SCOUTMASTER BUCKY

Energy Merit Badge Workbook

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Scouts participating in a Scoutmaster Bucky merit badge opportunity, whether online or in person, should consider using the Energy merit badge pamphlet for discovery and knowledge, along with the class preparation pages for clarifications, insights, and expectations. These resources are available here:

https://scoutmasterbucky.com/merit-badges/energy/

REQUIREMENT 1 REQUIRES PARENT / GUARDIAN PERMISSION.

REQUIREMENT 1a: With your parent or guardian's permission, use the internet to find a blog, podcast, website, or an article on the use or conservation of energy. Discuss with your counselor what details in the article were interesting to you, the questions it raises, and what ideas it addresses that you do not understand.

PARENT / GUARDIAN PERMISSION: IS REQUIRED.

Parent's / Guardian's Name

Phone or Email

Parent's / Guardian's Signature

Date ☐ *permission*

Notes:

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

Notes:

REQUIREMENT 2a:	Explain how THREE of the following devices use energy, and explain their energy conversions: toaster, greenhouse, lightbulb, bow drill, cell phone, nuclear reactor, sauna, electric vehicles.

TOASTER:

How it uses Energy:

Its Energy Conversion:

GREENHOUSE:

How it uses Energy:

Its Energy Conversion:

LIGHTBULB:
How it uses Energy:
Its Energy Conversion:
BOW DRILL:
How it uses Energy:
Its Energy Conversion:

CELL PHONE:
How it uses Energy:
Its Energy Conversion:
NUCLEAR REACTOR:
How it uses Energy:
Its Energy Conversion:

SAUNA:
How it uses Energy:
Its Energy Conversion:
ELECTRIC VEHICLES:
How it uses Energy:
Its Energy Conversion:

REQUIREMENT 2b:	Construct a system that makes at least two energy conversions and explain this to your counselor.

Don't forget to bring any work you have done in preparation to share with your merit badge counselor

Consider using the Energy Merit Badge Pamphlet for preparation information

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!

Notes:

REQUIREMENT 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.

Notes:

REQUIREMENT 3a:	Identify the parts of the system that are affected by the energy movement.

Notes:

REQUIREMENT 3b:	Name the system's primary source of energy.

Notes:

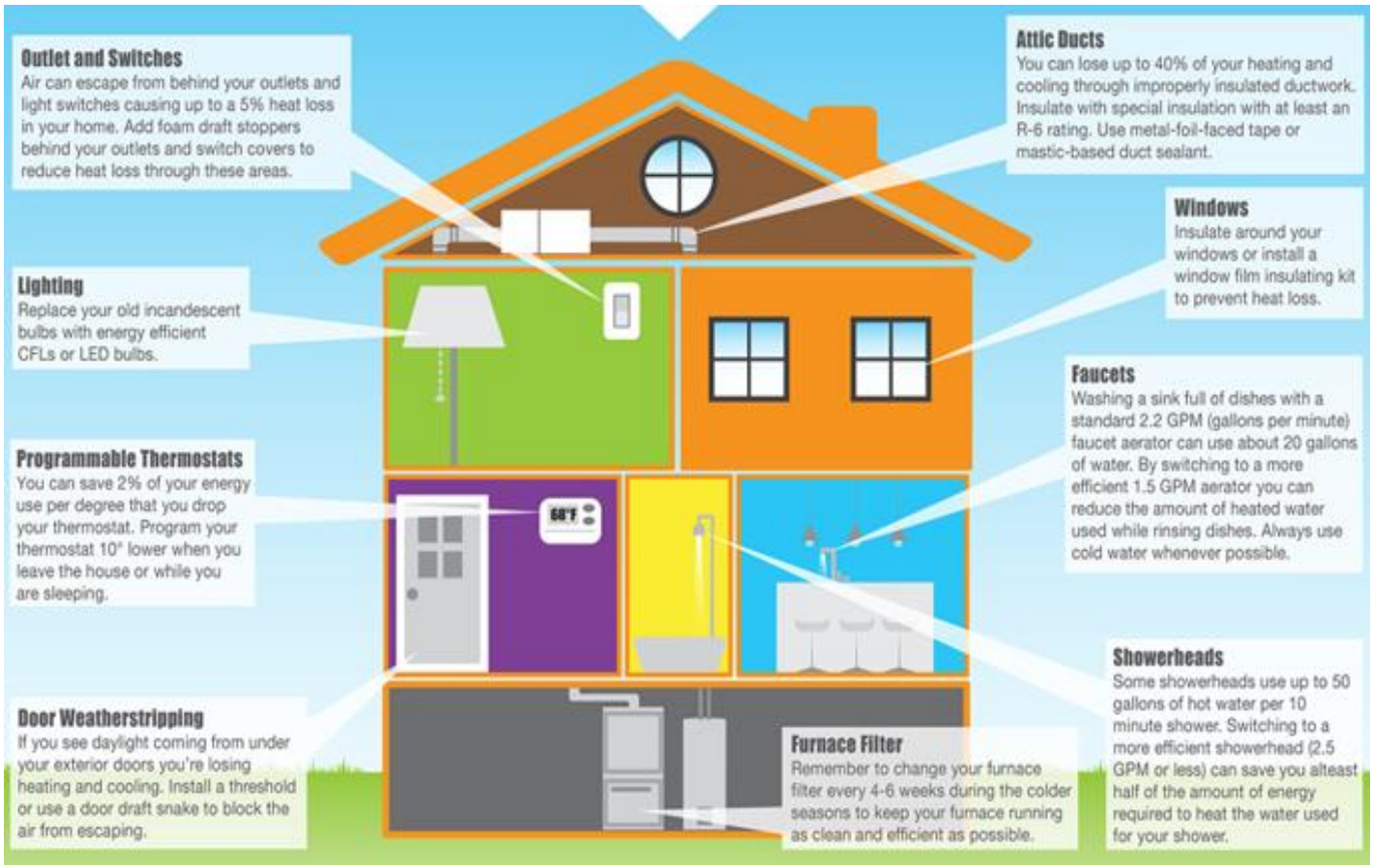
REQUIREMENT 3c:	Identify the useful outcomes of the system.

