

Water Power

Adapted from “Water Power” by TeachEngineering.org and “Water Wheels and Hydropower” by zSpace.com

Grade Level: 6th grade

Time Required: 45-60 minutes

TN Science Standard: 6.ESS3: Earth and Human Activity

- 1) Differentiate between renewable and nonrenewable resources by asking questions about their availability and sustainability.
- 2) Investigate and compare existing and developing technologies that utilize renewable and alternative energy resources.
- 3) Assess the impacts of human activities on the biosphere including conservation, habitat management, species endangerment, and extinction.

Summary

Students will observe a model waterwheel to investigate the transformations of energy involved tuning the blades of a hydro-turbine. They work as engineers to create model waterwheels while considering resources such as time and materials, in their design.

Objectives

Students will be able to

- Identify dams as a source of hydropower.
- Explain the advantages and disadvantages of human-made dams.
- Explain how engineers design and redesign hydropower technologies.

Materials

- Water or soda bottle with holes drilled in the cap and the bottom of the bottle to fit wooden dowel, 1 per group
- Duct tape
- Wooden dowel
- String
- Fin materials (cardboard, index cards, straws, toothpicks, popsicle sticks, spoons)
- Plastic wrap
- X-Acto Knife (**teacher use only**)
- Scissors
- Water

- Stopwatch

Putting together your model ([watch video here](#)).

Procedure

1. Follow along with the provided PowerPoint.
2. Slide 2: Answers may include water wheels, turbines, generators, etc.
3. Slide 4: Water is a renewable resource
4. Slide 5: There are 4 main types of water wheels. The most efficient is the Pitch Back Wheel. Ask the students why they think the Pitch Back Wheel is the most effective, based on the diagram.
"Pitch Back Wheels use the energy of the water twice, once from above and once from below to rotate the wheel around its central axis."
5. Slide 6: Tell the students *"Dams, or hydropower plants, use the same action of falling water to generate electricity. When water moves through the turbine, it turns a generator, which converts the energy from the moving water to useable electrical energy."*
6. Slide 7: Discuss the Norris Lake Dam and that it provides electricity to local communities in east Tennessee.
7. Slide 8: Answers may include less burning of fossil fuels, provides recreation areas, help prevent flooding, can't run out of the source, etc.
8. Slide 9: optional video to show, run time 1:15.
9. Now it's time to put your model together! Please watch [this video](#), or follow along below (run time 1:36).
 - Watch the video first so the students have an idea of what they're doing, or show them a sample of your own creation!
 - Have students create their own fins (**5 if you follow the video, may do more if you'd like!**) using the materials provided (cardboard, index cards, straws, toothpicks, popsicle sticks, spoons).
 - Stick the dowel through the holes in the water bottle.
 - Test out your models! Attach the student fins through slots or using the provided duct tape. You may want to do this outside, so you won't get wet! The video suggests using a scale to provide a counterbalance. This is optional!
10. Slide 11: Ask students how they could have improved their model.
11. Slide 12 and 13: Discuss the important work that HPUD and other local utility districts do to keep our water clean!