

Science
Unit 3: Energy

Essential Understandings	<ul style="list-style-type: none"> ▪ Energy exists in several different forms. ▪ Energy does not decrease or increase, it changes into different forms. ▪ Energy comes from many sources, both renewable and non-renewable, which are used to supply power.
Essential Questions	<ul style="list-style-type: none"> ▪ In what forms does energy exist? ▪ How does energy change from one form to another? ▪ What is energy efficiency? ▪ What is the difference between renewable and non-renewable resources? ▪ How are alternate energy sources used to supply power?
Essential Knowledge	<ul style="list-style-type: none"> ▪ There are two main types of mechanical energy: potential and kinetic. ▪ Energy exists in several forms (i.e. heat, chemical). ▪ Energy is conserved – it changes but is neither created nor destroyed. ▪ Energy conversions are less than 100% efficient for purposes of energy transfer and power generation. ▪ Non-renewable energy comes from sources that cannot be replaced in a short period of time. ▪ Renewable energy comes from sources that are inexhaustible or can be replenished in a short period of time. ▪ Alternate energy sources are used to generate power for vehicles, homes, and businesses in order to reduce the depletion of non-renewable resources and to reduce pollution.
Vocabulary	<ul style="list-style-type: none"> ▪ <u>Terms:</u> <ul style="list-style-type: none"> ○ potential, kinetic, forms of energy, conversion, efficiency, motion, renewable, non-renewable, power generation, alternate energy.
Essential Skills	<ul style="list-style-type: none"> ▪ Describe energy forms. ▪ Demonstrate transfer between kinetic and potential energy. ▪ Explain how energy is converted from one form to another. ▪ Differentiate between renewable and non-renewable energy sources. ▪ Describe a process of power generation. ▪ Explain the uses of alternate energy sources.

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<p>Related Maine Learning Results</p>	<p><u>Science</u></p> <p>A. Unifying Themes</p> <p>A1. Systems</p> <p>Students describe and apply principles of systems in man-made things, natural things, and processes.</p> <p>b. Explain how the output of one part of a system, including waste products from manufacturing or organisms, can become the input of another part of a system.</p> <p>C. The Scientific and Technological Enterprise</p> <p>C1. Understandings of Inquiry</p> <p>Students describe how scientists use varied and systematic approaches to investigations that may lead to further investigations.</p> <p>c. Describe how scientists' analysis of findings can lead to new investigations.</p> <p>C2. Understandings About Science and Technology</p> <p>Students understand and compare the similarities and differences between scientific inquiry and technological design.</p> <p>a. Compare the process of scientific inquiry to the process of technological design.</p> <p>b. Explain how constraints and consequences impact scientific inquiry and technological design.</p> <p>C3. Science, Technology, and Society</p> <p>Students identify and describe the role of science and technology in addressing personal and societal changes.</p> <p>a. Describe how science and technology can help address societal challenges including population, natural hazards, sustainability, personal health and safety, and environmental quality.</p> <p>b. Identify personal choices that can either positively or negatively impact society including population, ecosystem sustainability, personal health, and environmental quality.</p> <p>c. Identify factors that influence the development and use of science and technology.</p>
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<p>Related Maine Learning Results</p>	<p>C4. History and Nature of Science Students describe historical example that illustrate how science advances knowledge through the scientists involved and through the ways scientists think about their work and the work of others.</p> <ul style="list-style-type: none"> a. Describe how women and men of various backgrounds, working in teams or alone and communicating about their ideas extensively with others, engage in science, engineering, and related fields. c. Describe and provide examples that illustrate that science is a human endeavor that generates explanations based on verifiable evidence that are subject to change when new evidence does not match existing experiences. <p>D. The Physical Setting</p> <p>D2. Earth Students describe the various cycles, physical and biological forces and processes, positions in space, energy transformations, and human actions that affect the short-term and long-term changes to the Earth.</p> <ul style="list-style-type: none"> d. Describe significant Earth resources and how their limited supply affects how they are used. <p>D3. Matter and Energy Students describe physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter.</p> <ul style="list-style-type: none"> f. Explain and apply the understanding that substances have characteristic properties including density, boiling point, and solubility and these properties are not dependent on the amount of matter present. g. Use the idea of atoms to explain the conservation of matter. h. Describe several different types of energy forms including heat energy, chemical energy, and mechanical energy. i. Use examples of energy transformations from one form to another to explain that energy cannot be created or destroyed. k. Describe the properties of solar radiation and its interaction with objects on Earth. <p>E. The Living Environment</p> <p>E2. Ecosystems Students examine how the characteristics of the physical, non-living (abiotic) environment, the types and behaviors of living (biotic) organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part.</p> <ul style="list-style-type: none"> d. Describe how matter and energy change from one form to another in living things and in the physical environment.
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Sample Lessons And Activities	<ul style="list-style-type: none"> ▪ Investigate potential and kinetic energy transfers. ▪ Explore interactive energy websites. ▪ Research and present information about an alternate energy source and participate in the Alternate Energy Fair.
Sample Classroom Assessment Methods	<ul style="list-style-type: none"> ▪ Research and present alternate energy source.
Sample Resources	<ul style="list-style-type: none"> ▪ <u>Publications:</u> <ul style="list-style-type: none"> ○ A large variety of materials from the BJHS library (both video and text). ○ http://www.nrel.gov/wind/ ○ http://www.capewind.org/ ○ http://www.eia.doe.gov/kids/index.cfm ○ http://www.nrel.gov/solar/ ○ http://www.energyquest.ca.gov/story/index.html ○ http://www.darvill.clara.net/altenerg/tidal.htm ○ http://science.howstuffworks.com/nuclear-power.htm ○ http://auto.howstuffworks.com/fuel-efficiency/alternative-fuels/fuel-cell.htm ○ http://science.howstuffworks.com/environmental/energy/hydropower-plant.htm ○ http://www.hybridcars.com/news.html ○ http://www.buildinggreen.com/ ▪ <u>Videos:</u> <ul style="list-style-type: none"> ○ Various videos from BJHS library on all alternate energy sources