Notes:

REQUIREMENT 3d:	Identify the energy losses of the system.

Notes:

REQUIREMENT 4:	Conduct an energy audit of your home. Keep a 14 day log that records what you and your family did to reduce energy use. Include the following in your report and, after the 14-day period, discuss what you have learned with your counselor.



Home Energy Breakdown

- Heating - 26% Energy used by your heating system.
- Cooling - 17% Energy used by your cooling system.
- Water Heating - 13% Energy used by your water heater for bathing, cleaning, etc.
- Lighting - 10% Energy used for lighting your home.
- Appliances - 14% Energy used for food storage, clothes washing and drying, cooking, etc.
- Electronics - 7% Energy used for home entertainment systems, computers, etc.
- Other - 13% Energy used for pool pumps, motors, and other miscellaneous devices.

THINGS TO CONSIDER WHEN DOING A HOME ENERGY AUDIT:

- Check and adjust the temperature of your water heater to the warm setting (120-degrees Fahrenheit).
- Start using energy-saving settings on refrigerators, dishwashers, washing machines, and clothes dryers.
- Survey your incandescent lights for opportunities to replace them with compact fluorescents (CFL) or LEDs.
- Check the age and condition of your major appliances, especially the refrigerator.
- Clean or replace furnace, air-conditioner, and heat-pump filters.
- If you have a waterbed, make your bed today. The covers will insulate it, and save up to one-third of the energy it uses.
- Evaluate / Replace low-flow showerheads, faucet aerators, as needed.
- Evaluate age of water heater, If old enough that its insulation is fiberglass instead of foam, it clearly will benefit from a water heater blanket.
- Assess your heating and cooling systems. Determine if replacements are justified, or whether you should retrofit them to make them work more efficiently—to provide the same comfort (or better) for less energy.
- Purchase a power use monitor to learn how you use energy in your home and identify opportunities for saving
- Collect your utility bills. Separate electricity and fuel bills. Target the biggest bill for energy conservation remedies.
- Insulate hot water pipes and ducts whenever they run through unheated areas.
- Seal up the largest air leaks in your house—the ones that whistle on windy days, or feel drafty. The worst culprits are usually not windows and doors, but utility cut-throughs for pipes ("plumbing penetrations"), gaps around chimneys and recessed lights in insulated ceilings, and unfinished spaces behind cupboards and closets,
- At night and whenever you leave your home, adjust your thermostat to save heating energy in the winter and cooling energy in the summer. Some people find it easier to install a programmable thermostat.
- Schedule a home energy assessment (ask your utility company or state energy office) for more expert advice on your home as a whole.
- Insulate. Check your attic or crawlspace and inspect for proper and sufficient amount of insultation. If your walls aren't insulated, have an insulation contractor blow cellulose into the walls.
- Upgrade leaky windows. It may be time to replace them with energy-efficient models or to boost their efficiency with weather-stripping / storm windows / rope caulking
- Reduce air conditioning costs by planting shade trees / shrubs — especially on the west side of your house

Home Energy Audit Log

DAY 1	Energy Type	What was done

Home Energy Audit Log

DAY 2	Energy Type	What was done

Home Energy Audit Log

DAY 3	Energy Type	What was done

Home Energy Audit Log

DAY 4	Energy Type	What was done

Home Energy Audit Log

DAY 5	Energy Type	What was done

Home Energy Audit Log

DAY 6	Energy Type	What was done

Home Energy Audit Log

DAY 7	Energy Type	What was done

Home Energy Audit Log

DAY 8	Energy Type	What was done

Home Energy Audit Log

DAY 9	Energy Type	What was done

Home Energy Audit Log

DAY 10	Energy Type	What was done

Home Energy Audit Log

DAY 11	Energy Type	What was done

Home Energy Audit Log

DAY 12	Energy Type	What was done

Home Energy Audit Log

DAY 13	Energy Type	What was done

Home Energy Audit Log

DAY 14	Energy Type	What was done

THERE ARE TWO PARTS TO THIS REQUIREMENT OF WHICH YOU MUST DO ONLY ONE.	
REQUIREMENT 4a:	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.
ENERGY TYPE #1:	
Energy Type:	
How Delivered:	
How Measured:	
Current Cost:	
ENERGY TYPE #2:	
Energy Type:	
How Delivered:	
How Measured:	
Current Cost:	

