

**Eighth Grade Curriculum**  
**Unit 3: Stability and Change on Earth**  
**Number of Days: 40**

Unit Focus	Essential Questions	Next Generation Standards	Disciplinary Core Ideas (DCI)
<p>Students construct an understanding of the ways that human activities affect Earth's systems. Students use practices to understand the significant and complex issues surrounding human uses of land, energy, mineral, and water resources and the resulting impacts on the development of these resources. Students also understand that the distribution of these resources is uneven due to past and current geosciences processes or removal by humans. Students will also analyze and interpret data and design solutions to build on their understanding of the ways that human activities affect Earth's systems. Students initially define a problem by precisely specifying criteria and constraints for solutions as well as potential impacts on society and the natural environment; systematically evaluate alternative solutions; analyze data from tests of different solutions; combining the best ideas into an improved solution; and develop and iteratively test and improve their model to reach an optimal solution. Students are also expected to articulate their position of a modern day issue that requires understanding of core ideas via argumentative essay writing.</p>	<ul style="list-style-type: none"> <li>• <i>Why aren't minerals and groundwater distributed evenly across the world?</i></li> <li>• <i>How can we predict and prepare for natural disasters?</i></li> <li>• <i>How might we treat resources if we thought about the Earth as a spaceship on an extended survey of the solar system? (How would astronauts manage their resources?)</i></li> <li>• <i>How can basic chemistry be used to explain the mechanisms that control the global temperature in the atmosphere?</i></li> <li>• <i>How do we monitor the health of the environment (our life support system)?</i></li> </ul>	<p>MS-ESS3-1</p> <p>MS-ESS3-2</p> <p>MS-ESS3-3</p> <p>MS-ESS3-4</p> <p>MS-ESS3-5</p> <p>MS-ETS1-1</p> <p>MS-ETS1-2</p> <p>MS-ETS1-3</p>	<ul style="list-style-type: none"> <li>• <u>ESS3.A: Natural Resources</u></li> <li>• <u>ESS3.B: Natural Hazards</u></li> <li>• <u>ESS3.C: Human Impacts on Earth Systems</u></li> <li>• <u>ESS3.D: Global Climate Change</u></li> <li>• <u>ETS1.A: Defining and Delimiting Engineering Problems</u></li> </ul>
	<p><b>Links to Unit 3</b></p>		

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	<p><a href="https://njctl.org/courses/science/7th-grade-science/natural-resources-and-human-impact/">https://njctl.org/courses/science/7th-grade-science/natural-resources-and-human-impact/</a></p> <p>*All teachers must register at <a href="https://njctl.org">https://njctl.org</a></p>		
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NGSS Framework		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b><u>Constructing Explanations and Designing Solutions</u></b></p> <ul style="list-style-type: none"> <li>Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS3-1)</li> </ul> <p><b><u>Engaging in Argument from Evidence</u></b></p> <ul style="list-style-type: none"> <li>Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-ESS3-4)</li> </ul>	<p><b><u>ESS3.A: Natural Resources</u></b></p> <ul style="list-style-type: none"> <li>Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)</li> </ul> <p><b><u>ESS3.B: Natural Hazards</u></b></p> <ul style="list-style-type: none"> <li>Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)</li> </ul> <p><b><u>ESS3.C: Human Impacts on Earth Systems</u></b></p> <ul style="list-style-type: none"> <li>Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-4)</li> </ul> <p><b><u>ESS3.D: Global Climate Change</u></b></p> <ul style="list-style-type: none"> <li>Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)</li> </ul>	<p><b><u>Patterns</u></b></p> <ul style="list-style-type: none"> <li>Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)</li> </ul> <p><b><u>Cause and Effect</u></b></p> <ul style="list-style-type: none"> <li>Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1),(MS-ESS3-4)</li> </ul> <p><b><u>Stability and Change</u></b></p> <ul style="list-style-type: none"> <li>Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p><b><u>Influence of Science, Engineering, and Technology on Society and the Natural World</u></b></p> <ul style="list-style-type: none"> <li>All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-1),(MS-ESS3-4)</li> <li>The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-ESS3-2)</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p>

