

Thank you for your interest in earning the SUN Patch for Girl 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](#).
- **On Your Own:** 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 how we can help [here](#).

SUN PATCH FOR GIRL SCOUTS



PURPOSE OF THE SUN PATCH:

To allow girls to **DISCOVER** how solar works; **CONNECT** solar energy with their lives, community, and the planet; and **TAKE ACTION** on what they've learned to use solar energy as a renewable and pollution-free resource.

Note: The activities and information contained in this patch program are targeted toward Brownie-through Ambassador-level Girl Scouts (2nd - 12th grades).



Instructions on how your troop can earn the patch:

1. Complete the activities and discussions listed below in the **DISCOVER**, **CONNECT**, and **TAKE ACTION** sections.
2. Volunteers, use the information and resources contained here to facilitate conversations, answer questions, and lead activities.
3. Complete the **REPORTING** section at the end of this patch program document to get your Solar United Neighbors patches.



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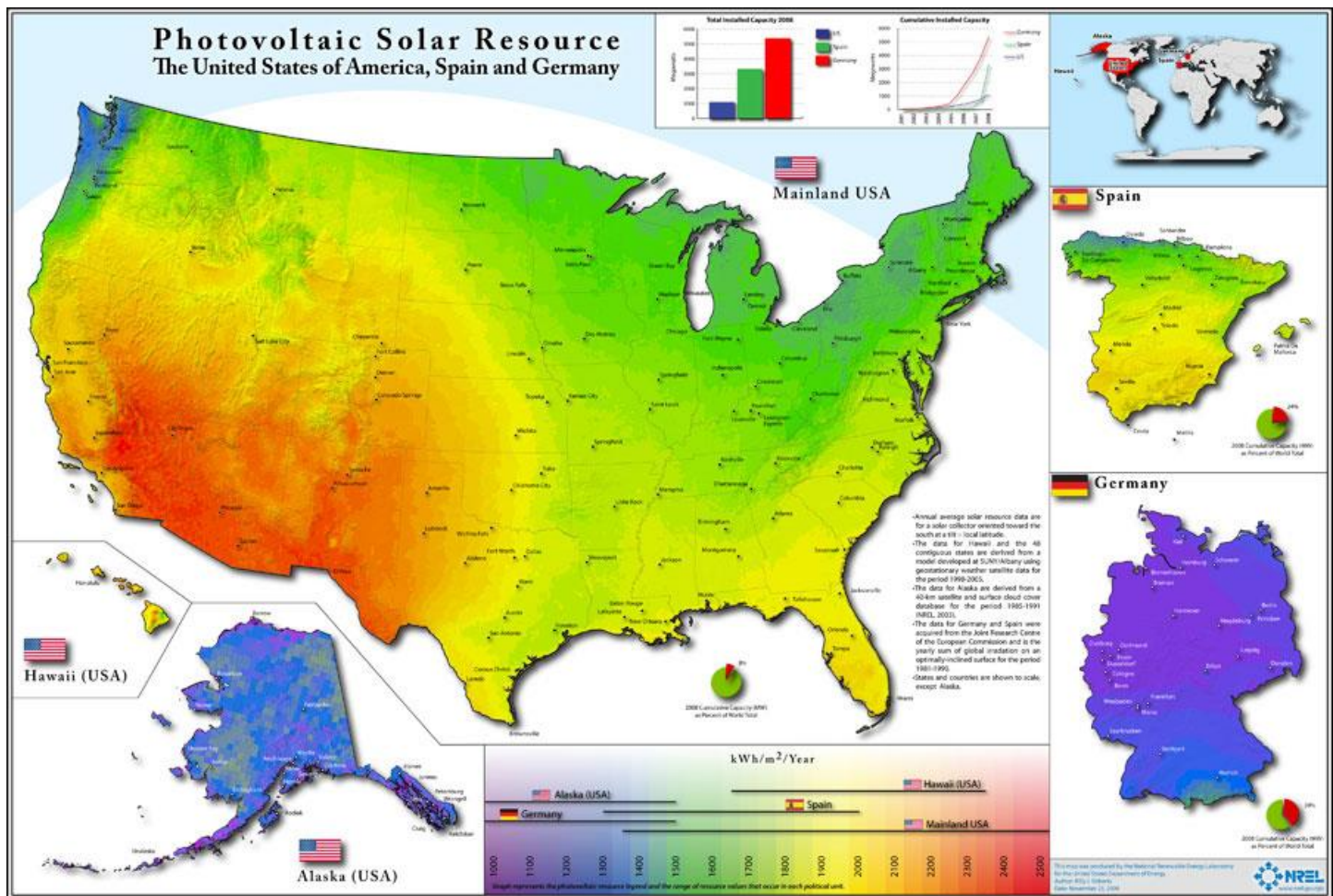


DISCOVER

PART 1: What is solar energy?

