and Massachusetts aren't nearly as sunny as California or Arizona, yet New Jersey now ranks 5th in the country for solar capacity and Massachusetts ranks 7th. Clouds don't stop the solar UV rays from getting through and power production from Photovoltaic solar panels actually works most efficiently in colder temperatures. Optimum temperature for power production is around 43 degrees Fahrenheit.

Solar is too expensive for most homeowners.

The fact is solar energy solutions are more affordable than ever and most of homeowners who go solar save 50-100% on their energy bills. Plus solar leases make it possible for almost anyone to go solar. On average, typical customers save \$1,700 a year on their energy bills, earn \$15,000 from combined tax incentives and grants and have increased their property value by \$40,000. Solar panels also produce a high return on investment. Bonds, CDs and even the S&P 500 don't come close. Home solar typically generates a 125% ROI in 5 years, 250% in 10 years, 350% in 15 years and almost 500% in 20 years!

The Solar industry is failing.

Yes, some American solar panel manufacturers have failed and when the automobile was first invented, quite a few automobile manufacturers failed too, but the best ones survived. The best solar energy companies will survive too. The fact that the U.S. is on pace to double its growth from 2 million solar installations to 4 million by 2023 is a sign of a thriving industry, one that has been adding jobs at a pace 12 times faster than the overall U.S. economy.

Solar panels will cause damage to my roof.

Solar panels actually benefit the portion of the roof they cover by protecting and preserving it from the harmful rays of the sun.

Reselling my house will be more difficult with solar panels.

Actually, solar panels would enhance the property value of your home. Many studies have found that homes with solar panels actually sell 20% faster than homes without solar panels, for 17% more money.

Solar panels are ugly.

Having solar panels on your roof announces to your neighbors and friends that you care about your planet and about the world your grandchildren and future generations will live in. Creating clean energy for you and your family is beautiful, not ugly. The next time you hear someone say they won't go solar because they don't like how it looks, ask them if they would rather have an ugly roof on a beautiful planet, or a beautiful roof on an ugly planet.

Next generation solar panels will make today's technology obsolete.

The fact is, unless you're running a server farm in your house, current solar panels are more than enough to generate all the power your home needs. Solar panels are not like iPads or other products that get updated every year, prompting hipsters to stand in long lines so they will be one of the first to own the latest new gadget. What difference does it really make if five or six years from now your neighbor gets some new type of "slim line" solar panels? You will have had five years creating your own clean power.

SOLAR HISTORY

- The history of solar power can be traced back to the 7th Century B.C. During this time, magnifying glasses used the sun's rays to make fire.
- The Greeks and Romans were the first to use passive solar designs. Buildings with south facing windows allowed the sun to heat and light indoor spaces.
- In 1922, Albert Einstein won the Nobel Prize for his services to Theoretical Physics and especially for his discovery of the law of the photoelectric effect.
- Edward Weston receives first US patent for a Solar cell in 1888
- Solar panels first appeared on the market in 1956 to Researchers at Bell Laboratories demonstrated the first practical silicon solar cell in 1954.
- Space programs started using photovoltaic powered systems in 1958 and they are still in use today.
- Da Vinci predicted a solar industrialization as far back as 1447.
- In May 2015, Tesla Motor Company announced its intention to launch a lithium ion battery storage product at a price point that would make it economic for American homes to store solar power generated during the day for use at night.

15 COMPELLING REASONS TO GO SOLAR!

1 **Drastically reduce or totally eliminate your electric bills.**

Installing solar power for your home or place of business helps you generate your own electricity and become less reliant on your electric utility, reducing or eliminating your monthly electric bill. A solar panel system typically has a 25-30 year lifespan, which means that you can cut your electricity costs for decades to come by going solar. Even if your solar system doesn't produce 100 percent of the energy you consume, it will still reduce your utility bills and save you or your business a lot of money.

2 **Solar energy is an investment, not an expense.**

Yes you read that right; instead, a solar system is one of the best investments you can make, with returns rivaling those of more traditional investments like stocks and bonds. With the substantial electricity bill savings your solar system will generate, the average American homeowner stands to pay off their system in seven to eight years and can see an ROI of 20 percent or more.

3 **Solar is a proven technology.**

World installs a record 168 GW of Solar Power in 2021 and enters the Solar Terawatt Age. SolarPower Europe's latest report (i) indicates that global solar capacity doubled in 3 years from 2018, bringing the world's solar fleet to one Terawatt capacity in April 2022.

By the end of 2021 there were 3.2 million residential solar systems in the US.

In 2018, California mandated that new single-family homes, as well as multi-family dwellings up to three stories high, must include solar panels starting in 2020. The mandate also applied to homes that undergo substantial upgrades. A second mandate was also voted into law, requiring new commercial buildings to have solar panels and battery storage as well. This mandate will be enforced at the beginning of 2023.