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	<p><b><u>ETS1.A: Defining and Delimiting Engineering Problems</u></b></p> <ul style="list-style-type: none"><li>• The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)</li></ul>	<p><b><u>Science Addresses Questions About the Natural and Material World</u></b></p> <ul style="list-style-type: none"><li>• Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-ESS3-4)</li></ul>
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### Unit 3A: Biogeochemical Processes

Standard(s):

- **MS-ESS3-1: EARTH and HUMAN ACTIVITY** -Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.
- **MS-ESS3-5: EARTH and HUMAN ACTIVITY**-Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Student Outcomes	Inquiry Based Learning Activities	Materials/Resources
<p><b>Students will know that:</b></p> <ul style="list-style-type: none"> <li>• Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. Natural hazards can be the result of interior processes, surface processes, or severe weather events.</li> <li>• Some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable.</li> <li>• Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces, can help forecast the locations and likelihoods of future events.</li> </ul> <p><b>Students will be able to:</b></p>	<p><b>STEM activity*-Apply Earthquake LAB-nicerc.org</b>  <a href="http://nicerc.org/product/8th-grade-apply-earthquakes-kit/">http://nicerc.org/product/8th-grade-apply-earthquakes-kit/</a></p> <p><b>STEM activity*-Water Crisis Activity-Web based interactive</b></p> <ul style="list-style-type: none"> <li>• <b>Temperature and Circulation Demonstration</b>  <a href="http://TemperatureandCirculationDemo-njctl.org">Temperature and Circulation Demo-njctl.org</a></li> </ul> <p><a href="http://Webbaseactivityinstructions-njctl.org">Web base activity instructions-njctl.org</a></p> <ul style="list-style-type: none"> <li>• <b>Ocean Circulation Simulation</b>  <a href="http://OceanSimulationlabquestions&amp;writeup-njctl.org">Ocean Simulation lab questions &amp; write up-njctl.org</a></li> <li>• <b>Reasons for Seasons-Nearpod interactive</b>  <a href="http://Reasonsforseasonsinteractivewebinar-nearpod.com">Reasons for seasons interactive webinar-nearpod.com</a></li> </ul>	<p><b>STEM activity-Apply Earthquake LAB</b></p> <ul style="list-style-type: none"> <li>• modeling clay</li> <li>• fishing line</li> <li>• balsa wood</li> <li>• straws</li> <li>• craft sticks</li> <li>• paper clips</li> <li>• cotton balls</li> <li>• poster board</li> <li>• dowel rods</li> <li>• wrapping paper</li> <li>• cardboard box</li> <li>• screw eye hooks</li> <li>• nylon string</li> <li>• marbles</li> </ul> <p><b>STEM activity</b></p> <ul style="list-style-type: none"> <li>• <b>Water crisis web instructions-njctl.org</b></li> </ul> <p><b>Temperature and Circulation Demonstration:</b></p> <ul style="list-style-type: none"> <li>• Clear, glass cake pan</li> <li>• Water</li> <li>• Red and blue food coloring</li> <li>• Ice</li> <li>• Sterno cooking fuel (tea lights, if this is inaccessible)</li> </ul>

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<ul style="list-style-type: none"> <li>• <b>Construct</b> a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.</li> </ul>		<ul style="list-style-type: none"> <li>• Matches</li> <li>• Gallon plastic bag</li> <li>• 4 Styrofoam cups</li> </ul> <p><b><u>Ocean Circulation Simulation</u></b>  <b>Materials (per group):</b></p> <ul style="list-style-type: none"> <li>• A large, plastic plant saucer (without ridges)</li> <li>• 3 Styrofoam cups</li> <li>• Ice water</li> <li>• Hot water</li> <li>• Red and blue food coloring</li> </ul>
		<p><i>Resources:</i>  <a href="http://www.Njctl.org">www.Njctl.org</a>  <a href="http://www.niecerc.org">www.niecerc.org</a>  <a href="http://www.Edpuzzle.com">www.Edpuzzle.com</a></p> <p><b>Additional Technology Resources:</b></p> <ul style="list-style-type: none"> <li>• <i>Explore Learning</i></li> <li>• <i>Nearpod.com</i></li> <li>• <i>Edpuzzle.com</i></li> <li>• <i>Brainrush.com</i></li> <li>• <i>YouTube</i></li> <li>• <i>Phet</i></li> <li>• <i>Teacher Tube</i></li> </ul>
<p><b>Differentiated Instruction:</b></p> <ul style="list-style-type: none"> <li>• Structure lessons around questions that are authentic, relate to students’ interests, social/family background and knowledge of their community.</li> <li>• Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).</li> </ul>	<p><b>ELL Modifications:</b></p>	

