Water and Energy was developed by The NEED Project with funding and technical support from the National Hydropower Association and the Hydro Research Foundation.
Your Body and Energy

Question: How does your body use energy?
# Potential or Kinetic?

**Directions:** Walk around your classroom and school. Look for things that have potential energy and kinetic energy. Draw a picture of the object in its potential energy state, and then in its kinetic energy state.

<table>
<thead>
<tr>
<th>POTENTIAL ENERGY</th>
<th>KINETIC ENERGY</th>
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Investigating Solids

**Question:** What happens when you hold a solid?
Investigating Solids

Question: What happens when you drop a solid?

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Investigating Solids

**Question:** What happens when you try to put two or more solids together?
Investigating Liquids

**Question:** What happens when you hold a liquid?
Investigating Liquids

Question: What happens when you drop a liquid?
Investigating Liquids

**Question:** What happens when you put two or more liquids together?
Investigating Gases

**Question:** What do you notice about air in a balloon that is not tied?

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Investigating Gases

**Question:** What do you notice about air in a balloon that is tied?
Investigating Gases

Question: How does a dropper work?
Observing Ice

**Question:** What will happen if the ice cube is left on the table?

**Prediction:** I predict __________________________

because ________________________________

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<th>Time: ____________</th>
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Ice Cube Investigation

Question: How can I melt the ice cube the fastest?

Prediction: I predict _____________________________
because  _______________________________________
_______________________________________________
_______________________________________________
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Plan: Draw a picture and/or use words to show how you will melt the ice cube.

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Observations: Record your observations below. Use pictures and labels.

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<th>Time: ___________</th>
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</tbody>
</table>
Conclusion: Use words to describe what happened and why you think the ice cube melted.
Water as a Gas

**Question:** How does water change from a liquid to a gas?

Draw a picture of the model system showing how water turns into water vapor. Use the words below to label what happens.

<table>
<thead>
<tr>
<th>Word Bank</th>
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</thead>
<tbody>
<tr>
<td>water</td>
</tr>
<tr>
<td>liquid</td>
</tr>
<tr>
<td>heat</td>
</tr>
<tr>
<td>evaporate</td>
</tr>
<tr>
<td>water vapor</td>
</tr>
<tr>
<td>gas</td>
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</tbody>
</table>
What Did You Notice?

**Question:** How does water change from a liquid to a gas?

Use words to describe how water turns into a gas. Use the words from the word bank in your explanation.

<table>
<thead>
<tr>
<th>Word Bank</th>
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</thead>
<tbody>
<tr>
<td>water</td>
</tr>
<tr>
<td>heat</td>
</tr>
<tr>
<td>water vapor</td>
</tr>
<tr>
<td>liquid</td>
</tr>
<tr>
<td>evaporate</td>
</tr>
<tr>
<td>gas</td>
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<tr>
<td>energy</td>
</tr>
</tbody>
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Water Wheel Investigation

Draw a diagram of your water wheel system. Make sure you label all of the parts. Below, use words to explain what is happening.
Directions: Label the parts of a hydropower plant in the boxes.
Final Reflection

What was the most important thing you learned about water?
What Are You Wondering About?

After learning something new, scientists often have even more questions. They will want to find the answers.

