



Energy

Scouts BSA · STEM

Name

Started

Completed

Energy is about where our power comes from, how it changes form, and how we can use it more wisely. You'll do experiments, track energy use in your own home, and look at real choices your community faces. What you learn can save your family money too.

Requirements

Every official requirement, in plain language. Check the official wording when you sign off (scouting.org/merit-badges/energy/). Tips and examples are ideas, not extra requirements.

1 Learning from an energy article

Tips for this section: At the start, pick an article, podcast, blog, or website about using or saving energy, and jot down your questions. After the other requirements, go back to it and notice how your understanding has changed.

- ☐ **1a** With a parent or guardian's permission, find an online blog, podcast, website, or article about using or conserving energy; discuss with your counselor what interested you, what questions it raised, and which ideas you didn't understand

- ☐ **1b** After finishing requirements 2-8, go back to your source from 1a and explain to your counselor what you've learned that helps you understand it better

2 Energy forms and conversions

Tips for this section: Look around for things that change energy from one form to another, like a flashlight or a toaster. Then build a simple system with an adult's help.

Example for this section: A simple conversion system: a hand-crank flashlight turns motion into electricity into light. Or wire a small solar panel to a toy motor with a paper fan, so sunlight becomes electricity and then motion, and explain each step.

- ☐ **2a** Explain how three of these devices use energy and the energy conversions in each: cell phone, toaster, lightbulb, sauna, greenhouse, bow drill, electric vehicle, or nuclear reactor

- ☐ **2b** Build a system that performs at least two energy conversions and explain it to your counselor

- ☐ **3** Show your understanding of energy efficiency by explaining to your counselor an everyday example of energy moving through a system to do something useful, covering the following

Tip: Pick something real, like a car, furnace, or light bulb, and figure out how much energy goes to useful work and how much is lost.

Example: Pick an old incandescent bulb: about 90 percent of its energy comes out as heat, not light. An LED makes the same light with far less electricity. Explain where the lost energy goes and why that matters for your bill.

- ☐ **3a** Identify the parts of the system the moving energy affects

- ☐ **3b** Name the system's main energy source

- ☐ **3c** Identify the system's useful results

- ☐ **3d** Identify where the system loses energy

- ☐ **4** Do an energy audit of your home and keep a 14-day log of the steps you and your family took to use less energy; your report must cover the following, and after the 14 days, discuss what you learned with your counselor

Tip: Make a simple daily log on the fridge and have your family help record lights, heating, cooling, and appliances for the 14 days.

Example: Your audit might find a drafty back door, a TV and game console left on standby, and a water heater set too high. Log lights, heating or cooling, and appliance use for 14 days, then try two changes and compare the meter.

- ☐ **4a** List the kinds of energy your home uses (such as electricity, wood, oil, liquid petroleum, natural gas), how each is delivered and measured, and its current cost; OR log trips, miles driven, fuel used, and miles per gallon for your family car or another vehicle

- ☐ **4b** Describe how your family could use energy more wisely, considering the energy behind daily activities like cooking, showering, lights, driving, TV, and computers; explain what sustainable energy sources are and how reusing and recycling can change your energy use

- ☐ **5** In a notebook, describe five ways energy is wasted at your school or in your community and how each could be reduced, and explain what trade-offs in energy use are, including the following

Tip: Notice waste on your way to school or around town, like lights left on or idling cars, and think of a practical fix for each.

Example: Five community examples: cars idling in the school pickup line, a store with doors propped open while the air conditioning runs, lights on in empty offices at night, leaking pipes, and half-empty buses. Suggest a practical fix for each.

- ☐ **5a** Explain how your suggested changes would cut costs, reduce pollution, or otherwise benefit your community

- ☐ **5b** Explain the changes in routines, habits, or convenience needed to reduce the waste, and why people might resist your ideas

- ☐ **6** Make pie charts of the following, and explain to your counselor the key ideas each shows and where your data came from; also explain how the price of a nonrenewable resource affects its use and can make alternatives worthwhile

Tip: Find recent numbers from a reliable government source and draw your pie charts by hand or on a computer.

- ☐ **6a** The energy resources that provide most of the energy used in the United States

- ☐ **6b** How much of the energy the United States uses comes from other countries

- ☐ **6c** How energy use is split among homes, businesses, industry, and transportation

- ☐ **6d** The fuels that generate electricity in the United States

- ☐ **6e** The world's known and estimated reserves of primary energy resources

7 Improving energy systems: Choose 5 of 9

Tips for this section: Choose five types of power production and look up what has made each cleaner, safer, or more efficient.

Example for this section: Choose five systems, like fossil fuel plants, cogeneration, nuclear, wind, and solar, and explain one improvement for each: cleaner smokestacks, plants that put leftover heat to work warming buildings, safer reactor designs, bigger turbine blades, and cheaper, more efficient panels.

- ☐ **7a** Explain what is being done to get more usable energy from biomass digesters or waste-to-energy plants, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7b** Explain what is being done to get more usable energy from cogeneration plants, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7c** Explain what is being done to get more usable energy from fossil fuel power plants, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7d** Explain what is being done to get more usable energy from fuel cells, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7e** Explain what is being done to get more usable energy from geothermal power plants, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7f** Explain what is being done to get more usable energy from nuclear power plants, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7g** Explain what is being done to get more usable energy from solar power systems, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7h** Explain what is being done to get more usable energy from tidal, wave, or ocean thermal energy conversion devices, describing the technology, cost, environmental effects, and safety concerns

- ☐ **7i** Explain what is being done to get more usable energy from wind turbines, describing the technology, cost, environmental effects, and safety concerns

- ☐ **8** Name three careers that use knowledge of energy; for one of them, research its training, education, certification, experience, and costs, plus job outlook, starting pay, and advancement; discuss with your counselor what you learned and whether the career interests you

Tip: Talk with someone at a utility, solar company, or energy office about their job and training.