

Interpreter Guide

Science of electricity overview

How is the electricity for our homes made and transmitted?

1. *Basic structure of all matter (you, me, the ground, the air...everything)*

- All matter is made of tiny particles called atoms.
- Atoms are made of even smaller particles.
- Every atom has a nucleus and each nucleus is made up of particles called protons and neutrons.
- Around the nucleus are clouds of very interesting particles called electrons.
- Protons have a positive charge and neutrons have no charge.
- Electrons have a negative charge and can move from one atom to another more easily than protons and neutrons.
- The movement of these negatively charged electrons creates an electric current!

2. *Generators*

- A generator is a magnet and metal wire.
- There are lots of electrons in the wire (as there are in anything).
- Electrons move easily through metal.
- A nearby magnet makes electrons want to orient with the magnetic field.
- When either the magnet or wire is moved, the electrons in the wire are moving around, trying to reorient to the magnetic field.
- The movement of electrons is electricity (electric current).
- The generators in power plants have giant coils of metal wire and giant magnets. Either the wire is spinning or the magnet is spinning to create electricity.
- What makes the wire or magnet spin? Depends on the kind of power plant:
 - Water flows over turbine blades.
 - Wind blows turbine blades.
 - Steam (from water heated by burning coal, oil, or gasoline) pushes turbine blades.
 - Steam (from water heated by nuclear fission) pushes turbine blades.

3. *Circuits*

- In a circuit, electrons moving through a wire create an electric current.
- In an open circuit the path is incomplete so electric current can't flow.
- Most circuits have switches.

Electrifying Minnesota

A traveling exhibit from the Minnesota History Center and The Bakken Museum.

- Switches are useful because they allow us to stop and start the flow of electricity whenever we want by opening and closing circuits.

Questions to ask visitors

- What do you use electricity for in your life?
- What do you notice about this object?
- How do you think this object works?
- How can you use these objects to make electricity? (for the interactive generator station)
- How do you think electricity changed people's lives in positive ways?
- How do you think electricity changed people's lives in negative ways?

Activities

Here are a few easy activities to try with visitors to the Electrifying Minnesota exhibit.

Reflections on Life without Electricity

Have visitors brainstorm all the things for which they use electricity. Ask, "When did you use electricity today before coming here?"

Then ask them about experiences where they have had to make do without electricity. During a power outage? Camping trip? An intergenerational dialogue is always fun here! One woman shared that though her parents' home in Iowa had electricity, their cabin at "the lake" in MN did not. She found this very annoying on evenings when she was putting on makeup to go out to dances at the Balmoral. Her granddaughter had difficulty trying to imagine applying mascara by kerosene lamp!

Ask the visitors to rate on a scale of 1-5 how much they would miss the things that use electricity. What could they use or do instead for each item if they didn't have electricity?

Uses electricity	How much would you miss it? 1-not really, 5-so much	To do the same thing, I could use...
Example: Lights	During the day: 1, At night: 4	Candles/flashlight

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Many good books relate what it's like to live without electricity—ask the visitors if they've read any of these books and what they thought about the characters' experiences without electricity.

Little House books by Laura Ingalls Wilder

Betsy-Tacy books by Maud Hart Lovelace

Dragonwings by Lawrence Yep

My Side of the Mountain by Jean Craighead George

Hatchet by Gary Paulsen

Get Moving with Electricity (a good activity for groups with children)

Ask, “How do we make the electricity we use every day?”

You'll teach them the basics of electricity generation in this activity. For now, just accept their answers and follow the path of electricity from the power plant to a house. “Great, the power station makes our electricity! Then what? Where does it go? How does it get there? How do you access/use it?”

This activity can be as simple or as complex as you want, but the main idea is that electricity is generated in power plants by moving magnets near wire.

Magnet + Wire + Movement = Electricity

Watch the video under “Interpreter Guide” to see a demonstration of this activity and chant.

www.legacy.mnhs.org/traveling-exhibits-electrifying-minnesota-education-resources

Here's how it works:

Have everyone form a circle holding hands. This circle is the wire. Then put one person in the center to be the magnet.

“First you take (*name of person who is the magnet*) a Sarah, a Sarah, a Sarah, Sarah, Sarah.

And she's a magnet, a magnet, a magnet, magnet, magnet!

And you spin her, you spin her, you spin her, spin her, spin her.

(*person spins in place*)

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And the wires, the wires, the wires, wires...
Make e-lec... electricity, e-lec... electricity!" (This is the chorus)

The "wire" people start wiggling their arms, in a wavelike motion, to show the flow of the electricity.

As the "wire" wiggles, the "magnet" spins faster, which generates more electricity in the wires and the magnet spins even faster, and so on... Pretty quickly the person in the middle will need to stop! They can choose someone to take their place as the magnet and they in turn become part of the wire circle.

You can add "power lines" and a "light" in a house: as the magnet spins and the wire wiggles, the power lines wiggle and the light jumps up and down.

A "switch" can be added, as well: the "light" holds his palm to the palm of the "switch." When their palms are touching, the circuit is closed and the "light" jumps up and down. Separate the palms to open the circuit and the "light" stops jumping.

Be as creative as you like, maybe a storm knocks down the "power lines" to end it all!