



# Energy

## Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet.

The work space provided for each requirement should be used by the Scout to make notes for discussing the item with his counselor, not for providing the full and complete answers. Each Scout must do each requirement.

No one may add or subtract from the official requirements found in **Boy Scout Requirements** (Pub. 33216 – SKU 620714).

The requirements were last issued or revised in 2015 • This workbook was updated in February 2015.

Scout's Name: \_\_\_\_\_ Unit: \_\_\_\_\_

Counselor's Name: \_\_\_\_\_ Counselor's Phone No.: \_\_\_\_\_

<http://www.USScouts.Org> • <http://www.MeritBadge.Org>

Please submit errors, omissions, comments or suggestions about this **workbook** to: [Workbooks@USScouts.Org](mailto:Workbooks@USScouts.Org)  
Comments or suggestions for changes to the **requirements** for the **merit badge** should be sent to: [Merit.Badge@Scouting.Org](mailto:Merit.Badge@Scouting.Org)

1. Do the following:

- a. Find an article on the use or conservation of energy.

Discuss with your counselor what in the article was interesting to you, the questions it raises, and what ideas it addresses that you do not understand.

What was interesting?


What questions does it raise?


What ideas does it address that you do not understand?


- b. After you have completed requirements 2 through 8, revisit the article you found for requirement 1a. Explain to your counselor what you have learned in completing the requirements that helps you better understand the article.


- 2. Show you understand energy forms and conversions by doing the following:

- a. Explain how THREE of the following devices use energy, and explain their energy conversions:

toaster,


greenhouse,


lightbulb,


bow drill,


cell phone


nuclear reactor,


sweat lodge.


b. Construct a system that makes at least two energy conversions and explain this to your counselor.


3. Show you understand energy efficiency by explaining to your counselor a common example of a situation where energy moves through a system to produce a useful result.


Do the following:

a. Identify the parts of the system that are affected by the energy movement.


b. Name the system's primary source of energy.


c. Identify the useful outcomes of the system.


d. Identify the energy losses of the system.


- 4.  Conduct an energy audit of your home. (See the *Sample Home Energy Audit* at the end of this workbook.)

Keep a 14 day log that records what you and your family did to reduce energy use.

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Include the following in your report and, after the 14 day period, discuss what you have learned with your counselor.

- a. List the types of energy used in your home such as electricity, wood, oil, liquid petroleum, and natural gas, and tell how each is delivered and measured, and the current cost; OR record the transportation fuel used, miles driven, miles per gallon, and trips using your family car or another vehicle.


- b. Describe ways you and your family can use energy resources more wisely. In preparing your discussion, consider the energy required for the things you do and use on a daily basis (cooking, showering, using lights, driving, watching TV, using the computer).








- b. Explain what changes to routines, habits, or convenience are necessary to reduce energy waste.


Tell why people might resist the changes you suggest.

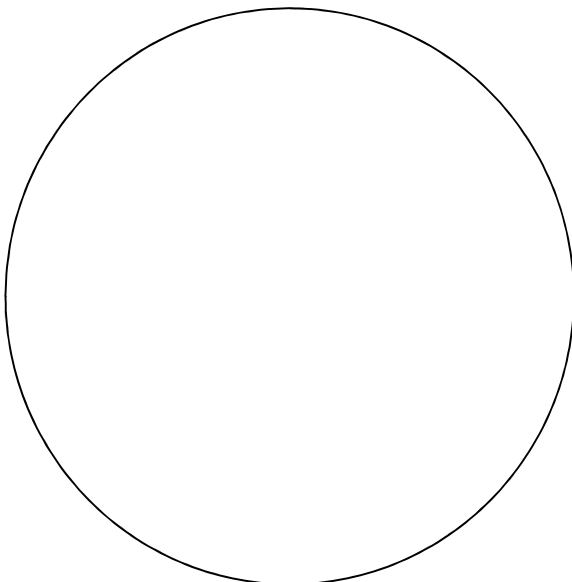

- 6. Prepare pie charts showing the following information, and explain to your counselor the important ideas each chart reveals.

Tell where you got your information.

