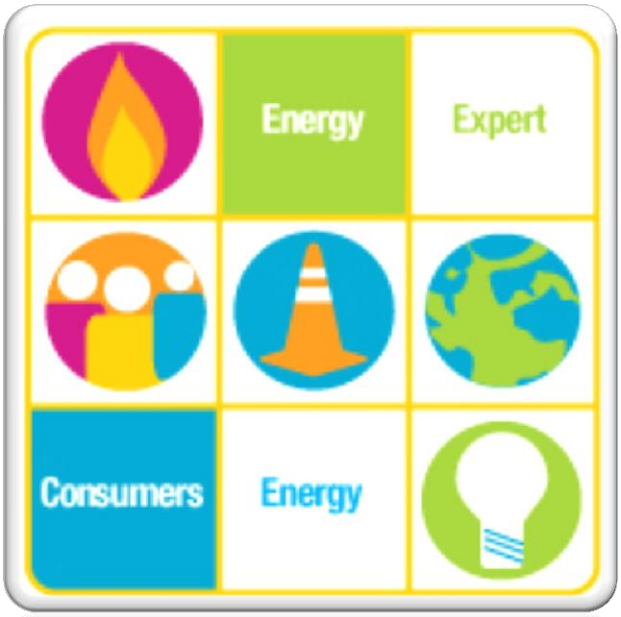

ENERGY EXPERT PATCH

Brownie Leader Guide

Consumers Energy
Count on Us

PROVIDING ENERGY EDUCATION TO STUDENTS IN THE COMMUNITIES WE SERVE. THAT'S OUR PROMISE TO MICHIGAN.

For more great energy resources visit:
www.ConsumersEnergy.com/kids

Hey Scout Leader!

Ready to help your Brownies earn the Energy Expert patch? This book will help your troop to become experts at:

***This book is intended for you, the leader. Go to www.ConsumersEnergy.com/scouts to download and print copies of the Brownie Workbook for your Scouts to complete.**

Remember!

This book is designed to be completed as a group with discussions around each topic.

Once complete, please visit www.ConsumersEnergy.com/scouts to order patches.

Questions? Feel free to email us at education@consumersenergy.com

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Page 1- ELECTRIC SAFETY
Things to Discuss as a Group

- Electricity travels at the speed of light, which is 186,000 miles per second! That's why it's important to understand the correct way to handle yourself around electricity. There are no second chances if you make a mistake!
- There are three things that can happen if a person comes in contact with electricity:

  Shock: An electric shock occurs when a person comes into contact with an electrical energy source. Electrical energy flows through a portion of the body causing a shock.

  Burn: This is the most common injury. An electrical burn can range from mild to severe. A severe burn may cause permanent damage.

  Electrocution: This means "to be killed by electricity." Make sure Scouts understand the difference between shocks, burns and electrocution.
- Review the two terms that talk about how electricity travels:

  Conductor: Allows electricity to flow. Examples include metal and water. Our bodies also are conductors. Water is an especially powerful conductor of electricity. An important phrase to remember is "Electricity, People, Water Don't Mix!" When using something electrical, stay away from water (e.g., sharing a bathroom: if someone is brushing their teeth, don't use a hair dryer or curling iron near them.)

  Insulator: Stops the flow of electricity. Examples include glass, special types of plastic and rubber. The gloves worn by electric lineworkers are made of a special type of rubber that helps protect them from electrical shock, burn or electrocution. NOTE: Not all types of rubber can stop the flow of electricity, only the kind made for those who work with electricity.
- Never fly a kite near power lines. Always check for power lines before climbing a tree or ladder. If you see any, don't climb the tree. An important phrase to remember is "Look up for power lines!"
- If you see a downed power line, stay at least 25 feet away from it. Turn and go in the opposite direction of the power line, and tell an adult to call Consumers Energy right away at (800) 477-5050 so we can fix it.

ELECTRIC SAFETY

Electricity travels at 186,000 miles per second! That's why it's important to understand the correct way to handle yourself around electricity.

3 things can happen if you touch electricity, you can be:

1. Shocked
2. Burned
3. Electrocuted

Conductors allow electricity to flow.

Insulators stop the flow of electricity.

Draw a picture of the power lines above or underground bringing electricity to your house.

If it's an option, take Scouts outside to look at the power lines from a safe distance.

Remember!

Review these phrases with Scouts

Electricity, people, water DON'T mix!