• What questions about water do you still have?
• How can you find the answers to your questions?
<p>| <strong>atmosphere</strong> | the layer of air that surrounds the Earth |
| <strong>blade</strong> | the part of a turbine that is pushed by the flowing water |
| <strong>cloud</strong> | a formation of water vapor in the atmosphere |
| <strong>condensation</strong> | changing a gas into a liquid |
| <strong>current</strong> | the flow of energy or flow of a substance—see ocean current |
| <strong>dam</strong> | a large wall built across a river to control the flow of water in the river |
| <strong>electricity</strong> | a form of energy; the flow of electrons |
| <strong>energy</strong> | the ability to do work; the power to make a change |
| <strong>evaporation</strong> | changing a liquid into a gas |
| <strong>flood</strong> | an event in which too much rain causes water to overflow river banks and move across nearby areas of land |
| <strong>gas</strong> | a substance without a definite shape or volume; a gas fills any container in which it is placed |
| <strong>gate</strong> | the part of a dam that opens and closes to control the flow of water |
| <strong>generator</strong> | a device that turns motion energy into electricity |
| <strong>gravity</strong> | the natural force of attraction between all objects in the universe; the force that pulls objects from higher places to lower places |
| <strong>heat</strong> | a form of energy; the amount of thermal energy in a substance |
| <strong>hydropower</strong> | the energy of moving water; using the energy of moving water to make electricity |
| <strong>ice</strong> | water in a solid state; water that has been cooled until it becomes a solid |
| <strong>irrigation</strong> | moving water from its natural course to water crops |
| <strong>kinetic energy</strong> | the energy of motion |</p>
<table>
<thead>
<tr>
<th><strong>Word</strong></th>
<th><strong>Definition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>lake</td>
<td>a body of water surrounded by land</td>
</tr>
<tr>
<td>light</td>
<td>a form of energy; radiant energy; energy that travels in rays</td>
</tr>
<tr>
<td>liquid</td>
<td>a substance with a definite volume, but not a definite shape; a liquid takes the shape of the container in which it is placed</td>
</tr>
<tr>
<td>melting</td>
<td>changing a solid into a liquid</td>
</tr>
<tr>
<td>motion</td>
<td>a form of energy; kinetic energy; movement</td>
</tr>
<tr>
<td>nonrenewable energy source</td>
<td>an energy source that is not replenished quickly and takes millions of years to form such as fossil fuels and uranium</td>
</tr>
<tr>
<td>ocean</td>
<td>a very large body of salty water</td>
</tr>
<tr>
<td>ocean current</td>
<td>the flow of water through the ocean, caused by different temperatures of the water in the ocean</td>
</tr>
<tr>
<td>penstock</td>
<td>a large pipe in a hydropower dam through which water flows to a turbine</td>
</tr>
<tr>
<td>pollution</td>
<td>when a substance causes harm to the environment</td>
</tr>
<tr>
<td>potential energy</td>
<td>energy stored in an object; energy that an object has because of its position</td>
</tr>
<tr>
<td>power lines</td>
<td>wires that carry electricity from one place to another</td>
</tr>
<tr>
<td>power plant</td>
<td>a facility where sources of energy are used to generate electricity by moving a turbine generator</td>
</tr>
<tr>
<td>precipitation</td>
<td>solid or liquid water falling from a cloud onto the Earth</td>
</tr>
<tr>
<td>renewable energy source</td>
<td>an energy source that is replenished in a short time such as water, wind, or solar energy</td>
</tr>
<tr>
<td>reservoir</td>
<td>a lake formed behind a dam</td>
</tr>
<tr>
<td>river</td>
<td>a large flowing body of fresh water that flows into another river or an ocean</td>
</tr>
<tr>
<td>solar energy</td>
<td>radiant energy from the sun</td>
</tr>
<tr>
<td>solid</td>
<td>an object or substance with a definite shape and size</td>
</tr>
<tr>
<td>steam</td>
<td>water as a gas; water vapor</td>
</tr>
<tr>
<td>stream</td>
<td>a creek; a small flow of water</td>
</tr>
<tr>
<td>sugar</td>
<td>an energy-rich substance made by plants</td>
</tr>
<tr>
<td>tide</td>
<td>a change in the water level of the ocean at the shore, caused by the gravitational pull of the moon</td>
</tr>
<tr>
<td><strong>turbine</strong></td>
<td>the part of a hydropower plant that captures the energy of flowing water and uses the energy to power a generator</td>
</tr>
<tr>
<td><strong>volume</strong></td>
<td>a measure of the space occupied by a liquid</td>
</tr>
<tr>
<td><strong>water</strong></td>
<td>the most abundant liquid on Earth; often referred to as H₂O</td>
</tr>
<tr>
<td><strong>water cycle</strong></td>
<td>the movement of water through the atmosphere and across the Earth</td>
</tr>
<tr>
<td><strong>water vapor</strong></td>
<td>water in a gaseous state; steam; water that has been heated until it becomes a gas</td>
</tr>
<tr>
<td><strong>water wheel</strong></td>
<td>a device to harness the energy of moving water to do work, such as grind grain</td>
</tr>
<tr>
<td><strong>wave</strong></td>
<td>the movement of water caused by the wind</td>
</tr>
<tr>
<td><strong>work</strong></td>
<td>using a force to move an object across a distance; anything that requires energy to make a change</td>
</tr>
</tbody>
</table>
Games, Puzzles, and Activities

Looking for some fun energy activities? There are plenty of fun games, puzzles, and activities available at www.NEED.org/games.

Wind

Wind is simply air in motion. It is caused by the uneven heating of the Earth’s surface by radiant energy from the sun. Since the Earth’s surface is made of very different types of land and water, it absorbs the sun’s energy at different rates. The heavier, denser, cool air over the water flows in to take its place, creating wind.

In the same way, the atmospheric winds that circle the Earth are created because the land near the Equator is heated more by the sun than land near the North and South Poles.

Biomass

Biomass is any organic matter that can be used as an energy source. Wood, crops, and yard and animal waste are examples of biomass. People have used biomass longer than any other energy source.

For thousands of years, people have burned wood to heat their homes and cook their food.

Propane is used at home

Propane is a mixture of hydrocarbons that is not a natural part of the Earth’s surface. It is a gas that is used in many ways, including cooking and heating. Many homes have propane stoves, furnaces, or generators. Some homes have appliances that use propane.

Looking for some fun energy activities? There are plenty of fun games, puzzles, and activities available at www.NEED.org/games.
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National Ocean Industries Association
National Renewable Energy Laboratory
NC Green Power
New Mexico Oil Corporation
New Mexico Landman’s Association
NextEra Energy Resources
NEXTracker
Nicol Gas
Nisource Charitable Foundation
Noble Energy
Nolin Rural Electric Cooperative
Northern Rivers Family Services
North Carolina Department of Environmental Quality
North Shore Gas
Offshore Technology Conference
Ohio Energy Project
Opterra Energy
Pacific Gas and Electric Company
PECO
Pecos Valley Energy Committee
Peoples Gas
Pepco
Performance Services, Inc.
Petroleum Equipment and Services Association
Phillips 66
PNM
PowerSouth Energy Cooperative
Providence Public Schools
Quarto Publishing Group
Read & Stevens, Inc.
Renewable Energy Alaska Project
Rhode Island Office of Energy Resources
Robert Armstrong
Roswell Geological Society
Salt River Project
Salt River Rural Electric Cooperative
Saudi Aramco
Schlumberger
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University of North Carolina
University of Tennessee
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U.S. Department of Energy–Wind for Schools
U.S. Energy Information Administration
United States Virgin Islands Energy Office
Wayne County Sustainable Energy
Western Massachusetts Electric Company
Yates Petroleum Corporation