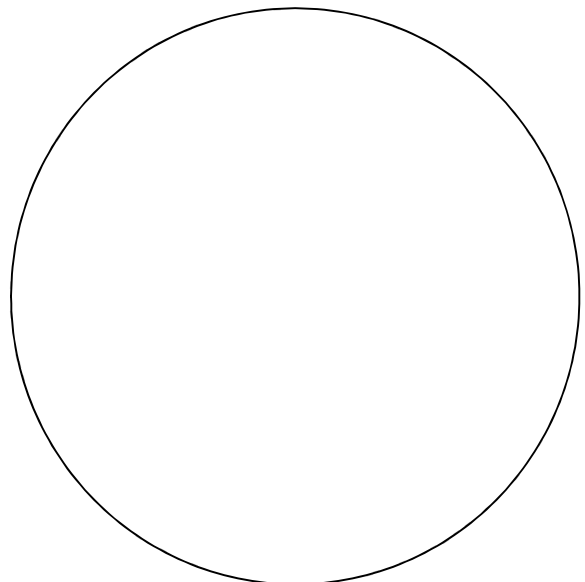
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Explain how cost affects the use of a nonrenewable energy resource and makes alternatives practical.

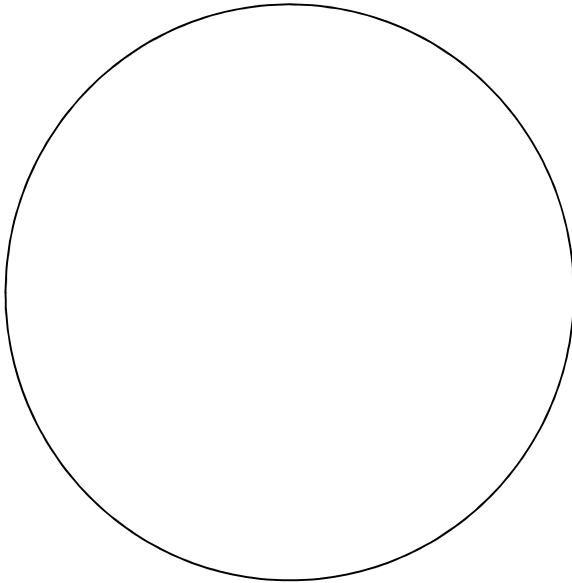

- a. The energy resources that supply the United States with most of its energy



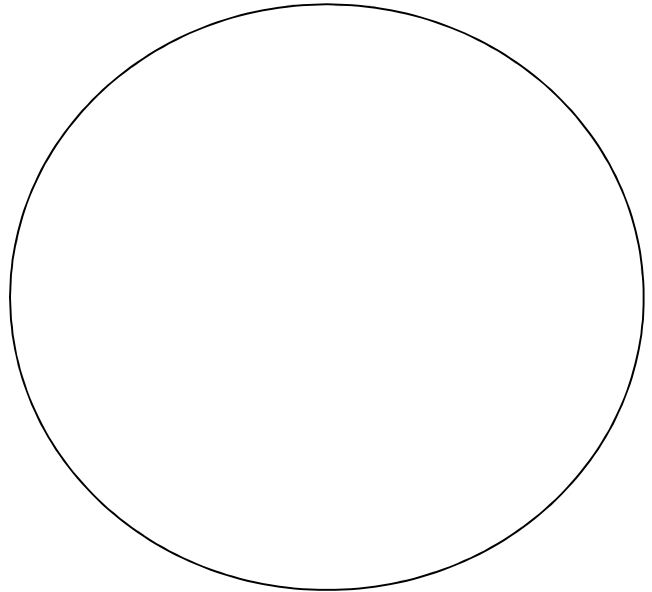
- b. The share of energy resources used by the United States that comes from other countries



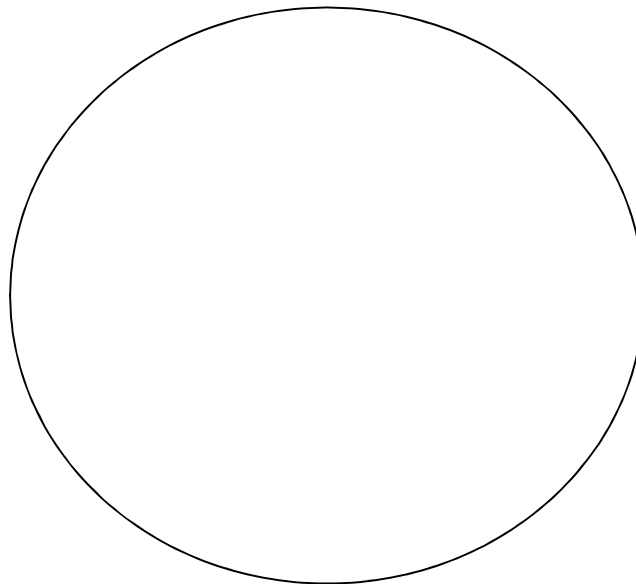
c. The proportion of energy resources used by homes, businesses, industry, and transportation



d. The fuels used to generate America's electricity



e. The world's known and estimated primary energy resource reserves



7. Tell what is being done to make FIVE of the following energy systems produce more usable energy. In your explanation, describe the technology, cost, environmental impacts, and safety concerns.

