

SOLAR UNITED NEIGHBORS SUN PATCH FOR CUB SCOUTS

*Thank you for your interest in earning the SUN Patch
for CUB Scouts!*

Questions? Please feel free to reach out to us at any time at
getinvolved@solarunitedneighbors.org

About Solar United Neighbors

We are a non-profit organization dedicated to helping people go solar, connect with other solar supporters locally and nationally, and fight for solar -friendly policies that protect the rights and interests of solar owners and solar supporters.



We help people go solar in two ways:

- **Solar co-ops:** Solar co-ops are groups of neighbors in a particular community or area who are interested in going solar around the same time. Solar United Neighbors educates local residents about how solar works, generates interest in and facilitates a bulk purchase process, and provides support to co-op participants through the process of going solar.
 - Learn more about our solar co-ops [here](#).
- **Membership:** Members of Solar United Neighbors have access to individualized support throughout the process of going solar. Our Solar Help Desk is staffed by solar experts who help homeowners, farmers, and businesses navigate the process of going solar, connect to local installers, and review proposals to ensure that consumers get the best possible solar pricing and services available.
 - Learn more about our membership program [here](#).



Purpose of the SUN Patch

The purpose of the patch is to educate scouts about how solar power works and to explore how solar energy plays a role in their communities, their families, and their lives as scouts, so that can become leaders in going solar in the future.



SUN Patch Requirements

1. Before starting work on any other requirements, first write down what you know about solar power and what it means to you.
 - Explain what you believe may be the current role of solar power in your area.
 - Explain what you believe may be the connection between solar power and scouting.
2. By reading the resource information provided in this patch program, find out:
 - How photovoltaic (PV) solar power works
 - Where solar power exists in your community, state, and across the nation.
3. Find solar panels in five locations in your neighborhood.
 - What are the solar panels powering?
4. After your research is complete, have a discussion with your troop (or family) about solar power.
 - Discuss the benefits of solar energy, your home electricity consumption, and whether going solar might be a good option for your family to consider.
5. Harness the power of the sun by doing at least one of the following activities: (see 'how to' instructions provided in this patch program):
 - Radiations Cans
 - Solar Concentration
 - Make solar nachos
6. Become a Solar Ambassador in your community by doing one of the following activities:
 - And talk to 5 people about solar power and what you learned from the rest of the program.
 - . Find out if there is a solar activities in your community and encourage your neighbors to join! Check out our listing of [active solar co-ops](#).
 - Download our [Solar Open House Toolkit](#) and read through it.
 - Contact getinvolved@solarunitedneighbors.org to get started.

Check out more information on how solar works and going solar in our [Solar FAQs](#).

Check out more resources on solar concepts and issues on our [Learn the Issues page](#).

Silicon also makes sandy beaches!



A solar panel (also called a “module”) is made of solar PV cells:



Solar panels are wired together to form a “solar array”:



