We've Got the Power Lesson Plan

LENGTH OF LESSON:
Two class periods

GRADE LEVEL:
Middle/High School

SUBJECT AREA:
Physical Science/ Power Production

OBJECTIVES:
Students will understand the following:

1. Power can be generated in a variety of ways.
2. Each method has its economic, environmental, and physical advantages and disadvantages.
3. Different methods of power production are supported by different groups of people.

MATERIALS:
For this lesson, you will need:

- Research materials on power production
- Computer with Internet access

PROCEDURE:

1. Ask your students to imagine that their classroom is a new community being established in an undeveloped, relatively wild part of the country. Discuss with the class some of the ways their new community might generate power: coal, oil, gas, hydroelectric power, geothermal power, nuclear power, solar power, wind.

2. Continue the discussion by having students cite some of the economic, environmental, and physical advantages and disadvantages of some of the power-production methods just mentioned.

3. Divide your class into small groups, and assign each group to research one of the power-production methods discussed, with the goal of discovering its economic, environmental, and physical advantages and disadvantages.

4. After the research is complete, have each team present an argument for its method of power production. Team members should represent the interests of business owners, families, environmentalists, and power company employees when presenting their arguments. They should also be prepared to discuss the safety concerns of each form of power production and the efficiency of the energy produced.

5. When all presentations have been made, allow time for discussion of the various merits and flaws of the arguments.

6. Ask the class to vote on which source of power they will use.

ADAPTATIONS:

Adaptations for Older Students:
Have students write paragraphs explaining how the power production methods they have studied actually work.

DISCUSSION QUESTIONS:

1. Describe the various processes involved in using turbine generators to create power.

2. Brainstorm a list of examples of machines that use turbine generators to create power, then compare the energy efficiency of these machines and discuss how they might work more efficiently to prevent heat loss.

3. Where is the closest power station to your school, and how does it make electricity? Debate whether your community should be doing anything differently to generate power.

4. Imagine conducting an "energy audit" of your home and school. Develop a list of ways that you might be able to save power in both locations.

EVALUATION:

You can evaluate your students on their presentations using the following three-point rubric:

- **Three points:** arguments cover economic, environmental, and physical advantages and disadvantages of the power-production method; arguments represent the interests of business owners, families, environmentalists, and power company employees; arguments cover safety concerns of and evaluate efficiency of the energy produced; arguments are logical and well organized.

- **Two points:** only some of the advantages and disadvantages of the power-production method are covered; arguments fail to represent one or more of the groups indicated by the assignment; arguments fail to cover safety concerns or efficiency; arguments are logical and well organized.

- **One point:** few of the advantages and disadvantages of the power-production method are covered; arguments fail to represent most of the groups indicated by the assignment; arguments fail to cover safety concerns and efficiency; arguments poorly organized.

EXTENSION:

Do-It-Yourself Electromagnet
A single wire does not produce a strong magnetic field, but a coiled wire around an iron core does. An electric generator uses just such magnetic forces to make electricity—a process that students can demonstrate easily in the lab. Divide your class into groups, and provide each group with the following equipment: a battery, a length of wire, a compass, and a few nails and paper clips. Students should first attach one end of their wire to the end of a battery holder. Next, ask them to carefully attach the other end of the wire to the other end of the battery, and then observe the strength of the magnetic field generated by observing whether the compass still points to true north when held next to the wire or whether the wire exerts any magnetic force on a paper clip. Next, ask students to bend their wire into a series of coils before attaching it (both ends) to the battery, and then to repeat their observations of the wire's magnetic field. Has it grown stronger? They might want to vary the number and size of the coils in their wire, repeating their observations each time. (Smaller coils will produce a stronger field, as will greater numbers of coils.) Finally, ask them to coil their wire around an iron nail before they attach it to the battery, and then to make their observations again. (They will find that the iron nail further increases the strength of the magnetic field.) When all of their experiments are complete, ask them to explain their findings in writing, and then to speculate about how such electromagnets might be used on a larger scale.