



ENERGY EXPERT PATCH

Tiger & Wolf 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 Tigers and Wolves earn the Energy Expert patch?
This book will help your pack to become experts at:

Page 1- Electric Safety

Page 2- Natural Gas Safety

Page 3- Respect the Flags

Page 4- Sources of Energy

Page 5- Electricity Generation

Page 6- Energy Careers

***This book is intended for you, the leader. Go to www.ConsumersEnergy.com/scouts to download and print copies of the Tiger & Wolf 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

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

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.

Do this with your pack: pretend a jump rope is a downed power line. Act out what you should do, then draw a picture of it here.

Lead this activity with your pack.

1. Talk about the downed power line safety tips listed on the “things to discuss as a group” page above.
2. Get a jump rope and lay it down on the ground.
3. Tell Scouts to act out how they should react to the pretend downed power line.

Answer: As soon as they see it they should get at least 25 feet away, then they should go tell an adult to call Consumers Energy at (800) 477-5050.

Remember!

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

Review these phrases with Scouts

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, then act out what you should 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

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.

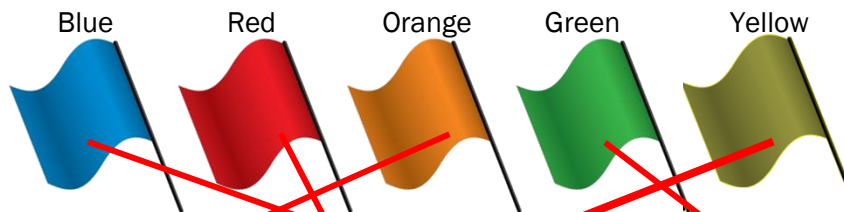
Other Ideas- visit www.Call811kids.com and watch a video where Scouts will learn from a pirate looking for buried treasure why you should always call 811 before you dig!

RESPECT THE FLAGS

Flags are used to mark

pipes and wires that are buried underground.

Before you start digging, you must always call MISS DIG. Connect the dots to find out the phone number!



Match the flag to the right utility



Page 4- 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. Some are fossil fuels and are found deep underground in the form of rock, liquid, or even gas. Some are constant like the sun shining or the wind blowing. Scientists take that energy and turn it into electricity using power plants.
- Some 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.

Other Ideas- Have Scouts pick which energy source they think is best and tell the group why.



SOURCES OF ENERGY

Non-renewable energy sources we will never run out of.

Renewable energy sources once they are used, they are gone.

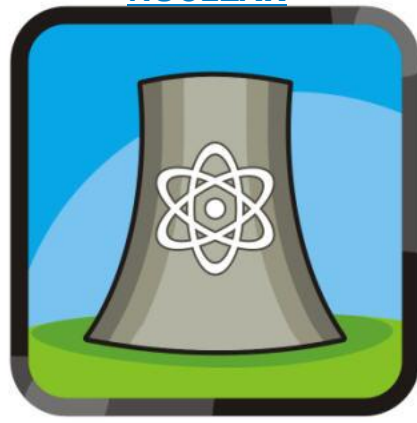
Draw what you think these energy sources look like

COAL



- This rocky source comes from old dead plants
- It must be mined deep out of the ground and sent on ships and trains

NUCLEAR



- This source comes from uranium atoms splitting
- These power plants have large cylinder shaped stacks

HYDRO



- This source uses water to turn turbines on rivers and dams
- Consumers Energy has 13 hydro power plants in Michigan

WIND

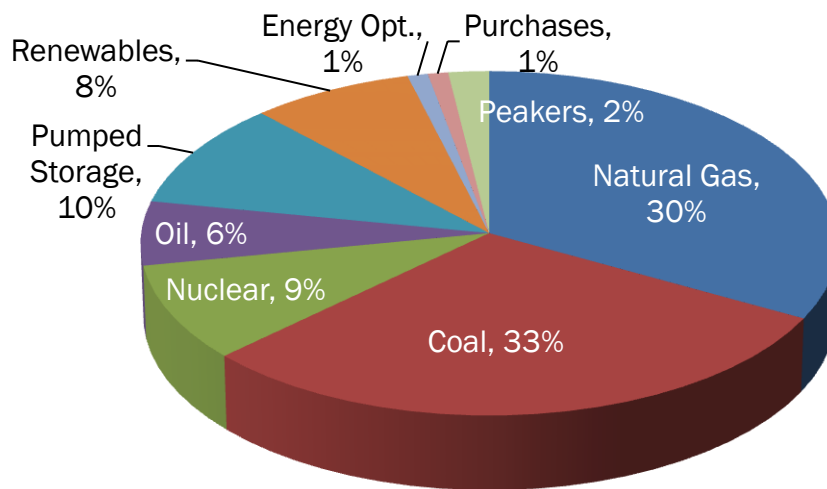


- This source uses wind to turn really tall turbines
- Michigan is the 14th windiest state in the country