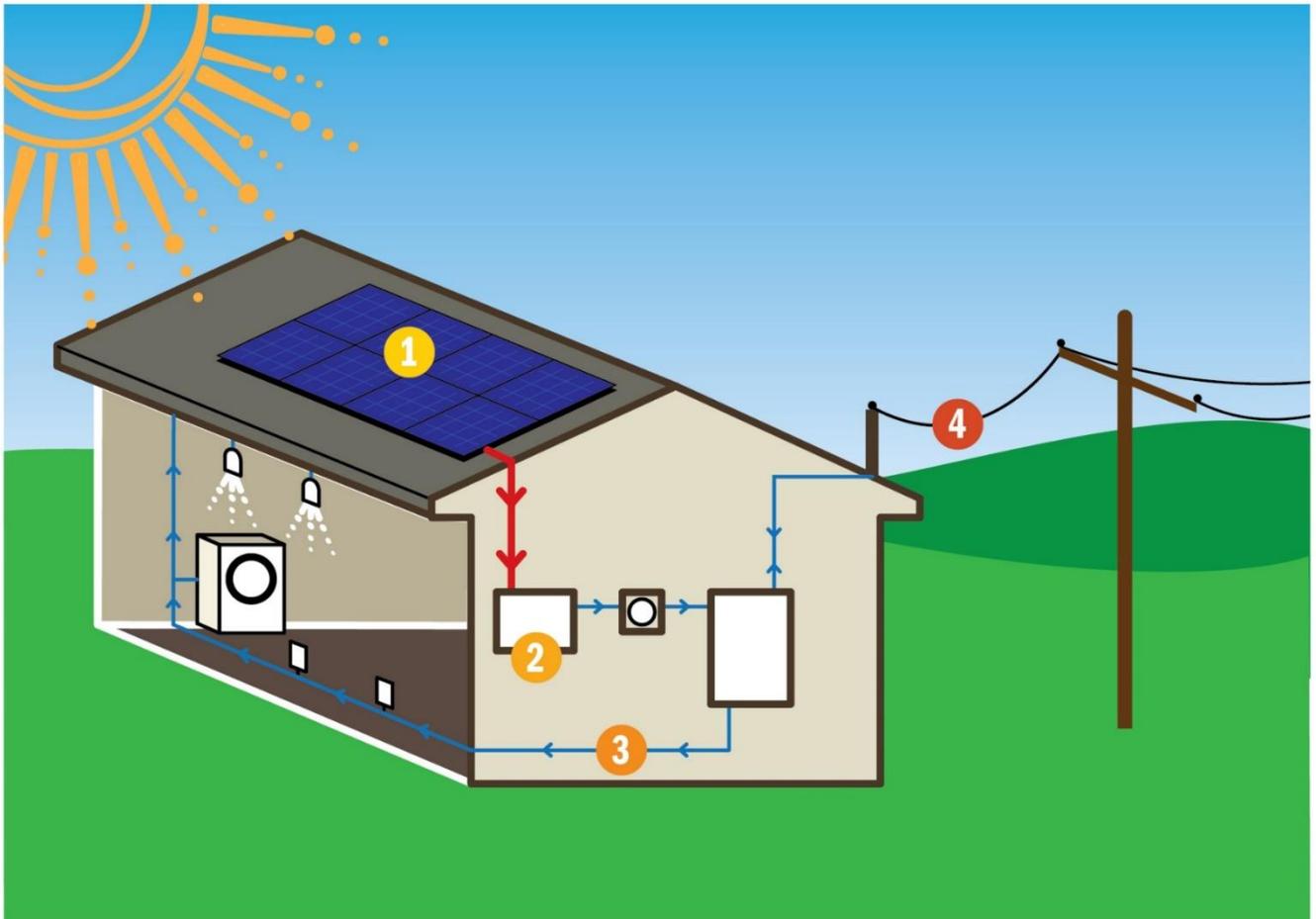
Solar arrays can go on your roof:



Or on the ground:



- Electricity from your solar panels flows into your home to power your appliances and electronic devices.
- Excess electricity flows through your electric meter to help power your neighbors' homes, too.