Look up for POWER LINES when climbing a tree or flying a kite

Stay away from downed power lines and call Consumers Energy right away (800) 477-5050

Page 2- NATURAL GAS SAFETY
Things to Discuss as a Group

- Natural gas is a colorless, tasteless, odorless form of energy that many people in Michigan use to heat their homes, light their stoves and dry their clothes. Explain how natural gas is an invisible gas, whereas the gasoline we put in our cars is a liquid. We add an odorant called mercaptan to it, which gives it a bad smell, much like rotten eggs. This helps people detect it in the event of a natural gas leak.

- Natural gas can leak because someone was digging and broke an underground pipe, or because an appliance that uses the gas is broken.

- A natural gas leak can lead to a fire or explosion, especially if a spark occurs.

- There are **six steps** one should follow if they believe natural gas is leaking at home:

  1. Tell an adult and leave the area. This means get out of the house.

  2. Do not make a spark. Lighting a match, using the telephone, light switches, garage door opener or other devices can create a spark that could ignite the natural gas.

  3. Do not try to find the source of the leak. Get out of the house immediately. Trying to detect where the leak is coming from jeopardizes one's safety.

  4. Go to a safe place. Scouts should discuss this with their parents and determine where a "safe place" is. Make sure scouts understand that they should not go to a stranger's house.

  5. Call for help. Appropriate places to call include Consumers Energy at (800) 477-5050, the local police or 911.

  6. Wait and don't go back into the house until Consumers Energy says it's OK.

- Have Scouts roll play what to do in the event of a natural gas leak.

NATURAL GAS SAFETY

Can you see natural gas if it's leaking?

Circle one: Yes / No

What can happen if natural gas is leaking? Write your answer.

A fire or explosion.

Natural gas smells like Rotten Eggs.

Take the Right Steps

Write the safety phrase under the right picture, and learn what to do if you smell natural gas!

Tell an adult, leave the area

Don't make a spark

Don't try to find the smell

Go to a safe place

Call for help 911 or 800-477-5050

Wait until Consumers Energy says it's safe again

For more great energy resources visit:
www.ConsumersEnergy.com/kids

Page 3- RESPECT THE FLAGS
Things to Discuss as a Group

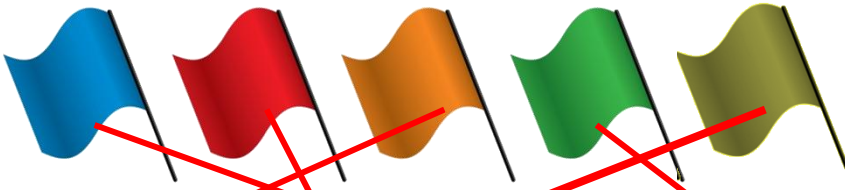
- Explain how underground pipes and wires bring utilities to our homes, schools and businesses. Without these pipes and wires, we wouldn't have things like water, heat, or cable television!
- Colored flags mark the different kinds of underground pipes or wires so when we have to dig we can avoid hitting and breaking a pipe. Each utility has its own colored flag:

  Yellow: Natural Gas pipe
  Red: Electric line
  Orange: Cable or telephone line
  Blue: Water pipe
  Brown/**Dark Green**: Sewer pipe
  Others: Pink and white flags are used for surveying and new construction. Sometimes, MISS DIG uses paint instead of flags, especially if the area being marked is concrete or asphalt.
- It's important that Scouts understand why these flags are important, and to never pull them out of the ground. If they see someone pulling them out, they should go tell an adult right away.
- MISS DIG is the organization that must be called at least three days before any digging project to have the ground marked with flags. This will enable the digger to know where not to dig. You should always call MISS DIG at **811** for projects like planting a garden, installing a mailbox or fence post, even simple jobs like planting a tree or bush. For more information about MISS DIG or to submit a request online, go to www.missdig.net
- Not calling MISS DIG at **811** leads to unsafe digging. You could hit a natural gas pipe or an electric line which could lead to serious damage, injury or worse.

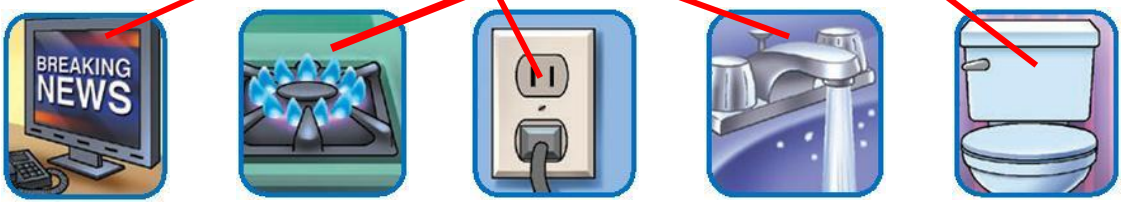
Other Ideas- visit www.Call811kids.com and watch a video where Scouts will learn from a pirate looking for buried treasure why you should always call 811 before you dig!