- The sun is a large ball of burning gas in the center of our solar system. It's made of mostly hydrogen that burns hotter than you could ever imagine.
- The sun is the largest source of energy in our solar system.
- More energy from the sun hits the earth in one hour than the ENTIRE world uses in a year. That's a LOT of energy!
- The energy that the sun produces is called solar energy. Solar means "from the sun."

ACTIVITY: Use the map below to compare the level of solar resources available in the United States, Spain, and Germany. Which areas have the most solar resources? Which have the least? How does your home state stack up?



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PART 2: How solar works

- Energy from the sun can be used to create free, clean electricity!
- A solar photovoltaic (PV) cell converts sunlight into electricity.
- Most solar PV cells are made from silicon. Silicon is used to make many other products, including concrete, glass, ceramics, cosmetics, and computers.

Silicon also makes sandy beaches!



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



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



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arrays can go on your roof:



Or on the ground:



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- 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.

1

Solar panels convert sunlight into direct current (DC) electricity

2

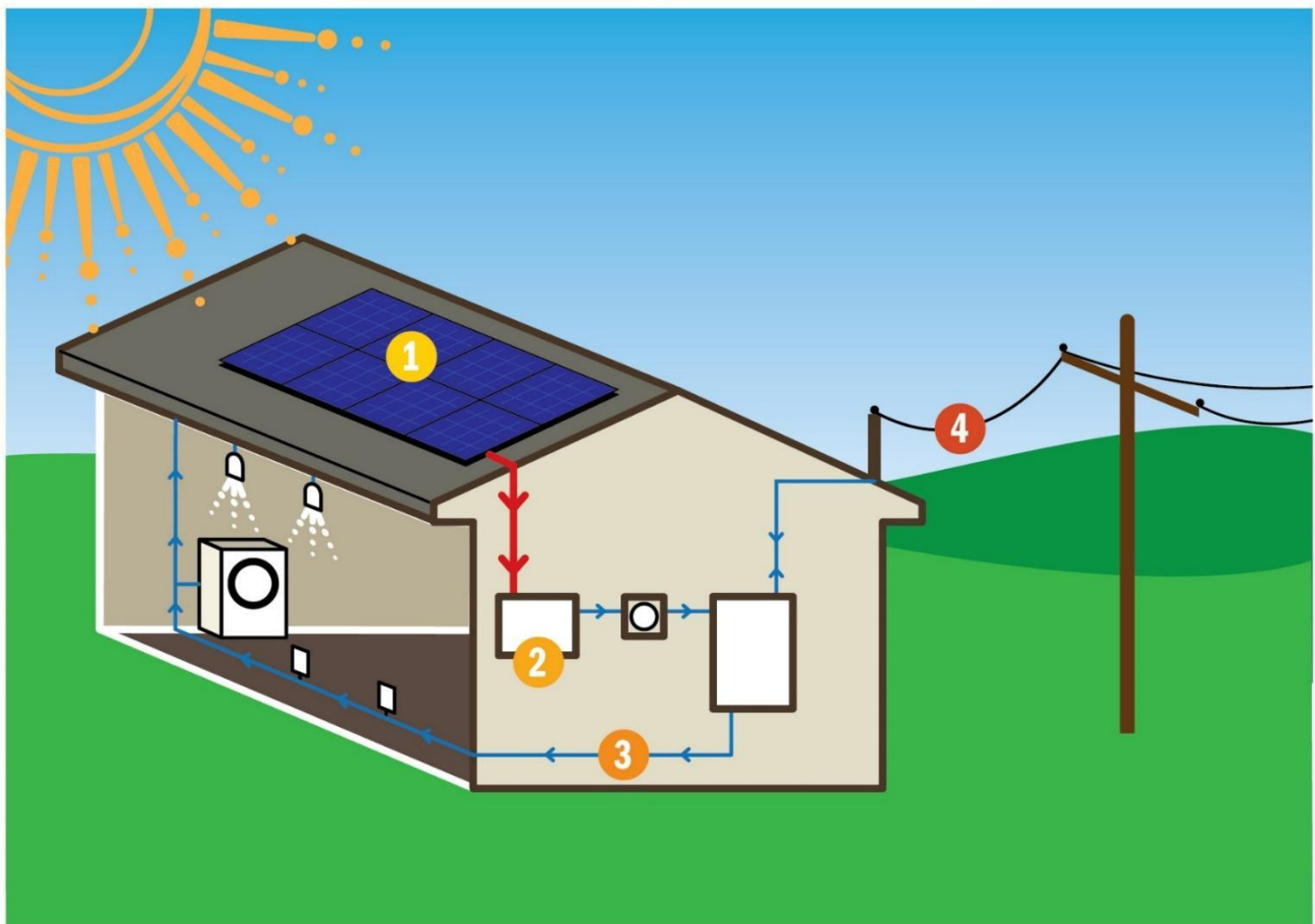
Inverter converts electricity from direct current (DC) to alternating current (AC)