ENERGY TYPE #3:
Energy Type:
How Delivered:
How Measured:
Current Cost:
ENERGY TYPE #4:
Energy Type:
How Delivered:
How Measured:
Current Cost:

ENERGY TYPE #5:
Energy Type:
How Delivered:
How Measured:
Current Cost:

ENERGY TYPE #6:
Energy Type:
How Delivered:
How Measured:
Current Cost:

ENERGY TYPE #7:
Energy Type:
How Delivered:
How Measured:
Current Cost:

ENERGY TYPE #8:
Energy Type:
How Delivered:
How Measured:
Current Cost:

REQUIREMENT 4a: Record the transportation fuel used, miles driven, miles per gallon, and trips using your family car or another vehicle.

14 Day Travel Log

Family Vehicle				
Fuel Used	Miles Driven	Miles Per Gallon	Miles per gallon	Traveled to:

REQUIREMENT 4b:	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).

Notes:

REQUIREMENT 4b:	Explain what is meant by sustainable energy sources.

Notes:

REQUIREMENT 4b:	Explain how you can change your energy use through reuse and recycling.

Notes:

REQUIREMENT 5:	In a notebook, identify and describe five examples of energy waste in your school or community. Suggest in each case possible ways to reduce this waste. Describe the idea of trade-offs in energy use. In your response, do the following:
REQUIREMENT 5a:	Explain how the changes you suggest would lower costs, reduce pollution, or otherwise improve your community.
REQUIREMENT 5b:	Explain what changes to routines, habits, or convenience are necessary to reduce energy waste. Tell why people might resist the changes you suggest.

Don't forget to bring any work you have done in preparation to share with your merit badge counselor

Consider using the Energy Merit Badge Pamphlet for preparation information

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!

Notes:

REQUIREMENT 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.

REQUIREMENT 6a: The energy resources that supply the United States with most of its energy.	**REQUIREMENT 6b:** The share of energy resources used by the U.S. that comes from other countries.
Sources:	Sources:
REQUIREMENT 6c: The proportion of energy resources used by homes, businesses, industry, and transportation	**REQUIREMENT 6d:** The fuels used to generate America's electricity.
Sources:	Sources:

REQUIREMENT 6e: The world's known and estimated primary energy resource reserves.

Sources:

REQUIREMENT 6: Explain how cost affects the use of a nonrenewable energy resource and makes alternatives practical.

Notes:

REQUIREMENT 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.
REQUIREMENT 7a:	Biomass digesters or waste-to-energy plants

Technology / Technologies:

Cost(s):

Environmental Impacts:

Safety Concerns:

REQUIREMENT 7b: Cogeneration plants
Technology / Technologies:
Cost(s):
Environmental Impacts:
Safety Concerns:

REQUIREMENT 7c:	Fossil fuel power plants
Technology / Technologies:	
Cost(s):	
Environmental Impacts:	
Safety Concerns:	

REQUIREMENT 7d: Fuel cells
Technology / Technologies:
Cost(s):
Environmental Impacts:
Safety Concerns:

REQUIREMENT 7e:	Geothermal power plants

Technology / Technologies:

Cost(s):

Environmental Impacts:

Safety Concerns:

REQUIREMENT 7f:	Nuclear power plants

Technology / Technologies:

Cost(s):

Environmental Impacts:

Safety Concerns:

REQUIREMENT 7g:	Solar power systems
Technology / Technologies:	
Cost(s):	
Environmental Impacts:	
Safety Concerns:	

REQUIREMENT 7h:	Tidal energy, wave energy, or ocean thermal energy conversion devices

Technology / Technologies:

Cost(s):

Environmental Impacts:

Safety Concerns:

REQUIREMENT 7i:	Wind turbines.

Technology / Technologies:

Cost(s):

Environmental Impacts:

Safety Concerns:

REQUIREMENT 8:	Identify three career opportunities that would use skills and knowledge in energy.
Career Opportunity #1:	
Career Opportunity #2:	
Career Opportunity #3:	
REQUIREMENT 8:	Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field.
Selected Career Opportunity:	
Training Requirements:	
Education Requirements:	
Certification Requirements:	
Experience Requirements:	

Expenses associated with:	
REQUIREMENT 8:	Research the prospects for employment, starting salary, advancement opportunities, and career goals associated with this career.
Employment:	
Starting Salary:	
Advancement Opportunities:	
Career Goals:	
REQUIREMENT 8:	Discuss what you learned with your counselor and whether you might be interested in this career.
Notes:	