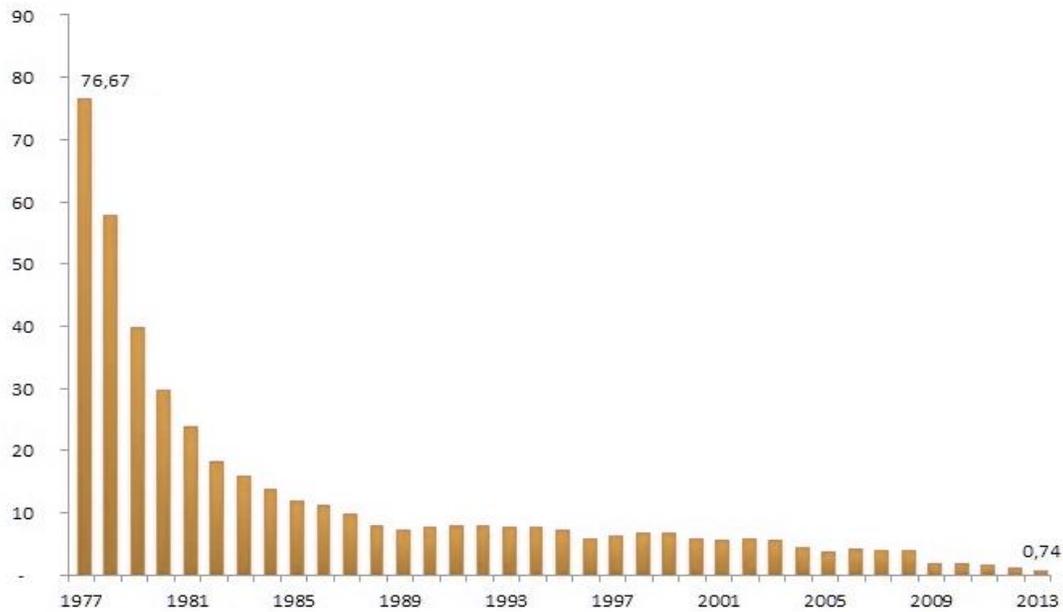


Solar's growing role in our electric system

- Solar provides clean, renewable, locally produced energy. And solar panels are more affordable than ever! In fact, the cost of solar has dropped 90% since the 1970s.