RESPECT THE FLAGS

Flags are used to mark _____Pipes and wires_____ that are buried underground.



Match the flag to the right utility



Before starting a digging project, you should always call ___Miss Dig___ at 811 Know what's **below.** **Call** before you dig.

What's Wrong?

Draw an X over what these kids are doing wrong

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www.ConsumersEnergy.com/kids

Page 4 - ENERGY AT HOME
Things to Discuss as a Group

- Ask Scouts what things in their houses use electricity? What things use natural gas?

- Make sure Scouts understand that energy costs money. Using energy efficiently can result in paying less for energy and helping the environment.

- Go over the diagram on page 4 and talk about how electricity is generated and gets to the home. Explain that electricity can be generated using different sources (coal, oil, natural gas, wind, water, solar). This will be explained more in the next lesson "Sources of Energy" on page 5.

- Energy use is measured using a gas or electric meter, which is usually found on the outside of homes (some are inside homes).

- Ask Scouts if they can guess when we use the most electricity in Michigan, summer or winter? Answer: summer. Ask Scouts if they can figure out why we use more electricity in the summer than we do the winter. Answer: Air conditioning and fans are used more, and they run on electricity. Also, school is not in session resulting in more use of TV, computer and other appliances throughout the day.

- Ask Scouts to think of one way they can use less energy at home starting today.

Other Ideas-

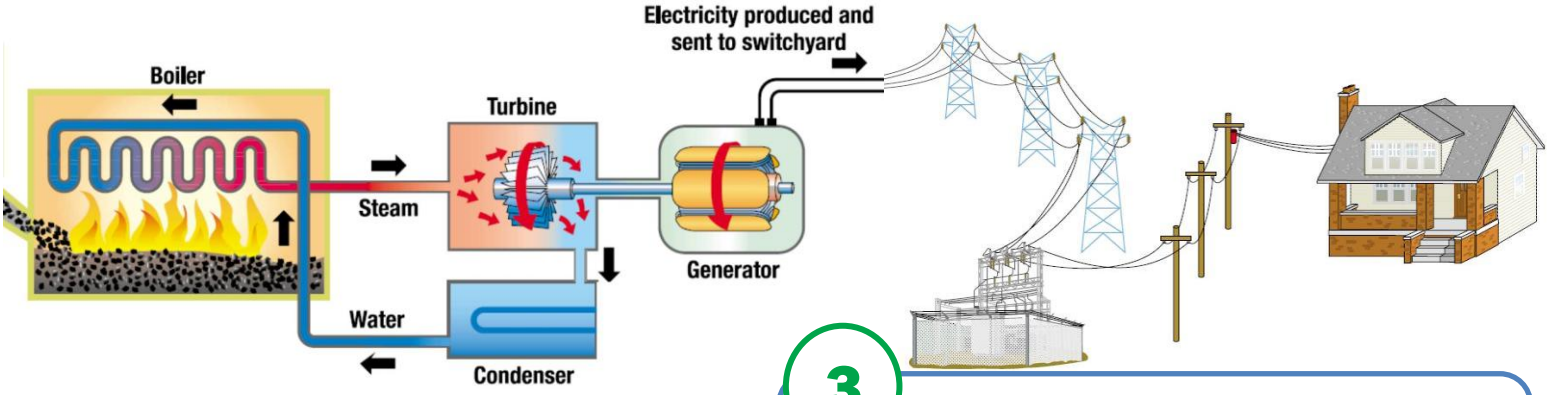
- Take a trip to an historical museum. Observe and discuss the way things were done before we had modern conveniences such as televisions, computers and furnaces. Ask each scout to write a short story describing what life might have been like for a child before we had access to electricity and natural gas.
- Ask each Scout to look for things in the room or at home that use electricity or natural gas.

ENERGY AT HOME

How DOES electricity get to your house?

1 Coal is mined out of the ground, and sent on trains and boats to a power plant

2 Coal is burned to make steam, which turns a turbine, turning a generator



3 Electricity is generated, sent through transmission lines, into a substation, then over distribution lines to your house!

THINK ABOUT IT

What would life be like without electricity? On a separate piece of paper, draw a picture or write a story about your life without electricity. *Have Scouts do this at home, then bring it back to share with the whole group.

Electricity is measured by using a Meter that is attached to your house.

In Michigan, when do we use more electricity? Circle one.

Summer or Winter

Write one way you can use less energy at home starting today!