Page 5- ELECTRICITY GENERATION

Things to Discuss as a Group

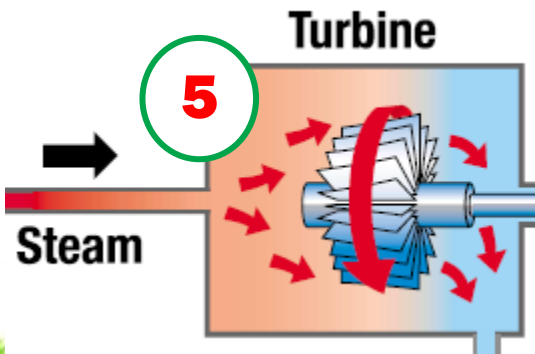
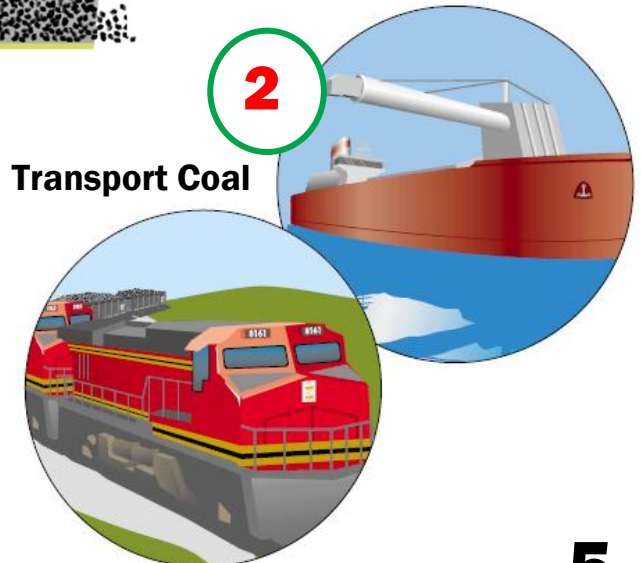
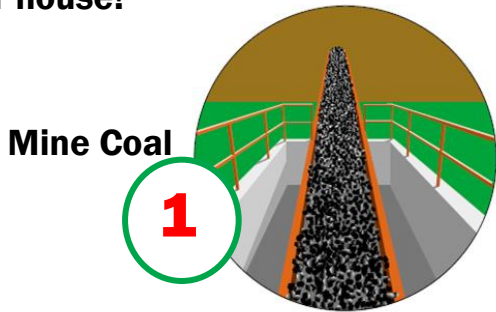
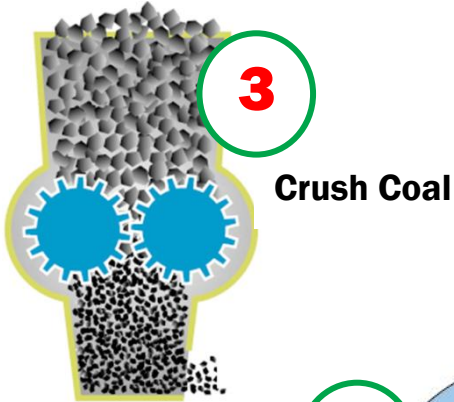
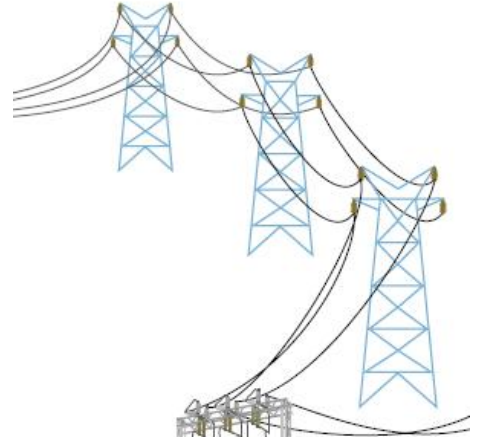
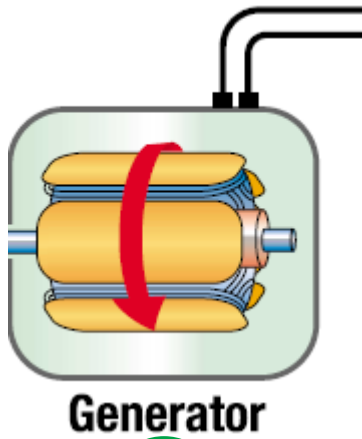
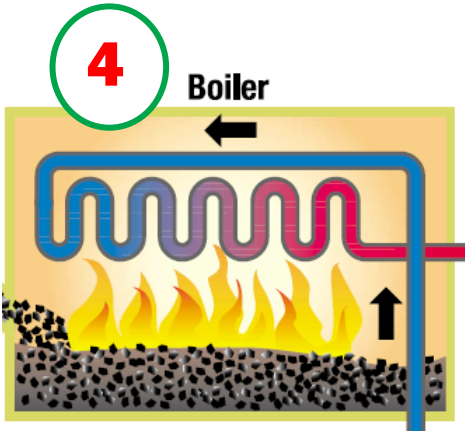
- Explain to Scouts that electricity does not come out of thin air. Energy companies, like Consumers Energy, make electricity in power plants using the many sources you just learned about in the “Sources of Energy” activity.
- The following chart breaks down electricity generation from Consumers Energy in 2013. This data is from the 2013 Accountability Report.



