



Solar: Frequently Asked Questions

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1. **Q: What's the difference between solar photovoltaic (PV) and solar thermal (hot water) systems?**

A: Solar PV systems convert sunlight directly into electricity using semiconductor technology. Solar PV can be used in conjunction with the existing electricity grid, known as an 'on-grid system,' through net metering and interconnection with the local utility. Solar PV systems can also provide electricity to facilities not connected to the electricity grid, known as an 'off-grid system,' with batteries typically providing the needed storage and backup for times when the sun is not shining. Batteries can also be added to on-grid systems to provide a home or business with electricity when the grid goes down. For more information about Solar PV, visit [Utah Clean Energy](#), the [National Renewable Energy Laboratory](#), and/or the [U.S. Department of Energy Solar Technologies Program](#).

Solar thermal systems, also known as solar hot water, use the sun's light to directly heat water and/or space for homes and businesses. There are several solar-thermal system configurations which employ the sun's energy to heat water; the most appropriate for Utah's climate, where freezing temperatures are common, is a closed-loop, active, solar hot water system. Closed-loop solar thermal systems use the sun to heat a heat-transfer fluid in the collector. Heated fluid is pumped from the collector in the bottom of the solar storage tank into a heat exchanger where heat energy is transferred from the fluid to potable water. Heated water is then held in the storage tank ready for use, with a conventional system providing additional heating as necessary. For more information on Solar Thermal, visit [Utah Clean Energy](#), the [Utah State Energy Program](#), and the [National Renewable Energy Laboratory](#).

Please visit [Solar Basics](#) for more information about solar technologies.

If you are interested in learning more about electricity and energy in general, visit the [U.S. Energy Information Administration](#) website.



2. Q: How much energy will my solar system generate?

A: Solar PV - A typical output for a 1 kilowatt (kW) solar PV system situated due south with a 37 degree tilt, located in northern Utah (Salt Lake City) is approximately 1,400 kilowatt hours (kWh) per year. A typical output for an identical system in southern Utah (Cedar City) is approximately 1,576 kWh per year. The orientation, tilt, shading, and type of panels and inverter will affect the system output. Refer to the following FREE Solar PV Calculators to get more precise estimates on system output and estimated cost savings:

- [PV Watts](#) (developed by the National Renewable Energy Laboratory)
- [Solar Advisor Model](#) (developed by Sandia National Laboratory and the National Renewable Energy Laboratory)

Solar Thermal - A typical output for a two-collector system (with a [Solar Rating & Certification Corporation \(SRCC\)](#) rating) will produce approximately 33,920 BTUs per day, which is equivalent to about 3,650 kWh per year (there are 3412 BTUs per kilowatt). Expressed in Decatherms, a 2-collector system will generate approximately 13 Decatherms/year.

3. Q: What size solar system will work best for me?

A: The size of your system will depend on your current energy usage, the level of energy efficiency of your home or business, the available usable roof space, your budget and financing options, and the percentage of your energy consumption you want to offset with solar. It is recommended that you first take steps to make your home or businesses as efficient as possible before (or in conjunction with) making your solar investment. For simple tips on how to make your home more energy efficient and simple conservation tips, visit [Utah Clean Energy](#).

The easiest way to calculate the approximate size of your solar system is to determine how much electricity and/or natural gas you currently consume by reviewing your power bills from the last 12 months (you can request these from your utility company if you don't have them on hand). Next, you will want to factor in any potential energy savings you anticipate from increased energy efficiency or conservation measures, and calculate those into your future annual usage. Then, you will want to determine how much of your current electricity and/or natural gas you hope to offset with solar energy. On average, a 1-kilowatt solar PV system in northern Utah will generate around 1400 kWh/year.

The average Utah home consumes approximately 850 kilowatt hours of electricity per month (or 9,600 kilowatt hours per year). A 6.5 kilowatt solar PV system would likely provide 100% of the home's annual electricity needs.

Improving the home's energy efficiency and practicing conservation can help save money and reduce the size of the solar system needed to serve the annual electricity needs.



(continued from pg. 2) So, if your home uses 300 kWh/month (or 3,600 kWh/year) of electricity, and you want to meet 100% of your demand with solar electricity, you will likely need a 2.4 kW solar PV system (for a northern Utah home). However, solar is modular and can be sized to accommodate your budget and your goals for reducing your home's energy bills. Speak with a qualified installer to help you determine the most appropriate solar system size for your home (or business). You can also use the [Solar Salt Lake Map-Calculate Your Resource](#) feature and the [Solar Calculators](#) section to give you an idea of the solar PV system size most appropriate for your needs.

If you want to heat your water or space with solar thermal, you should consult [a qualified solar thermal installer](#) to determine the appropriate system size. A professional assessment is recommended before making any investment decisions.

4. Q: How much does solar cost?

A: The cost of solar depends on the application, technology, size, and available [residential incentives](#) and/or [commercial incentives](#). Prices in Utah may be higher than in surrounding states and across the country due to the fact that Utah has a smaller solar market and fewer incentives and policies to promote solar, compared with other states. Four factors that help keep solar costs low are economies of scale, competition in the marketplace, module and inverter prices (which fluctuate with supply and demand), and strong policies and programs to promote solar energy.