3

Your home consumes the electricity produced by your solar array

4

Solar array connects to the local grid, allowing you to receive electricity even when the solar panels aren't producing any



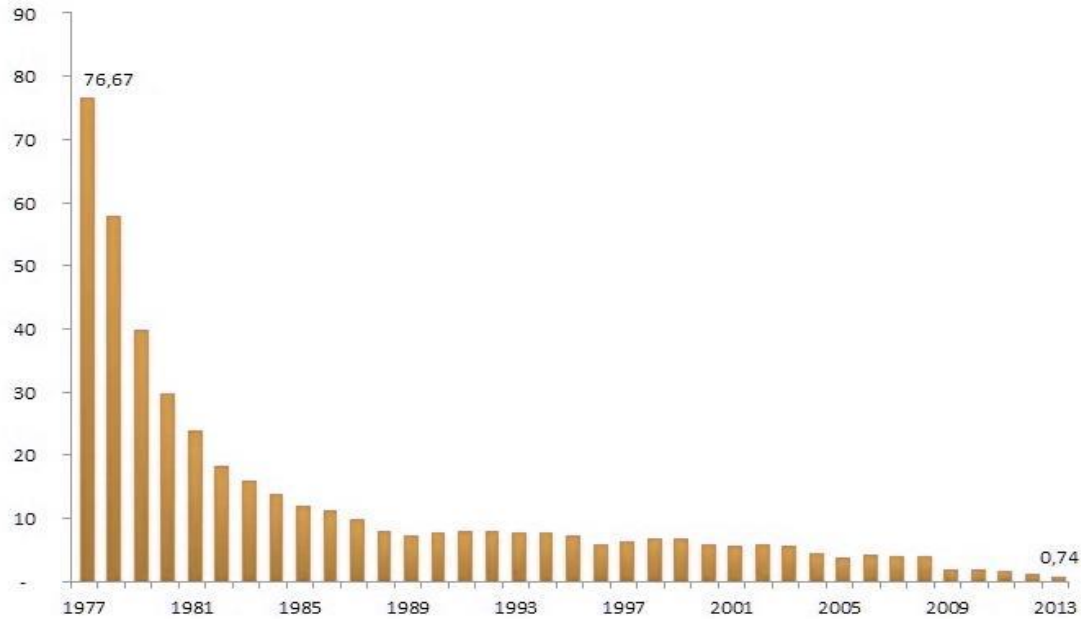


PART 3: Solar's growing role in our electric system

- 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.