- Coal is still the most common way energy companies nationwide generate electricity. Coal, along with other sources such as oil, natural gas, nuclear, and biomass, generate some type of heat to produce steam which turns a turbine, turning a generator. Steam is a very powerful and very efficient way to generate electricity.
- Explain the following steps teaching Scouts how electricity is generated in a coal power plant and sent to their homes:
 1. Coal is mined from underground.
 2. Coal is transported, by train or boat, to power plants.
 3. The coal is fed into pulverizers that crush the coal into a fine powder.
 4. The coal powder is mixed with air and blown into the boiler where it ignites.
 5. The fire heats up water in tubes, turning the water into steam, which turns a turbine.
 6. The shaft connected to the turbine turns the generator, creating electricity.
 7. The electricity is sent over transmission lines to a substation in your neighborhood where the voltage is lowered.
 8. The electricity then travels through smaller, distribution lines to your house.

ELECTRICITY GENERATION

How is electricity made? Put the pictures in the right order.



Page 6 - 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.

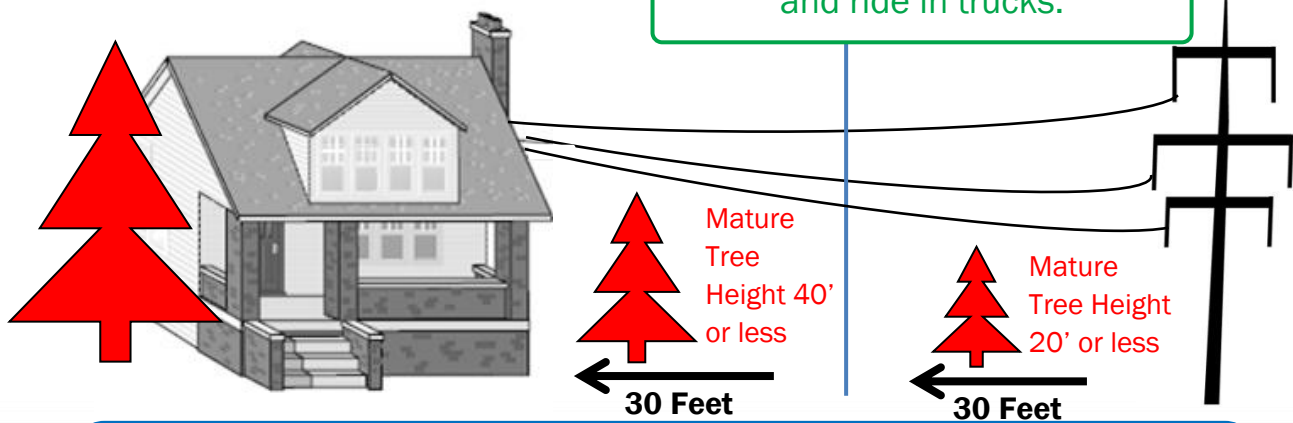
To see job openings at Consumers Energy, visit www.ConsumersEnergy.com/careers



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.



Forestry employees at Consumers Energy help to make sure trees are planted far enough away from power lines to be safe. **Draw the right size trees in the right places at this house.**