

Exploring Hydropower

Overview: The students will investigate the hydropower by finding the potential energy for hydropower at a creek flowing into a reservoir.

Keywords: Hydropower, gravitational energy, electrical energy

Age / Grade Range: 10-12

Background: Hydropower plants usually involve a dam across a river to hold back water in reservoirs. This stored water is released to flow through turbines, spinning generators to produce electricity.

There are different types of dams: a gravity dam (built of concrete), an embankment dam (made of compacted rock or earth), an arch dam (built in a narrow canyon- Glen Canyon Dam), and a buttress dam (a narrow wall supported by buttresses on the downstream side) (The NEED Project, 2012).

There are three main parts of a typical hydropower plant: the reservoir, dam, and power plant (turbines and generators). The reservoir stores the water until it is needed. The dam contains the water; there are openings in the dam to control its flow. The power plant converts the energy of the moving water into electricity (The NEED Project, 2012).

Hydroelectricity is at the core of power in Idaho. According to Idaho Power (2013), which operates 17 hydropower plants throughout the state, hydroelectricity is the company's largest source of electricity. With that being the case, water is an extremely important energy resource for the state of Idaho.

Next Generation Science Standards & Common Core:

Core Idea PS3: Energy

- PS3.A: Definitions of Energy

Core Idea ESS2: Earth's Systems

- ESS2.C: The Roles of Water in Earth's Surface Processes
- ESS2.D: Weather and Climate

Core Idea ESS3: Earth and Human Activity

- ESS3.C: Human Impacts on Earth Systems
- ESS3.D: Global Climate Change

Core Idea ETS2: Links Among Engineering, Technology, Science, and Society

- ETS2.A: Interdependence of Science, Engineering, and Technology
- ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World

Goals: Students will visit a dam and reservoir used for irrigation, and learn about the basic aspects and functions of a dam. Students will measure the potential

hydropower in Idaho. Students must think critically in order to defend their given perspective and give legitimate reasons to support their claims. Each group will generate good notes and plan who will say what during the debate.

- Students will come back together and the instructor will ask questions to each group such as: Why do you think hydropower is good or bad for Idaho? What impact does hydropower have on ecosystems? Should we build more dams in Idaho, why or why not? Will climate change negatively or positively affect hydropower use for energy? Explain.
- Emphasis will be put on answering questions with respect and constructive feedback.

After each student has had a chance to speak for their team, each group will write a closing statement concerning the most significant point that was made during their debate. A representative from each group will read the statement and the debate will conclude.

Additional resources:

Virtual Hydropower Prospector is a GIS tool designed to assist in locating and assessing natural stream water energy resources in the United States.

<http://gis-ext.inl.gov/vhp/Default.aspx>

Energy for Educators is an online source for lesson plans on renewable energy offered by the Idaho National Laboratory. Lesson plans exist for elementary, intermediate, and high school levels on topics of wind, solar, geothermal, nuclear, hydro, biomass and energy.

<http://www.energyforeducators.org/index.shtml>

The Nation Energy Education Development (NEED) Project is designed to offer teachers hundreds of resources to educate students on renewable energy sources. The NEED Project offers curricular guides for K-12 teachers. Lessons include both a teacher and a student handbook. Students may find games, puzzles, activities, and science fair projects.

<http://www.need.org/>

<http://www.need.org/needpdf/Exploring%20Hydroelectricity%20Teacher.pdf>

Energy Education Resources: Kindergarten Through 12th Grade is published by the National Energy Information Center (NEIC), a service of the Energy Information Administration (EIA), to provide students, educators, and other information users a list of generally available free or low-cost energy-related educational materials.

<http://www.eia.doe.gov/bookshelf/eer/kiddietoc.html>

Literature Cited:

Idaho Power Company (2013).

<http://www.idahopower.com/AboutUs/EnergySources/FuelMix/generationResources.cfm>

The NEED Project (2012). Exploring hydroelectricity.
<http://www.need.org/Curriculum-Guides-by-Grade-Level>