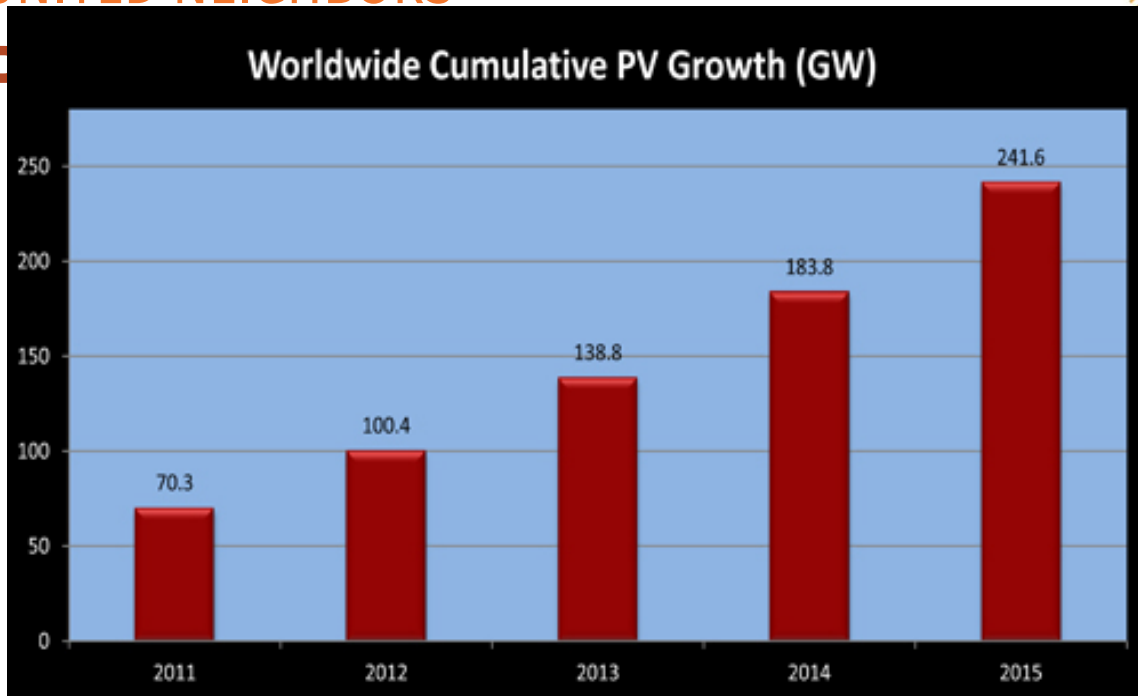
The Swanson effect

Price of crystalline silicon photovoltaic cells, \$ per watt

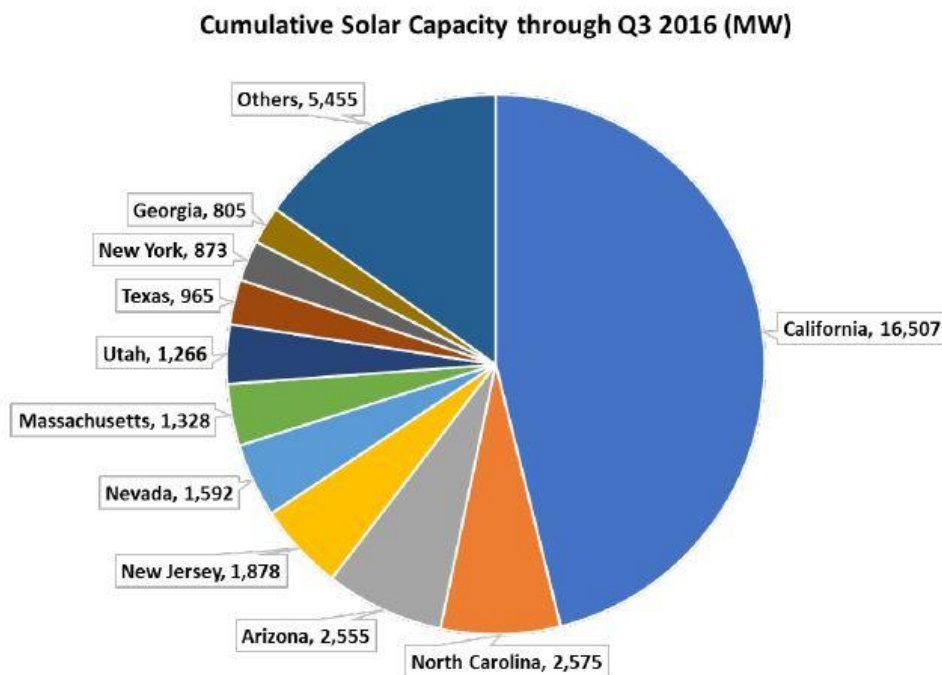


Source: Bloomberg New Energy Finance

- 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:



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?

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CONNECT

ACTIVITY 1: Do you know anyone who has solar panels on their house? Do you have solar panels on your house? If you know someone with solar panels, *ask them about it!*

- Suggested questions:
 - Why do you have solar panels?
 - When were your solar panels installed?
 - How do your solar panels benefit you?
 - What has happened since you installed your solar panels?

