

Place-Based Project Ideas: Energy

Place-based education involves students in local culture, ecology, landscapes, opportunities, and experiences so that they can connect the science concepts they are learning to something that they know already, and to something that matters to them. Research shows that place based education helps students learn, invites students to become active citizens, transforms school culture, and connects schools with the community*. These project ideas are included to get teachers and students thinking about ways to make science education relevant to the place in which they live. This is only a starting place; the list is certainly not exhaustive, and teachers are invited to continue adding, sharing, and building the list.

These ideas were developed with the Yukon Flats School District in mind. Other districts using the Yukon Flats curriculum resource should adapt the list of ideas to fit their own district and region.

*Place-based Education Evaluation Collaborative. 2010. The Benefits of Place-based Education: A Report from the Place-based Education Evaluation Collaborative (Second Edition). Retrieved 5/16/11 from <http://tinyurl.com/PEECBrochure>.

Project Idea: Staying Warm

What are some examples of questions students can investigate, and projects students can do, related to energy?

How is your house (or your school) insulated?

Test different materials to determine their "R Value", or to see which insulator works best.

How does thickness of an insulating material affect the amount of heat lost?

How does the shape of a house affect its ability to retain heat?

How does the number or type of windows affect a building's heat loss?

Build model houses and test their heat loss.

Compare the insulating values of traditional and modern materials and methods of home construction.

What clothing works best to keep you warm when wet?

What clothing works best to prevent wind chill?

How does snow act as an insulator?

Do different types of firewood produce different amounts of heat?

Compare weight, bulk, and insulating value of fur, down, and synthetic insulation in clothing.

Does the color of clothing affect its ability to keep you warm?

What is hypothermia and how can you prevent and treat it?

Investigate the effect of wearing a hat on your body temperature. Is it true that you lose more heat through your head than through other body parts?

What are different requirements for clothing in the Arctic? How did traditional clothing fulfill those requirements?

Possible Resources:

DOE, 2002a. "Insulation Fact Sheet," Department of Energy http://www.ornl.gov/sci/roofs+walls/insulation/ins_01.html.

DOE, 2002b. "Types of Insulation: Basic Forms," Department of Energy http://www.ornl.gov/sci/roofs+walls/insulation/ins_tab1.html.

Wikipedia contributors, 2006. "Thermal Insulation," Wikipedia, The Free Encyclopedia

http://en.wikipedia.org/w/index.php?title=Thermal_insulation.

Clothing and Insulation www.howeverythingworks.org/.../clothing_and_insulation.pdf

Cold Climate Housing Research Center <http://www.cchrc.org/>

Connections to other units and concepts: Life Science Year 1 Biodiversity (how do animals stay warm?) Physical Science Year 1 Properties of Matter

Project Idea: Using Energy

What are some examples of questions students can investigate, and projects students can do, related to the energy?

Investigate ways that energy is wasted in your school. Make a plan to conserve energy.

Construct a wind generator.

Investigate the use of solar power – how does it work? What are the requirements to make it cost-effective?

Build a greenhouse to utilize solar energy.

Compare modern energy uses and sources with traditional use of energy in your village or region. What types of energy were used for transportation, heating, and cooking, lighting, fish wheels, etc?

Demonstrate how hydropower can be used to lift a load.

What types of fuels are used in your village? Compare the costs and the carbon emissions from diesel, gas, and wood.

Can you generate energy from trash?

Possible Resources:

Alaska Center for Energy and Power Wind for Schools <http://www.uaf.edu/acep/alaska-wind-diesel-applic/wind-for-schools/>

Alaska Energy Efficiency K-5 Student page http://www.akenergyefficiency.org/students/k_to_5

Energy Resources for Rural Alaska <http://www.akenergyefficiency.org/interior>

US Department of Energy for Educators <http://www.energy.gov/foreducators.htm>

National Energy Education Development Project <http://www.need.org/>

Connections to other units and concepts: Year 2 Physical Science Forces and motion (wind and water power)

Project Idea: Energy, Electricity and Machines

What are some examples of questions students can investigate, and projects students can do, related to energy?

How is energy converted to work in snow machines, chainsaw engines, and outboard motors?

What does a spark plug do in an engine? Why are there differences in spark plugs?

How does a magneto generate an electric current?

What is the function of a carburetor and what are its parts? Take apart old carburetors.

How have outboard motors improved over time?

How does the clutch on a snow machine work?

Build electric motors from a kit or from scratch.

Possible Resources:

Village Science by Alan Dick <http://www.ankn.uaf.edu/publications/vs/>

4-H Small Engines Project <http://www.n4hccs.org/projects/smallengines/smenew.htm>

How Electric Motors Work <http://electronics.howstuffworks.com/motor.htm>

Instructions to make a motor <http://www.scitoys.com/scitoys/scitoys/electro/electro.html#motor>

Making a motor at home http://www.partsgeek.com/mmparts/understanding_motors.html

Connections to other units and concepts: Physical Science Year 2 Forces and Motion