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- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principals ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA))

### Assessments:

- **Water Crisis STEM inquiry**
- DOQ-Edconnect

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### Unit 3B: Human Impact & Alternative Energy Solutions

Standard(s):

- **MS-ESS3-4:EARTH and HUMAN ACTIVITY** -Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Student Outcomes	Inquiry Based Learning Activities	Materials/Resources
<p>Students will know that</p> <ul style="list-style-type: none"> <li>• All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.</li> <li>• Increases in human population and per-capita consumption of natural resources impact Earth's systems.</li> <li>• Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.</li> <li>• Cause and effect relationships may be used to predict how increases in human population and per-capita consumption of natural resources impact Earth's systems.</li> <li>• The consequences of increases in human populations and consumption of natural resources are described by science.</li> <li>• Science does not make the decisions for the actions society takes.</li> <li>• Scientific knowledge can describe the consequences of human population and per-capita consumption of natural resources impact</li> </ul>	<p><b>STEM activity*-Alternative Energy for Homes</b>  <a href="#">STEM activity*-Heated and Temperature Regulated Units-Apply Alternative Energy Kit-nicer.org</a></p> <p><b>STEM activity*-Alternative Energy for Cars</b>  <a href="#">STEM activity*-Cars Powered by Alternative Energy-Apply Cars Kit-nicer.org</a></p>	<p><b>Apply Alternative Energy Kit</b>                      cups, thermometers, cardboard sheets, chocolate bars, aluminum foil, foam plates, parchment paper, cling wrap, dowel rods, diorama foam, double sided tape, and balsa wood                      -nicerc.org STEM EDA</p> <p><b>Apply Cars Kit-</b>                      Pez® dispensers and candy, standard mousetrap, tumbler straw, dowel rods, CDs, cardboard boxes, zip ties, masking tape, straws, paper clips, nylon string, school glue, and pliers                      nicerc.org STEM EDA</p> <p><i>Resources:</i>  <a href="http://www.nicerc.org">www.nicerc.org</a>  <a href="http://www.njctl.org">www.njctl.org</a>  <a href="http://Nearpod.com">Nearpod.com</a>  <a href="http://Edpuzzle.com">Edpuzzle.com</a></p> <p><b>Additional Technology Resources:</b></p> <ul style="list-style-type: none"> <li>• <i>Explore Learning</i></li> <li>• <i>Nearpod.com</i></li> <li>• <i>Edpuzzle.com</i></li> <li>• <i>Brainrush.com</i></li> <li>• <i>YouTube</i></li> <li>• <i>Phet</i></li> <li>• <i>Teacher Tube</i></li> </ul>

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<p>Earth's systems but does not necessarily pre- scribe the decisions that society takes.</p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• <b>construct</b> an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</li> <li>• <b>create</b> engineering designs that utilizes application of alternative energies.</li> </ul>		
<p><b>Differentiated Instruction:</b></p> <ul style="list-style-type: none"> <li>• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.</li> <li>• Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).</li> <li>• Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).</li> <li>• Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).</li> <li>• Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.</li> <li>• Use project-based science learning to connect science with observable phenomena.</li> <li>• Provide ELL students with multiple literacy strategies.</li> <li>• Structure the learning around explaining or solving a social or community-based issue.</li> </ul>	<p><b>ELL Modifications:</b></p>	

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- Collaborate with after-school programs or clubs to extend learning opportunities.

Restructure lesson using UDL principals ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)) )

### Assessments:

- **Argumentative Essay- What is the best alternative energy source?**
- **Heated Home-STEM –Engineering design**
- DOQ-Edconnect