ACTIVITY 2: Neighborhood Scavenger Hunt - take a walk (or drive) around your neighborhood and look up! Have you ever looked up at the roofs of houses before?

- How many solar panels can you find in your community? Don't forget to check stop lights, street lamps, construction signs...even on the ground!
- Can you find solar panels in five locations in your neighborhood? What are the solar panels powering?





TAKE ACTION

Activities for Brownies (2nd-3rd grades), **Juniors** (4th-5th grades) and **Cadettes** (6th-8th grades):

1. Watch [the videos on this page](#) to learn why people choose to go solar.
2. Ask 5 friends, teachers, or family members what they know about solar energy and if they think it is important - why or why not?
3. Create a collage about why you think solar energy is important. Include things you've learned from these activities and heard from your friends, family, and teachers.
4. Make s'mores with the sun! Follow the instructions to make a solar oven:



SOLAR S'MORES OVEN INSTRUCTIONS:

1. WHAT YOU'LL NEED:

- Cardboard pizza box (the kind delivered pizza comes in)
- Aluminum foil
- Clear tape
- Plastic wrap
- Black construction paper
- Ruler, wooden spoon or stick
- Graham crackers, chocolate bars, marshmallows

2. WHAT YOU DO:

- 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 s'mores will be placed— black absorbs heat.
- Place the s'mores ingredients in the box as shown in the picture.
- Use clear plastic wrap to create an airtight window for sunlight to enter into the box. Do this by opening the box and taping a double layer of plastic wrap over the inside

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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 chocolate gets soft and the marshmallows are warm and toasty. Then peel back the plastic, combine the s'mores together and enjoy your warm, tasty treat from the sun!

3. WHAT HAPPENED?

The heat from the sun was trapped inside your solar oven, and it got very hot in there. Ovens like this one are called collector boxes, because they collect sunlight. As it sat out in the sun, your oven eventually heated up enough to melt the chocolate and marshmallow!

4. HOW DOES IT HAPPEN?

Rays of light are coming to the earth at an angle. The foil reflects the light ray and bounces it directly into the opening of the box. Once it has gone through the plastic wrap, it heats up the air that is trapped inside. 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, and it will take longer to heat things than a conventional oven. Although this method will take longer, it is very easy to use, and it is safe to leave alone while the energy from the sun cooks your food.

Activities for Seniors (9th-10th grades) and Ambassadors (11th-12th grades):

1. Find out whether your home or school is good for solar:
 - a. Type the location address into [Google Project Sunroof](#).

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- b. Project Sunroof will analyze the hours of usable sunlight per year and the square footage available for solar panels at your location!
- OR- (if Project Sunroof is not available for your location)
- c. Type the street address into Google Maps. Open Satellite View.
- d. Does the roof face south? South-facing roofs are best for solar. (East and west-facing roofs can also work for solar, but north-facing roofs do not get enough sunshine.) Use the compass tool to determine which side of the roof faces south.
- e. Are there large trees or buildings shading the roof? A shade-free roof is best for solar! Use the 3D mapping feature on the bottom right corner of the screen to see whether the south-facing roof is shaded.
- f. If your house or school has an unshaded, south-facing roof area, it may be a good spot for solar panels! Talk to your parents and teachers about installing panels at home and school.

- 2. **Solar creates jobs.** As more solar is installed by homeowners and utilities alike, new jobs are being created across the country. The solar industry now employs more than 260,000 people nationwide and is adding jobs far faster than the overall economy.
 - Take a deeper dive into local job creation using [The Solar Foundation's Solar Job Census](#). The map displays solar job figures on the state and county levels. How many solar jobs are in your state? How many are in your county? Look online or in the phone book to find out how many local solar installation companies are working in your area.



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community:

- Sign up 20 people to learn more about solar. You can sign up folks for the Solar United Neighbors newsletter using [this online form](#), or download our paper sign-up sheet [here](#).
- Find out if there is a solar co-op in your community and encourage your neighbors to join! Check out our listing of [active solar co-ops](#).
- Contact getinvolved@solarunitedneighbors.org to learn more ways to spread the word about solar and connect with our volunteer opportunities.

4. Organize a solar open house in your community:

- Download our [Solar Open House Toolkit](#) and read through it.
- Contact getinvolved@solarunitedneighbors.org to get started.

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 girls 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 girl 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 girl scouts 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.