4 **Guaranteed Performance**

Solar panel manufacturers typically include a 20- to 25-year warranty with their solar panels, guaranteeing an 80% performance after 25 years.

5 **Solar can pay you money while you're earning back your investment.**

Incentives in the U.S. allow your system to make you a profit, in addition to electric bill savings that will pay off the cost of your system. The two main incentive programs that allow you to earn additional bill credits that your system produces are Solar renewable energy credits (SRECs) and net metering. These programs compensate you for the electricity that your solar panels generate. If you live in a state where either of these incentives apply, you can expect both immediate and long-term returns from your solar system investment.

6 **A solar system increases the value of your home**

A study from Lawrence Berkeley National Laboratory revealed an increase in resale value of approximately \$5,911 for each kilowatt of solar power installed. A Zillow study noted that homes with solar tend to sell for about 4.1% more than homes without.



7 Eliminates exposure to rising energy costs.

Before you could produce your own electricity from solar you had no choice but to purchase your electricity from your local utility electricity provider, which have historically produced annual rate increases by as much as 5%, and a trend that is unlikely to change. However, going solar gives you control and energy independence.

8 Boosts U.S. energy independence

The sun is virtually an infinite energy source and a key component to achieving energy independence. Increasing the capacity to harness this free energy source to create electricity will generate electricity from the sun will protect this country from price fluctuations in global energy markets.

9 Create jobs and help your local economy

According to the independent non-profit Interstate Renewable Energy Council (IREC), solar jobs were up in 47 states and increased by 9% between 2020-2021. An increase of 21,563 jobs to 255,037 workers as of 2021. (ii)

10 Take Advantage of Incentives

In December 2020, Congress passed an extension of the ITC, which provides a 26% tax credit for systems installed in 2020-2022, and 22% for systems installed in 2023. As of August 2022, there is a bill before the House to expand and increase the ITC to 30% for 10 years. These incentives enable you to get a percentage back of the total cost of a system (equipment & installation). When you combine these with state and local rebates, Solar Renewable Energy Credits (SREC's) and your total costs can be cut by as much as 50% or more while the incentives last.

Using SREC's as an example of additional incentives, Data from One Block Off the Grid showed that the average solar home in New Jersey earned between \$5,000 and \$7,000 by selling their SREC credits every year. To find out what state and local incentives apply to you (as they can vary between ZIP codes), call us for up to the date information.

11 Solar panels are simple to install

Solar panels don't have any moving parts and only require the correct bolts and fixing to keep them securely in place. The whole process can be easily completed in just a few hours.

12 Solar panels have a long lifespan.

Many solar-electric systems are made with tempered glass and under normal conditions they will withstand hail up to one inch in diameter, traveling at 50 mph. In locations known to have larger hail, they are still more likely to deal a glancing blow to your system rather than a direct hit, because panels are usually oriented at a tilt and facing south (northern hemisphere), which is most frequently not the prevailing direction for severe hailstorms. It is commonly accepted that those panels are likely to have a life span in excess of 30-40 years.

13 Protect the environment & reduce carbon emissions

The U.S. places second in the world to China for annual carbon dioxide emissions at 14% and the use of a solar system can go a long way in lowering your carbon footprint by replacing utility power with clean electricity from solar panels. The average residential solar system offsets about 100,000 lbs. of carbon dioxide in 20 years, which is the equivalent to driving a car approximately 100,000 miles or planting 2,000 trees.

14 Low maintenance

Solar panels have no moving parts, are completely silent, easy to operate and rarely need maintenance. As long as the panels are free from shading and debris and cleaned periodically, the panels will continue to produce free electricity effortlessly, for a commonly accepted 30-40 years with very little spent on maintenance and repair work!

15 Solar works in many climates.

There are many people who believe solar won't work in colder and overcast climates, when in fact solar panels actually work more efficiently in cooler temperatures, because excessive heat can reduce voltage output. While more hours of direct sun exposure will certainly help a solar system generate more electricity, modern panels are quite efficient and can still generate energy in low light situations.

(i) <https://www.solarpowereurope.org/press-releases/world-installs-a-record-168-gw-of-solar-power-in-2021-enters-solar-terawatt-age>

(ii) <https://irecusa.org/blog/press-release/solar-jobs-up-in-47-states-increase-9-nationwide-in-2021/>