- Biomass digesters or waste to energy plants
- Cogeneration plants
- Fossil fuel power plants
- Fuel cells
- Geothermal power plants

- Nuclear power plants
- Solar power systems
- Tidal energy, wave energy, or ocean thermal energy conversion devices
- Wind turbines

**Energy System 1:**

What is being done to produce more usable energy?

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Technology

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Safety concerns

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Energy System 2:

What is being done to produce more usable energy?


Technology


Cost


Environmental impacts


Safety concerns


**Energy System 3:**

What is being done to produce more usable energy?


Technology


Cost


Environmental impacts


Safety concerns


**Energy System 4:**

What is being done to produce more usable energy?

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Technology

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Environmental impacts

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Safety concerns

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Energy System 5:

What is being done to produce more usable energy?


Technology


Cost


Environmental impacts


Safety concerns




8. Find out what opportunities are available for a career in energy.


Choose one position that interests you and describe the education and training required.

Position:

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Education:


Training:


**Requirement resources can be found here:**  
[http://www.meritbadge.org/wiki/index.php/Energy#Requirement\\_resources](http://www.meritbadge.org/wiki/index.php/Energy#Requirement_resources)

## Sample Home Energy Audit

### Attic

- Insulation - Is there enough insulation between ceiling joists?
- Vents - Sufficient and unobstructed?

### Living Areas

- Air Leakage - Tape a foot of toilet paper to a pencil with paper hanging free. Hold near windows and doorframes, window air-conditioning units, and electrical covers. If paper moves, you may need weather-stripping, caulking, or storm windows.
- Wall Insulation - Are the wall too cool to the touch on a cold day or too warm on a hot day?
- Thermostat - Set at 68 degrees in winter (turn down 5 degrees more when sleeping), 78 in summer.
- Drapes - During winter, open drapes and shades to let sunlight in. Close at night. During the summer, close drapes.
- Unused Rooms - Close heating and cooling vents, doors in areas seldom used.
- Use fans instead of air conditioning when possible. Fans can also help circulate air when the air conditioning is on.

### Fireplace

- Close the damper when fireplace is not in use.
- Glass doors keep heat from escaping up the chimney.

### Kitchen

- Refrigerator/Oven Seal - To test, close a dollar bill in the door. If the bill moves with little resistance, the seal is bad.
- Appliances - Use washers and dryers in the morning and late evening hours when energy requirements are lower.
- Lights - Turn off lights when not used. Install lower wattage and fluorescent light bulbs whenever possible.
- Faucets do not drip.

### Basement/Crawl Space

- Heating/Cooling System - Clean or replace filters monthly. Have unit serviced once a year.
- Water Heater - Set temperatures no higher than 120 degrees. Drain sediments 3-4 times a year.
- Ducts/Pipes - Insulate hot water pipes as well as heating and cooling ducts.
- Floors - If you have a crawl space under your house, install batt-type fiberglass insulation under floors.
- Venting - Washer & dryer units should be vented directly to the outside.

### Outside

- Weather Stripping & Caulking - Caulk the cracks around windows, weather-strip around doors.
- Windows - Storm windows and double-paned glass can reduce energy usage up to 15%.
- Doors - Keep doors tightly closed on hot or cold days.
- Storm Doors - Help insulate doors

## Important excerpts from the [Guide To Advancement - 2013](#), No. 33088 (SKU-618673)

### [1.0.0.0] — Introduction

The current edition of the *Guide to Advancement* is the official source for administering advancement in all Boy Scouts of America programs: Cub Scouting, Boy Scouting, Varsity Scouting, Venturing, and Sea Scouts. It replaces any previous BSA advancement manuals, including *Advancement Committee Policies and Procedures*, *Advancement and Recognition Policies and Procedures*, and previous editions of the *Guide to Advancement*.

