



# WATT'S MY LINE?

## PLANNING OVERVIEW

### SUBJECT AREAS:

Physics, Chemistry, Language Arts

### TIMING:

Preparation: 30 minutes

Activity: 4-5 45-minute class periods

### Summary

Students demonstrate their understanding of how we use energy resources to produce electricity by giving presentations and participating in a unique game of cooperative charades.

### Objectives

Students will:

- Identify major energy resources
- Demonstrate how electricity-generating technologies work
- Compare the advantages and disadvantages of various energy resources

### Materials

Nine sets of copies of Chapter 2 and Chapter 3 Discussions (including the introductory pages and all of the resource sections of Chapter 3)

Student Handout: "Electric Power Technologies," one for each student, plus one for teacher to cut up prior to playing the charades game

Hat or other container in which to place the slips of paper naming the power technologies

Presentation materials: These will vary, but may include poster board, markers; video equipment, overhead projector and transparencies; computer presentation software such as PowerPoint® (often bundled with Microsoft Office®), Kid Pix®, Hyper Studio®, or Inspiration®.

Optional: Materials for making props such as paper cups, plates, plastic utensils, string, paper, tape, markers, yard sticks, paper clips, small Slinkies®, springs, used paper towel tubes, and so on.

Optional: Other reference materials on energy resources and their uses; Internet access

### Making the Link

Many of us don't think much about where our electricity comes from or how much of it we consume (that is, until there's a power outage!). It would be ideal if teachers could take their classes to visit power plants to see how electrical technologies work and to learn firsthand what resources they use for energy. Because such opportunities aren't typically available, this activity brings electrical technologies to "life" right in the classroom.

Many different energy resources and the electrical generation technologies that use them have been discussed in the previous sections. In studying these in more depth, students may come to recognize the value of using more than one energy resource for electricity, as well as the advantages of using more renewable energy resources.

### The Activity

#### PART ONE

1. Before beginning this activity, divide your students into nine study groups. If you have not yet given students copies of the Chapter 2 and Chapter 3 Discussion sections (including the introductory pages and all the resource sections), do so — one set to each group.



2. Tell students that each group will prepare and give a presentation on one of the energy resources and how it is used to generate electricity. Explain that following the presentations the class will be playing a game of cooperative charades pantomiming a technology that makes use of one of these resources.
3. Review the Sidebar from Chapter 2 Discussion, "What is Energy?" and the section "Understanding Electrical Terms." Emphasize that energy can change, or convert, from one kind to another. In the second part of the activity, students will be showing how energy changes from one type to another (such as from mechanical energy to electrical energy. Discuss that the term "watt," is a measurement of power, specifically the rate of heat flow or of the flow of electricity. It is named after James Watt, an inventor whose experiments resulted in significant improvements to the power of steam engines during the Industrial Revolution.

4. Assign an energy resource to each group. Explain that groups will be studying the information about their resources and then preparing a presentation to give to the rest of the class. Show them the materials that you wish them to use for preparing these presentations. If you have extra references (including Internet access), then point these out as well. Remind students that their presentations need to be very clear, so that the class will be adequately prepared to later play the game of charades.
5. Set a deadline and let groups go to work.
6. When the deadline arrives, have groups give their presentations to the rest of the class. Allow for a question and answer period following each presentation, if time allows.

#### PART TWO

1. Next, prepare to play the game "Watt's My Line?". Cut up one copy of the handout, "Electric Power Technologies" so that you have one type of system on its own slip of paper. Place all of these slips into a hat or other container.
2. Ask your class if anyone has ever played Charades, Pictionary, or Cranium. Ask for examples of how they had to pantomime something for the other players. Next, explain to your class that they will be playing a pantomime energy game, "Watt's My Line?". Students will be trying to guess what "line" of electrical work is being depicted.
3. Explain that if they get a technology for which there are several different types of systems (such as for Solar Thermal, where there are Solar Dish-Engines, Parabolic Troughs, and Central Towers) they get to decide which one specifically they wish to depict.

4. To show their technology, each group needs to use pantomime. All members of a group must participate in their group's role-play. Group members may speak, make sound effects, and use props, but may not use words that reveal the electrical technology being depicted. Show students the materials you have available for props.

You may wish to give an illustration before students begin preparing their pantomime. For example, to depict a storage hydropower plant, one student might be the water, another the dam and the penstock (channel through which the water falls), another the turbine, another the generator, and still another the tailrace through which the water spills out to the river below the dam. Sound effects (gurgling, whooshing, humming, etc.) and props will enhance the pantomime and add to the fun.

5. Place your class back into their study groups. Now have each group draw a slip from the hat. Remind groups not to reveal what their technology is. Tell them that they may use the Discussion sections and any other reference materials provided to them, as well as what they learned from the student presentations, to figure out how to portray their energy technology in an interactive group charade.

Some students may have to take on more than one role in the pantomime if the groups are small. You may also wish to arrange for groups to work outside or far enough away from each other (or as homework) so that their work remains a "secret."

6. Set a time limit and let groups go to work. When the time limit is up, have groups act out their "power pantomime." You may wish to have students put away their reference materials, but allow them to keep a copy of the handout, "Electric Power Technologies," to help guess what is being depicted. Before the class begins, decide how the viewers will guess (raising hands, calling out, etc.). Then proceed to play "Watt's My Line?"

### Wrap-up

Lead a class discussion comparing the different energy resources and their technologies. Explore the benefits and disadvantages of each resource, referring to the Consideration sections for each resource, if you'd like.

### Assessment

Students will have had the opportunity to:

- Work cooperatively in research groups to produce energy resource presentations.
- Portray and guess the various types of electricity-producing technologies in a game of cooperative charades.
- Compare and contrast the different energy resources and their technologies and discuss their use in a responsible energy plan.





# ELECTRIC POWER TECHNOLOGIES

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Biomass Power Plant

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Geothermal Flash Steam Power Plant

Geothermal Dry Steam Power Plant

Geothermal Binary Power Plant

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Hydropower: Run-of-River System

Hydropower: Storage (Impoundment) System

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Ocean: Marine Current System

Ocean: Wave Energy System

Ocean Thermal Energy Conversion (OTEC)

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Solar: Photovoltaic (PV) System

Solar Thermal: Concentrating Solar Power System (CSP)

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Wind: Stand-alone Turbine

Wind Farm

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Hydrogen Fuel Cell

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Fossil Fuel Power Plant

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Nuclear Fission Power Plant

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