FUN FACTS ABOUT SOLAR

- All TV and communications satellites are powered by solar energy using photovoltaic cells.
- Solar energy is the primary source of energy for all life forms.
- Sunlight travels to the earth in approximately 8 minutes from 93 million miles away, at 186,282 miles per second.
- In a single hour, enough sunlight reaches the earth's surface to meet the entire world's energy needs for a full year.
- The sun is the most inexhaustible, renewable source of energy known to our civilization.
- Photovoltaic Panels (solar panels) are mainly composed of silicon.
- When silicon is taken from just one ton of sand, and used in photovoltaic solar power panels, that silicon can produce as much electricity as 500,000 tons of burning coal.
- A 1-kilowatt home solar system will prevent approximately 170 lbs. of coal from being burned, 300 lbs of CO₂ from being released into the atmosphere and 105 gallons of water from being consumed each month! The average size house system is 5 kilowatts.
- In 2017, total U.S. primary energy consumption was equal to about 97.7 quadrillion (97,728,000,000,000,000) Btu's
- Karnataka, India is the site of the world's largest solar park. Pavagada Solar Park will produce 2000MW and span across 13,000 acres.
- Retail residential electricity rates (the amount you pay per kilowatt-hour, or ¢/kWh) have risen across the nation at a rate of about 4% on average over the last 10 years.
- The unit of energy used to measure solar energy is the kilowatt hour (1 kilowatt = 1000 watts). One kilowatt hour (kwh) is equal to the amount of electricity required to burn a 100 watt light bulb for 10 hours.

In Q1 2021, the U.S. solar market installed just over 5 GWdc of solar capacity, a 46% increase over the first quarter of 2020 and

- the largest Q1 on record.

Home value increases when solar is added. A typical home appreciates 50% - 75% of the solar system cost. Another study estimates

- that your home appreciates \$10 - \$25 for each \$1 reduction in your annual electrical bill. (Cut your electrical bill by \$1,000 a year and your home increases in value by \$10,000 to \$25,000.)

The Mojave Desert receives so much direct sunlight that if it were lined with arrays of solar panels, it would generate more energy

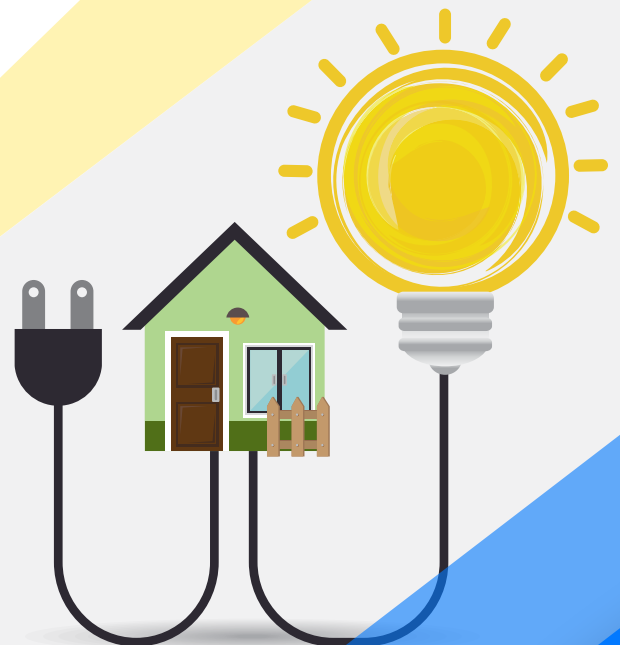
- in a single day than the U.S. needs for an entire year. In fact, the amount of potential solar energy generation in the Mojave Desert is twice the annual electricity usage in the U.S.

Solar panels don't need direct sunlight to produce electricity. However, direct sunlight produces the

- most energy.

Around 80% of the sunlight that hits the ice is reflected into space, whereas the

- ocean absorbs around 90%.



EASY DIY TIPS TO SAVE ENERGY AND MONEY TODAY!



- Install a programmable thermostat to save up to 10% on cooling and heating costs annually.
- Air dry dishes instead of using your dishwasher's drying cycle
- Turn things off when you are not in the room such as lights, TVs, entertainment systems, and your computer and monitor
- Plug home electronics into power strips; turn the power strips off when the equipment is not in use – TVs and DVDs in standby mode still use several watts of power
- Lower the thermostat on your water heater to 120 degrees
- Take short showers instead of baths and use low-flow shower heads for additional energy savings
- Wash only full loads of dishes and clothes
- Keep range-top burners and reflectors clean; they will reflect heat better and you will save energy.
- Match the size of the pan to the heating element
- Use small electric pans, toaster ovens or convection ovens for small meals rather than your larger stove or oven. Small appliances will use one third to one half as much energy as a full sized oven.
- Place the faucet lever on the kitchen sink in the cold position when using small amounts of water. When it is in the hot position it draws hot water even though it may never reach the sink.

You can conduct a simple home energy assessment to determine what is accounting for the biggest portion of your utility bills. Just follow these easy DIY Energy Assessment Tips.

- Check the insulation in your attic, exterior and basement walls, ceilings, floors and crawl spaces.
- Check for air leaks around your walls, ceilings, windows, doors light and plumbing fixtures, switches and electrical outlets.
- Check for open fireplace dampers
- Make sure you maintain your appliances and heating and cooling system. These are like cars and need regular tune ups. Check your owner's manual for the recommended maintenance.
- Study your family's lighting needs and look for ways to use controls – like sensors, dimmers, or timers – to reduce lighting use.