Turn off lights, take short shower, use CFL bulbs

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Page 5 & 6 - SOURCES OF ENERGY
Things to Discuss as a Group

- Explain to Scouts that energy can be found in many different forms all over the earth. Scientists take that energy and turn it into electricity using power plants. Some of these energy sources are **renewable**, meaning we can use them over and over again, examples include wind, water and solar. Some energy sources are **non-renewable**, meaning once we've used them they are gone, examples include coal, natural gas, and oil.

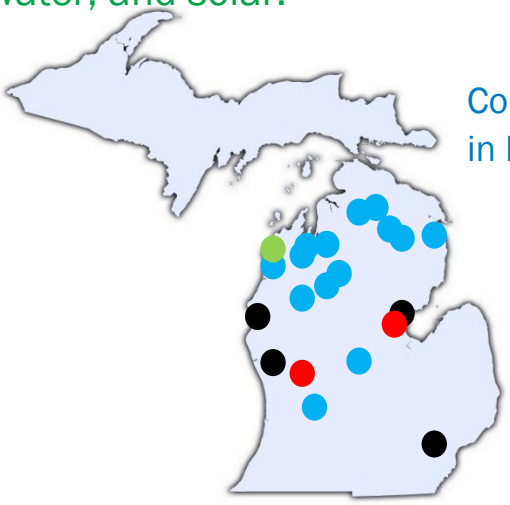
- Fuel definitions (From the Glossary of Terms provided by the Energy Information Administration of the U.S. Department of Energy).
    - **Coal:** A fossil fuel formed by the breakdown of vegetable material trapped underground without access to air.
    - **Natural Gas:** An odorless, colorless, tasteless, non-toxic clean-burning fossil fuel. It is usually found in fossil fuel deposits and used as a fuel. Natural gas is a natural resource. Many furnaces, clothes dryers and stoves operate using natural gas.
    - **Oil:** The raw material that petroleum products are made from. A black liquid fossil fuel found deep in the Earth. Gasoline and most plastics are made from oil.
    - **Solar Energy:** The sun's radiant energy can be converted into other forms of energy, such as heat or electricity. This is a renewable energy source.
    - **Water Cycle:** Water constantly moves through a vast global cycle, in which it evaporates from lakes and oceans, forms clouds, precipitates as rain or snow, and then flows back to the ocean. The energy of this water cycle, which is driven by the sun, is tapped most efficiently with hydropower. Water is a renewable energy source.
    - **Wind:** The term given to any natural movement of air in the atmosphere. A renewable source of energy used to turn turbines to generate electricity.

- **Water Power –** talk with Scouts about using water to make electricity. This activity correlates to LOVE water and SAVE water in the Wonders of Water journey.

SOURCES OF ENERGY

Non-renewable energy sources are fossil fuels like coal, oil, and natural gas.

Renewable energy sources can be reused like wind, water, and solar.



Consumers Energy has many power plants in Michigan that use different sources of energy.

- Hydro Power Plant
- Wind Farm
- Natural Gas Power Plant
- Coal Power Plant
- ★ Where do you live? Mark it on this map with a star. Show Scouts where you are.

TYPES OF FUEL WORDSEARCH

Coal Natural Gas Nuclear Oil Sun Water Wind

C	U	P	X	E	M	F	A	V	P	L	Q	M	Y	L	K	D	F	B	E
P	L	X	V	G	A	L	U	C	M	W	I	L	X	C	T	I	S	Z	P
W	C	V	Y	I	W	S	Z	L	E	S	A	L	O	S	V	I	S	D	P
A	U	M	E	I	N	S	X	G	P	E	B	M	A	X	T	N	U	M	O
W	N	Y	S	U	A	I	C	R	C	U	M	S	I	L	A	P	N	E	M
M	L	Z	H	C	T	Q	I	P	T	J	L	F	M	T	D	A	R	W	X
P	M	Y	V	O	U	V	I	O	F	P	L	V	X	S	T	E	Y	Q	L
S	O	I	Y	X	R	M	W	A	T	E	R	A	N	K	L	T	U	D	P
J	G	A	Q	P	A	B	S	G	I	K	R	M	V	P	L	R	Y	U	Z
A	F	M	E	I	L	W	A	T	R	I	L	P	D	I	V	M	K	W	Q
I	W	P	O	X	G	X	D	J	E	Y	Z	U	K	R	S	S	C	O	X
G	R	E	U	U	A	Y	C	G	I	H	A	O	R	M	H	Q	A	L	N
T	Y	J	H	P	S	K	I	I	E	F	Y	I	B	O	L	U	O	U	T
E	I	R	R	M	B	M	L	P	C	B	E	L	M	T	Y	R	L	T	U
L	P	K	D	E	N	C	E	T	U	Y	H	E	E	P	R	F	D	R	E
R	G	L	F	U	E	A	B	E	Q	J	L	W	Z	N	I	O	R	U	D
U	B	W	B	M	R	D	L	C	Z	E	A	S	C	F	P	Y	E	I	F
M	W	I	D	N	T	U	S	M	S	S	E	P	C	O	A	L	T	G	J
O	I	Q	I	K	I	P	Z	R	U	V	E	I	R	W	D	P	Y	V	T
T	N	J	W	G	L	Q	A	F	F	P	M	O	W	Z	L	Y	W	R	R
R	D	Z	S	D	W	I	N	U	C	L	E	A	R	Q	P	M	P	C	E
E	M	C	R	C	Q	B	E	H	C	S	A	R	F	A	E	G	V	M	H