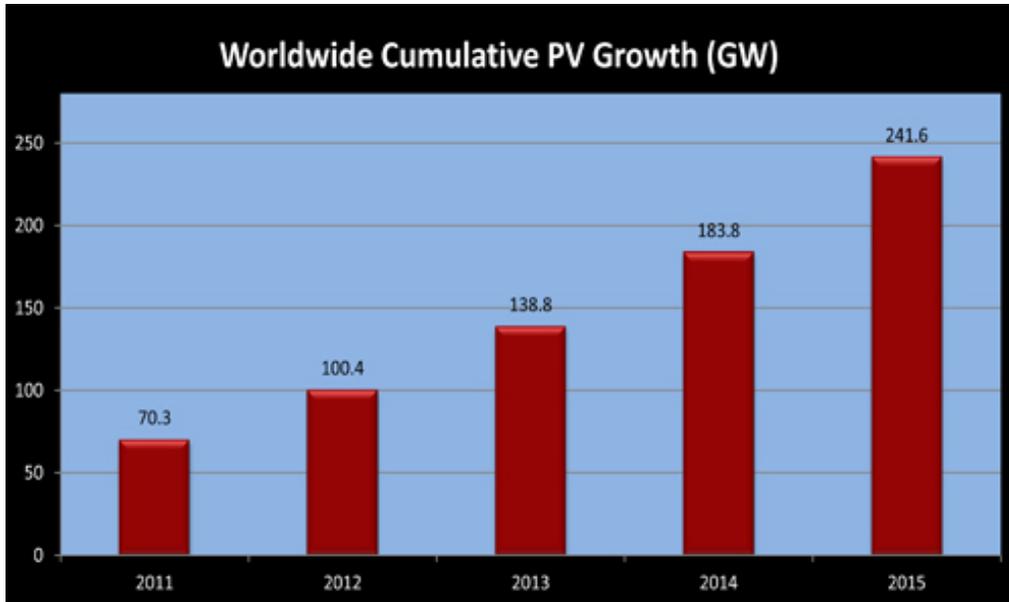
The Swanson effect

Price of crystalline silicon photovoltaic cells, \$ per watt

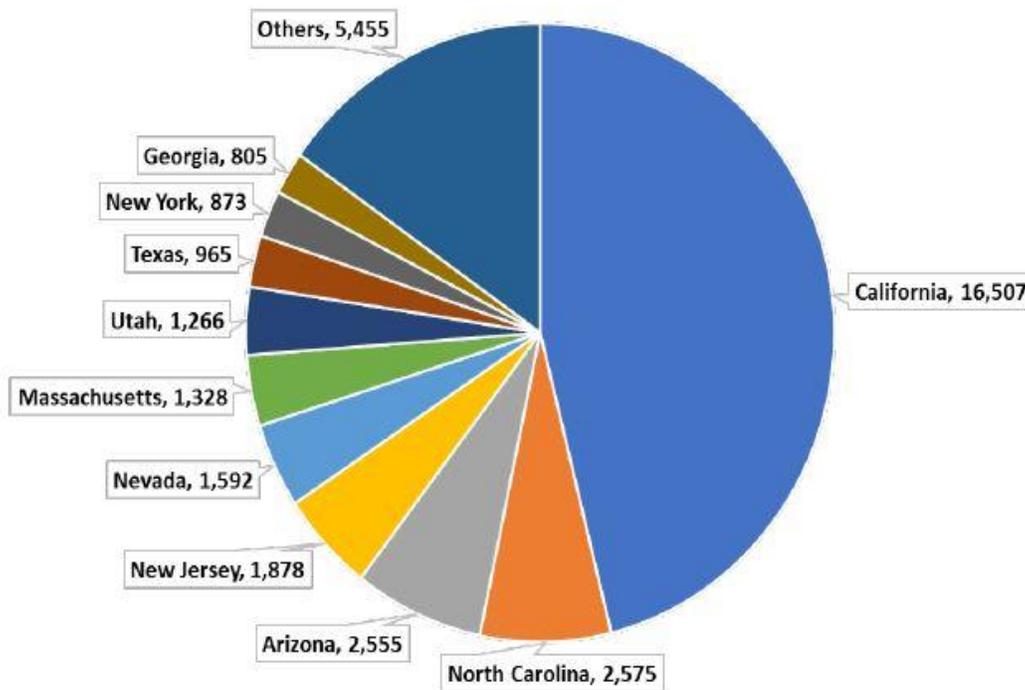


Source: Bloomberg New Energy Finance

- Around the nation and the world, more and more homes, businesses, schools, libraries, and governments are making their own electricity using solar panels.
- In the United States, California leads the way in solar installations:



Cumulative Solar Capacity through Q3 2016 (MW)



Activity:

Is your home state listed on this chart?

Find out more about solar in your state using [the interactive map available here](#).

How many solar arrays have been installed in your state? How many solar jobs are in your state?

Solar Power Scavenger Hunt

Solar power is present throughout your community powering traffic lights, signs and much more. These signs not only allow for everyday life to transpire but also save local governments money on power and electricity. Can you find any solar panels at work in your home town? Where?



Solar Power and Scouting

Cub Scouting much like its older brother boy scouts has an outdoor ethic that is center around preserving the natural world for the future. All scouts are encouraged to follow the outdoor ethic of "Leave No Trace." Much like picking up after oneself at a campsite so that others a can enjoy the natural space in the future, solar power generates clean energy fueling our modern society, and leaves no trace of pollutants preserving the earth and its natural resources for the future.

The twelve points of the Scout Law also relate to solar power and sustainability. For example, the points Thrifty and Clean certainly apply. Solar power is a thrifty and clean of use of the world's energy resources and one's financial resources. Solar uses our abundant supply of sunlight to generate electricity without polluting the environment, as opposed to consuming our limited amounts of natural gas or oil with polluting consequences. Not only is solar power a clean, renewable energy source that preserves the world's finite resources, but also it is financially thrifty, saving people money on their energy bills and making them more energy independent. Maybe you can think of other ways to apply the Scout Law to solar power?

However, the most important reason for a scout to learn about the ins and outs of solar power is based on the idea that Cub scouts are aimed at helping young scouts explore the world around them. Solar energy is as an expanding part of the world and is growing in importance, so it is essential for scouts to understand and be knowledgeable about the solar world around them.

Radiations Cans (adult supervision necessary)

Materials:

1. Two cans one black the other silver (the black one can be painted black or wrapped in black construction paper)
2. Two Thermometer
3. Piece of paper
4. A pencil
5. Measuring glass
6. Water

Steps:

1. Fill both cans with water roughly same amount of water
2. Take and record the temperature of the water in both cans
3. Then place can in a sunny place for 15mins. Measuring the water temperature every 5 minutes recording it each time.
4. Compare the temperature between cans

What happened?

The rays of the Sun hit both of the cans warming them up raising the temperature of the water. However, since black is a color that absorbs more light and retains more heat. The water in the black was warmed more by the sun.