If you have already made your home as energy efficient as possible and your utility bills are still high, you may want to consider a solar power system. Contact us for a no obligation consultation to see how much you can save with solar.

IS SOLAR ENERGY AFFORDABLE?

The truth is—you are already affording it. If you currently spend \$200 each month (\$2400 a year) or \$24,000 over the next 10 years and factor in a conservative yearly increase of 4.5% (national average based on PUC-public utilities commission), you will have spent \$35,677 with absolutely no return on your dollars.

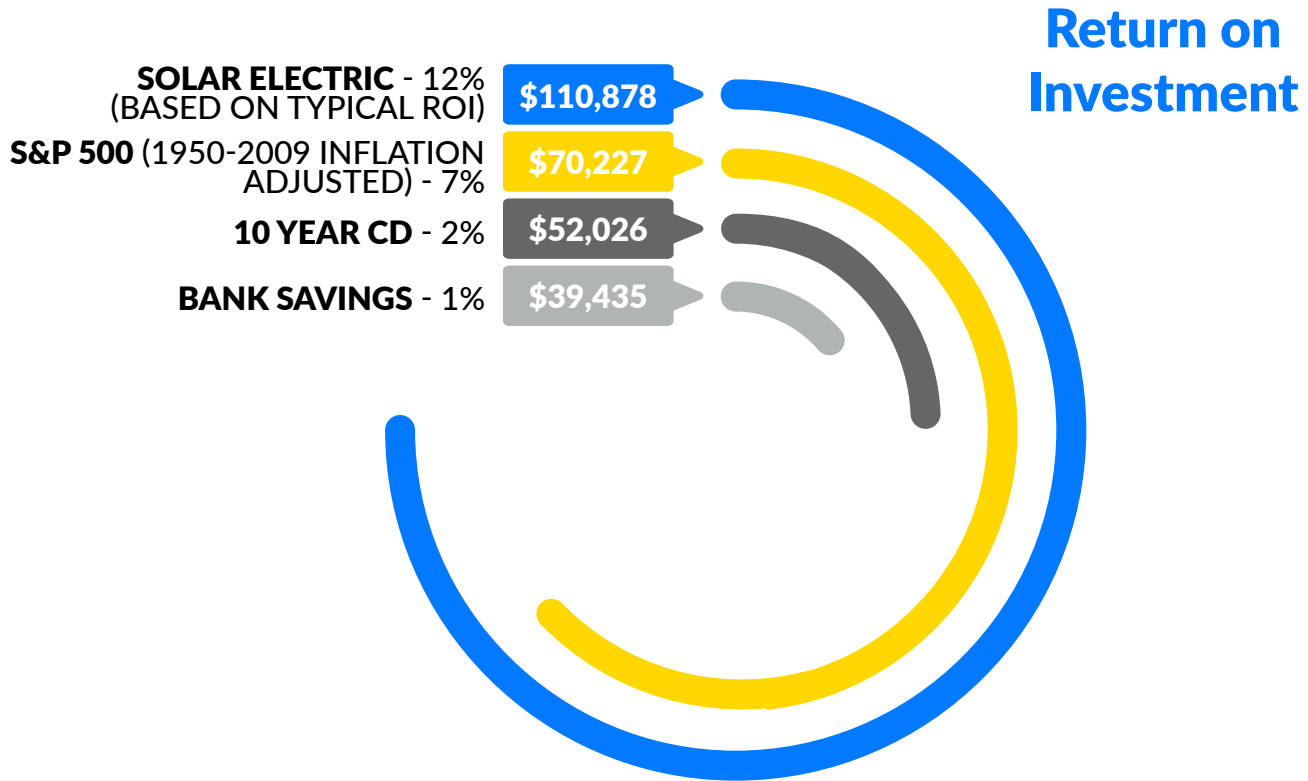
Solar Payback

A quality solar electric system will generate an 8-16% return on investment (ROI) without accounting for the projected annual rise in energy rates of between 4.5% to 6%. This means that the solar electric system will pay for itself, in most cases, within 10 years. Best of all, the return is tax free. A comparable investment needs to return 16-20% to compete with the return on investment for solar due to taxes.

A traditional bank account has an approximate 1-2% ROI and the stock market has an average 10% ROI. These do not come close to solar's 8-16% tax-free return on investment. Risk free, tax free, where would you rather invest your money?

HOW DOES SOLAR STACK UP?

If you invested \$35,700 today over the next 10 years...



INTERESTED IN GOING SOLAR? WANT TO KNOW IF YOUR HOME IS SOLAR ELIGIBLE? CALL FOR DETAILS.



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