

Name(s) \_\_\_\_\_ Date \_\_\_\_\_

# Powering Our Communities

## ESSENTIAL QUESTIONS TO KEEP IN MIND:

- Where does the electricity for our school come from?
- Why does it matter where our electricity comes from?

## WHAT IS A POWER GRID?

### Transporting Electricity

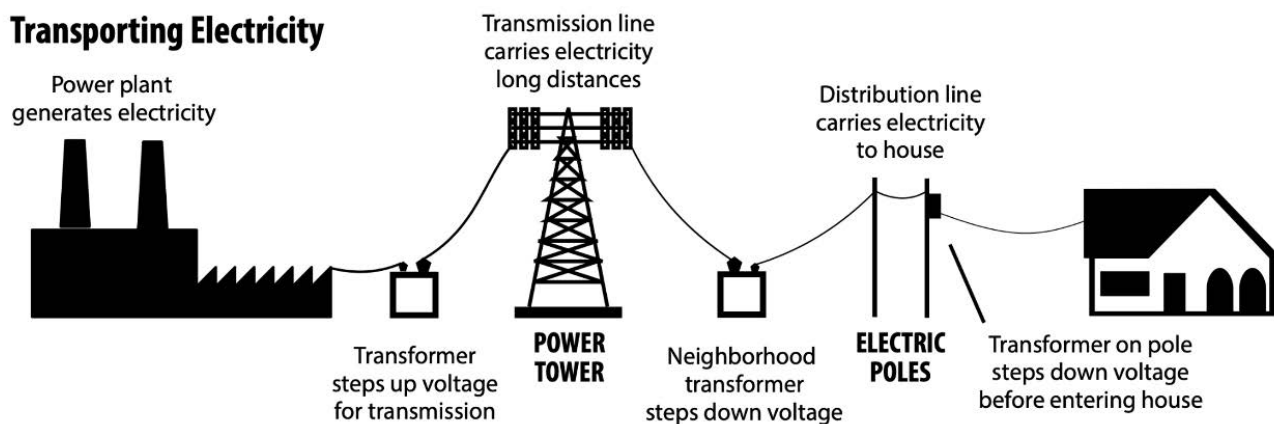


Image from NEED Project: [Elementary Energy Infobook- Electricity Travels Through Wires](#)

Power grids get electricity to where it is needed! They include power plants to transform heat, wind, solar, and nuclear energy into electricity. They also include transmission lines that carry lots of electricity at high voltage and distribution lines that carry smaller amounts of lower-voltage electricity to your home where it will be consumed. Electricity is the movement of charged particles called electrons in a circuit.

In this activity, you will build a circuit to model the power grid. Our model will include representations of transmission lines, distribution lines, and consumers. It also includes representations of three kinds of power plants that generate electricity from different kinds of energy: nuclear, solar, and wind energy. Solar and wind energy are renewable, but nuclear is nonrenewable.

## MATERIALS

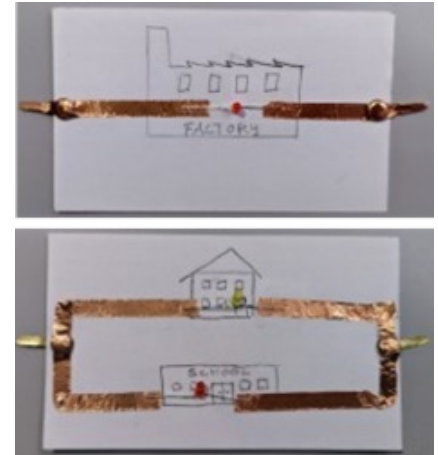
- 8 LEDs (red and yellow/green)
- 4 index cards, each with 1 hole punched on each side
- 8 brass brads
- Maker Tape (2-foot strip per student)
- Transparent tape
- Scissors
- 1 power source (battery, hand crank, or solar cell)

## PROJECT STEPS

### Create Distribution Areas

1. Take an index card. Mark the right side as negative (-) and the left side as positive (+).
2. Attach brads through each of the holes in the index card.
3. Split the legs of each brad so it lays flat.
4. Twist each brad so that one of its legs points away from the card. These legs will attach to the model transmission lines.
5. Between the two brads, draw the “buildings” you want to model, for example, a factory, store, school, or house.
6. Carefully lay down a strip of Maker Tape from the brad to your building on each side. Leave a space about an inch wide between the two strips of tape.
7. Spread the legs of an LED so you can lay it down across a house with a leg on each strip of Maker Tape.
8. Use transparent tape to secure the LED leg to the Maker Tape on each side.
9. Repeat steps #1-8 to make 3 distribution areas on 3 cards.

Finished distribution areas



### Create the Nuclear Power Plant (Nonrenewable Power Source)

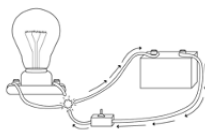
10. Repeat steps #1-4 to prepare an index card to model a nuclear power plant.
11. Draw a nuclear power plant on the card if you would like to.
12. Carefully lay down a strip of Maker Tape from the middle of the index card to the brad on the right.
13. Place a coin battery on top of the Maker Tape on the (-) side of the index card, just below the centerline. **Make sure the Maker Tape doesn't show on the left side of the battery or you will cause a short circuit!** See “Safety” note below.
14. Carefully lay down a second strip of Maker Tape from the top of the coin battery over to the brad.
15. Flip the coin battery over to make sure that the Maker Tape strips don't touch each other.

Finished nuclear power plant



### SAFETY

Coin cell batteries should not be stacked or stored in a way that they could accidentally pile onto each other. Piled coin cell batteries could cause a short circuit.



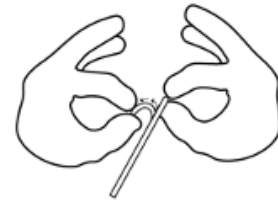
Short circuits are very dangerous. They happen when electricity flows without passing through a load such as an LED or fan. The battery can become very hot.

Coin cell batteries are amazing, but if eaten by humans or animals can become lethal. Never put any type of battery in your mouth.



## EXPERT TIPS FOR USING MAKER TAPE

- **How to peel the Maker Tape:**
  - Fold the maker tape in half the long way. The crease that you create down the middle will help it peel more easily.
- **Maker Tape can easily stick to itself.** Do not remove all the paper at once. Instead, slowly peel the paper backing while you are securing it to the project.



## OPTIONAL REFLECTION SECTION

### Be an advocate for clean energy!

Share what you know! Using this space, draw or write what you learned about the power grid and how offshore wind energy is going to help your community use more clean energy.