Solar Concentration (adult supervision necessary)

Materials:

1. three cans one black the others silver (the black one can be painted black or wrapped in black construction paper)
2. Two Thermometer
3. Concave Mirror
4. Piece of paper
5. A pencil
6. Measuring glass
7. Water

Steps:

1. Fill all cans with water roughly the same amount of water
2. Take and record the temperature of the water in both cans
3. Place cans in the sun
 - a. Place one mirror pointing at the black and the other mirror point at one of the silver cans, so the sun reflects on to the cans respectively.
4. Then wait 15mins. Measuring the water temperature every 5 minutes recording it each time.
5. Compare the temperature between cans.

What happened?

The rays of the Sun hit all of the cans warming them up raising the temperature of the water. However, the cans that were hit by the light from the mirror received additional light and thus heat from the sun. Furthermore, since black is a color that absorbs more light and retains more heat the black can absorbed more energy from the water in the black was warmed even more by the sun.

How to Make Solar Nachos (with adult supervision only)

Materials

- 2 cups tortilla chips
- ½ - 1 cup of cheddar or mexican blend shredded cheese
- Pie pan
- Turkey cooking bag (or other large, clean plastic bag)
- Cardboard pizza box (the kind delivered pizza comes in)
- Aluminum foil
- Clear tape
- Plastic wrap
- Black construction paper
- Ruler, wooden spoon or stick

Instructions:

- To create your solar oven, cover the inner side of the top and bottom of the box with aluminum foil so that it will reflect rays from the sun. To do this, tightly wrap foil around it, then tape it to the back, or outer sides.
- Line the bottom of the box with black construction paper where the nachos will be placed—black absorbs heat.
- Place the tortilla chips into a pie pan. Sprinkle the cheese on top.
- Place the pan into a turkey cooking bag and twist shut.
- Place assembled nachos in the cardboard box oven.
- Use clear plastic wrap to create an airtight window for sunlight to enter the box. Open the box and tape a double layer of plastic wrap over the inside of the box. Leave about an inch of plastic overlap around the sides and tape each side down securely, sealing out air.
- The best hours to set up your solar oven are when the sun is high overhead - from 11 am to 3 pm. Take it outside to a sunny spot and adjust the flap until the most sunlight possible is reflecting off the aluminum foil and onto the plastic-covered window. Use a ruler, wooden spoon, or stick to prop the lid at the right angle.
- Reposition your solar oven when needed, so that it faces direct sunlight. You should check periodically on your oven to make sure it is in the sun. Make sure that the foil-covered flap is reflecting light into the box through the plastic-covered window.
- Wait until the cheese melts and the nachos are warm. Then peel back the plastic, enjoy your warm, tasty treat from the sun!

What Happened?

The heat from the sun was trapped inside your solar oven, and it got very hot in there. Ovens like this are called collector boxes, because they collect sunlight. As it sat out in the sun, your oven eventually heated up enough to melt the cheese! The foil reflects rays of sunlight and bounces them directly into the opening of the box. Once the sunlight has gone through the plastic wrap, it heats up the air that is trapped inside the oven. The black paper absorbs the heat at the bottom of the oven, and the plastic wrap keeps it from escaping out the sides of the oven. Your solar oven will reach about 200° F on a sunny day, so it will take longer to heat things than a conventional oven. Although this method will take longer, it is easy to use and safe to leave alone while the sun's energy cooks your food!

REPORTING

Congratulations! You've completed the SUN patch! Solar United Neighbors thanks you for learning about solar energy and helping to spread the word about solar in your community!

Instructions on how to get your SUN patches:

To receive your patch(es), please provide the information requested below and send by email to getinvolved@solarunitedneighbors.org:

Troop number

Troop location (town and state)

Troop leader name

Troop level/age range

Number of scouts who participated in the program

Number of patches requested

Total number of hours spent on the program

How did you hear about the SUN patch?

What did the scouts learn from this program?

Additional feedback about the SUN patch program?

Mailing address that you would like us to mail your troop's patches to

Optional: Photos of your troop earning the SUN patch!

Once we receive your patch request information, we will work on getting your desired number of patches mailed out to you. We are happy to provide you with the patches your troop has earned free of charge.