### [Page 2, and 5.0.1.4] — Policy on Unauthorized Changes to Advancement Program

**No council, committee, district, unit, or individual has the authority to add to, or subtract from, advancement requirements.** There are limited exceptions relating only to youth members with special needs. For details see section 10, "Advancement for Members With Special Needs".

### [Page 2] — The "Guide to Safe Scouting" Applies

Policies and procedures outlined in the *Guide to Safe Scouting*, No. 34416, apply to all BSA activities, including those related to advancement and Eagle Scout service projects.

### [7.0.3.1] — The Buddy System and Certifying Completion

A youth member must not meet one-on-one with an adult. Sessions with counselors must take place where others can view the interaction, or the Scout must have a buddy: a friend, parent, guardian, brother, sister, or other relative—or better yet, another Scout working on the same badge—along with him attending the session.

When the Scout meets with the counselor, he should bring any required projects. If these cannot be transported, he should present evidence, such as photographs or adult verification. His unit leader, for example, might state that a satisfactory bridge or tower has been built for the Pioneering merit badge, or that meals were prepared for Cooking. If there are questions that requirements were met, a counselor may confirm with adults involved. Once satisfied, the counselor signs the blue card using the date upon which the Scout completed the requirements, or in the case of partials, initials the individual requirements passed.

Note that from time to time, it may be appropriate for a requirement that has been met for one badge to also count for another. See "Fulfilling More Than One Requirement With a Single Activity," 4.2.3.6.

### [7.0.3.2] — Group Instruction

It is acceptable—and sometimes desirable—for merit badges to be taught in group settings. This often occurs at camp and merit badge midways or similar events. Interactive group discussions can support learning. The method can also be attractive to "guest experts" assisting registered and approved counselors. Slide shows, skits, demonstrations, panels, and various other techniques can also be employed, but as any teacher can attest, not everyone will learn all the material.

There must be attention to each individual's projects and his fulfillment of *all* requirements. We must know that every Scout—actually and *personally*—completed them. If, for example, a requirement uses words like "show," "demonstrate," or "discuss," then every Scout must do that. It is unacceptable to award badges on the basis of sitting in classrooms *watching* demonstrations, or remaining silent during discussions.

It is sometimes reported that Scouts who have received merit badges through group instructional settings have not fulfilled all the requirements. To offer a quality merit badge program, council and district advancement committees should ensure the following are in place for all group instructional events.

- Merit badge counselors are known to be registered and approved.
- Any guest experts or guest speakers, or others assisting who are not registered and approved as merit badge counselors, do not accept the responsibilities of, or behave as, merit badge counselors, either at a group instructional event or at any other time. Their service is temporary, not ongoing.
- Counselors agree not to assume prerequisites have been completed without some level of evidence that the work has been done. Pictures and letters from other merit badge counselors or unit leaders are the best form of prerequisite documentation when the actual work done cannot be brought to the camp or site of the merit badge event.
- There is a mechanism for unit leaders or others to report concerns to a council advancement committee on summer camp merit badge programs, group instructional events, and any other merit badge counseling issues—especially in instances where it is believed BSA procedures are not followed. See "Reporting Merit Badge Counseling Concerns," 11.1.0.0.
- There must be attention to each individual's projects and his fulfillment of all requirements. We must know that every Scout—actually and *personally*—completed them.

### [7.0.3.3] — Partial Completions

A Scout need not pass all the requirements of one merit badge with the same counselor. It may be that due to timing or location issues, etc., he must meet with a different counselor to finish the badge. The Application for Merit Badge has a place to record what has been finished—a "partial." In the center section on the reverse of the blue card, the counselor initials for each requirement passed. In the case of a partial completion, the counselor does not retain his or her portion of the card. A subsequent counselor may choose not to accept partial work, but this should be rare. A Scout, if he believes he is being treated unfairly, may work with his unit leader to find another counselor. An example for the use of a signed partial would be to take it to camp as proof of prerequisites. Partials have no expiration except the Scout's 18th birthday. Units, districts, or councils shall not establish other expiration dates for partial merit badges.

### [7.0.4.8] — Unofficial Worksheets and Learning Aids

Worksheets and other materials that may be of assistance in earning merit badges are available from a variety of places including unofficial sources on the Internet and even troop libraries. Use of these aids is permissible as long as the materials can be correlated with the current requirements that Scouts must fulfill. Completing "worksheets" may suffice where a requirement calls for something in writing, but this would not work for a requirement where the Scout must discuss, tell, show, or demonstrate, etc. Note that Scouts shall not be required to use these learning aids in order to complete a merit badge.