For more great energy resources visit:
www.ConsumersEnergy.com/kids

WATER POWER

Read this out loud.

Our energy choices can impact our world in many ways. Using water to make electricity means we can't use it for other things. It's important to think about the benefits and the problems of using an energy source before we make a decision to use it. Let's think about water a little bit more.

Another word for a power plant that uses water to generate electricity is HYDROELECTRIC

Water is (circle one) renewable non-renewable.

Think of ways we can use water if we don't use it for electricity:

1. We can drink it
2. We can take showers and baths
3. We can go swimming

List some benefits of using water for electricity:

1. It's better for the environment
2. It gives us more electricity for hospitals
3. Water can be used over and over again

List some problems with using water for electricity:

1. We can't use the water for other things
2. It could disrupt the animal's habitat
3. There could be flooding

Page 7 - ENERGY CAREERS
Things to Discuss as a Group

- **Electric lineworker -**The person in this important job drives a truck and either climbs utility poles or rides in a bucket that carries him or her up to electric lines in order to work on or repair them. This job requires special training. The worker must wear protective gear such as a hard hat, rubber gloves, rubber sleeves, safety glasses, etc. and should not be afraid of heights! Sometimes, electric lineworkers are asked to help restore power in other states when energy companies need extra help.
- **Natural gas service worker-** The person in this important job drives a truck and installs or repairs natural gas lines, which are buried underground. This job requires special training. The natural gas service worker must wear protective gear such as a hard hat, safety goggles and gloves. They use shovels and clippers and operate different types of excavation equipment such as backhoes and diggers.
- **Customer Service Representative (call center)-** This job handles calls from customers who call for lots of reasons like asking questions about their bill, getting help turning on or off their electric and natural gas service, or reporting an emergency like a downed power line or natural gas leak. This person needs to be a good listener and problem solver.
- **Meter Reader –** This person reads the numbers on the meters attached to homes and businesses. Meters tell the reader how much electricity or natural gas the customer used in a month. The meter reader then enters the numbers on a hand-held device. This important job and process allows the company to send the correct bill to customers.
- **Engineer-** At Consumers Energy, engineers fuel the company's brain power. They help the company provide safe, reliable and affordable energy. They design, operate and maintain power plants, and miles of electrical distribution lines and natural gas piping. Engineers usually need a four-year college degree. There are many different types of engineers including civil, environmental, chemical, electrical, computer, industrial, mechanical and material engineers. Consumers Energy uses all these different types of engineers.
- **Executive Communications-** Even an energy company needs people to help communicate to their customers! This job travels a lot and is very creative. You usually need a four-year college degree. This job requires good writing and presentation or public speaking skills.
- **Information Technology (IT)-** Consumers Energy needs many different types of IT workers from networking, to system programmers, to web designers! It takes a lot of technology to deliver reliable energy to our 6.8 million customers. IT professionals usually have a four-year degree. They must enjoy working on a computer and solving problems.
- **Forestry-** Foresters keep trees from interfering with power lines. 30% of power outages are caused by tree interference. Workers need to know how trees grow and differences between types of trees. They work closely with customers and property owners, and with crews who annually trim trees near power lines.
- To see job openings at Consumers Energy, visit www.ConsumersEnergy.com/careers

ENERGY CAREERS

Match the right career with the work they like to do.

Engineer	I like working on the computer and solving problems.
Customer Service Representative	I like writing and talking in front of groups of people.
Executive Communications	I like to design things, and I'm good at math.
Information Technology (IT)	I like to talk to people and help solve problems.
Electric Lineworker	I like to be outside, ride in vans, and help people.
Forestry	I like to walk, work independently and meet new people.
Natural Gas Worker	I like to work with trees and help the environment.
Meter Reader	I like to be outside, climb high and ride in trucks.

Draw a picture of yourself working in your favorite energy career.

Have Scouts share their favorite career and picture with the group.