Fortunately, Utah's solar industry is growing and costs have come down 40-50% over the past two years. With available incentives and historically low prices, investing in solar today can be extremely cost-effective. The other important thing to remember is that solar is a fuel-free, clean, and inexhaustible resource that is not subject to fuel volatility, carbon risk, or limitations of fuel availability – solar provides price-stable and secure energy for decades to come.

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ON AVERAGE and BEFORE INCENTIVES, a grid-tied, roof-mounted solar PV system in Utah costs in the range of:

- \$6,000-\$7,000 per installed kilowatt for residential systems
- \$4,000-\$5,000 per installed kilowatt for small/medium commercial systems
- \$3,000-\$4,000 per installed kilowatt for a large commercial system

ON AVERAGE and BEFORE INCENTIVES, a residential solar thermal system costs in the range of \$8,000 - \$12,000. Commercial solar thermal systems are unique and should be evaluated on a case-by-case basis with a certified installer. (continued on pg. 4)



(continued from pg. 3) These prices are subject to change over time and may vary from installer to installer. These prices also only reflect UP FRONT costs, and DO NOT take into account any available [long-term financing](#), monthly energy saving benefits, [net metering](#) credits, and/or third-party ownership structures ([solar leases and power purchase agreements](#)) – all of which will help make solar more affordable and more attractive as an investment option. Talk to your installer and your bank about these opportunities to see if they are an option where you live. As with any investment, it is best to get 2-3 estimates before making your final decision.

5. Q: How do I calculate the available incentives?

A: An example for residential solar demonstrating how all the incentives may interact is provided below. You should consult a tax attorney or accountant to determine the proper protocol when claiming any tax credits. You can also refer to the [Solar Energy Industry Association Tax Credit Manual](#) for frequently asked questions regarding the federal tax credit and state level incentives.

Solar Incentive EXAMPLE:

- You purchase a 1-kW solar PV system up front (without any financing) for \$7,000, BEFORE any incentives.
- Your utility offers a \$2,000/kW rebate. So, your cost (for determining the tax basis) is \$5,000.
- The state gives you a state tax credit of 25% up to \$2,000. So $\$5,000 * .25 = \1250 .
- Your income has therefore increased by \$1,250.
- The Federal government gives you a credit of 30% with no cap. So, $\$5,000 * .30 = \1500 .
- The Federal government then taxes the \$1,250 you received from the state, reducing your incentives by \$375, leaving you with \$2,375 net incentive.
- So, your net cost on the system AFTER incentives will be \$2,625.

6. Q: What is a typical payback for solar in Utah?

A: Unfortunately there is no easy answer to this question. The time it takes you to recover your investment will depend on the technology you select, your energy efficiency and usage habits, your current and future electricity rates, the system size and configuration, and available incentives. You can ask your installer and use the available solar calculators referenced above and below to estimate your payback time (however, these tools may not adequately take into future costs and risks of current energy usage). One of the biggest benefits of solar is the fact that it is an inexhaustible, clean, and price stable resource that will last well over 20 years. Investing in solar today helps you mitigate the future risks, fuel volatility, and uncertainty, while also improving your self-reliance and energy independence.



(continued from pg. 4) You can utilize the following calculators to estimate your payback time.

- [PV Watts](#)
- [Solar Advisor Model](#)
- [Cooler Planet](#)

7. Q: What is the expected life of a Solar PV or thermal system?

A: A well-designed and maintained PV system will operate for 20-30 years. Some inverters may need to be replaced around year 15. Batteries typically last 15 years and should be used according to their operating specifications to maximize their life. A solar thermal system will typically last 20 years.

8. Q: How much system maintenance is required?

A: Solar systems require much less maintenance than conventional power generators, and the amount and type of maintenance performed directly affects performance and lifetime of a system. Routine maintenance can be performed with common tools and common sense. Checking connections, fluid level in batteries, shading of modules, etc., can be accomplished in a few minutes on-site. Your installer should provide you with a maintenance plan. In areas that receive a lot of snow, you'll want to talk to your installer about effective techniques for snow removal. In areas with a lot of dust or pollution, you'll want to talk to your installer about strategies for keeping the solar panels as clean as possible, as too much build-up will reduce the efficiency and output of the system.

9. Q: Where can I find a local solar installer?

A: Visit the [Utah State Energy Program](#) website for a list of Utah solar dealers and installers.

10. Q: How do I know which installer to select?

A: Refer to the [Solar Installer Section](#) for information and tips on how to select a qualified solar installer.

11. Q: How do I connect to the utility?

A: You will need to work with your installer and contact your local utility to request an application for net metering and/or interconnection, depending on the size of your system. If you are a Rocky Mountain Power customer, [you can get information and download their net metering application on-line](#). Learn more about Utah's Net Metering Policy, visit [Utah Clean Energy](#) and the [Database of State Incentives for Renewables & Efficiency](#). If your utility doesn't offer net metering, or if the net metering program does not adequately value the solar energy you provide to the grid, you can work with your Municipal City Council or Rural Co-op Board of Directors to request that a program be offered and/or improved to allow for distributed solar.