

Unit Title: Renewable and Nonrenewable Resources

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BASED ON A CURRICULUM

OVERVIEW SAMPLE AUTHORED BY

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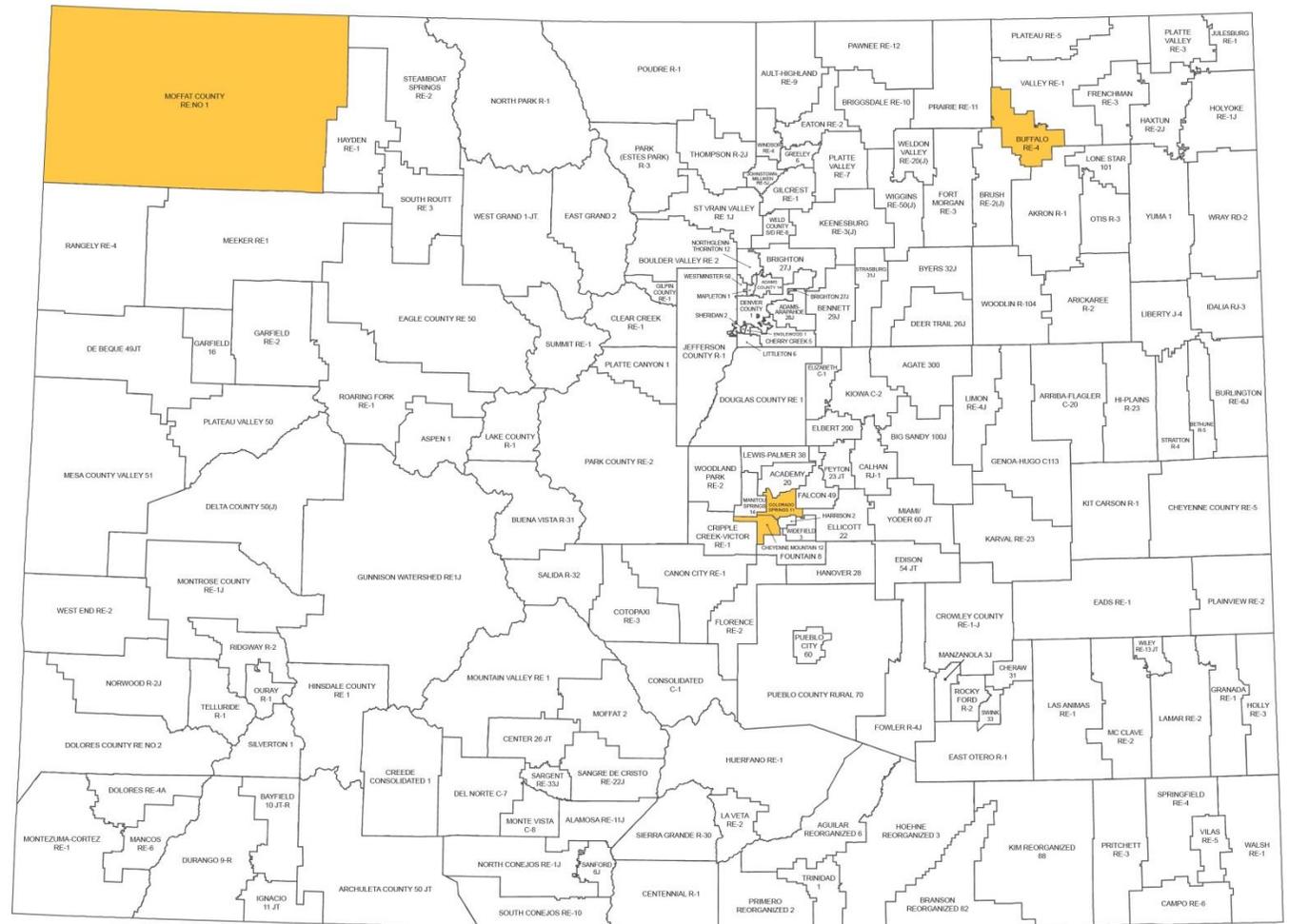
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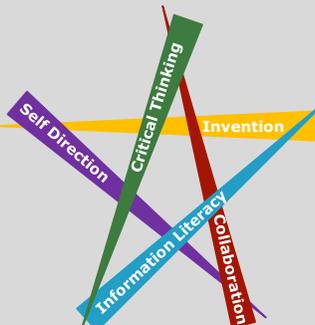
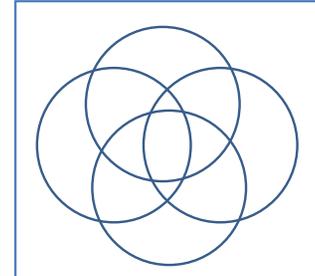
Amy Gandee



This unit was authored by a team of Colorado educators. The template provided one example of unit design that enabled teacher-authors to organize possible learning experiences, resources, differentiation, and assessments. The unit is intended to support teachers, schools, and districts as they make their own local decisions around the best instructional plans and practices for all students.

Colorado Teacher-Authored Sample Instructional Unit

Content Area	Science	Grade Level	5 th Grade
Course Name/Course Code			
Standard	Grade Level Expectations (GLE)	GLE Code	
1. Physical Science	1. Mixtures of matter can be separated regardless of how they were created; all weight and mass of the mixture are the same as the sum of weight and mass of its parts	SC09-GR.5-S.1-GLE.1	
2. Life Science	1. All organisms have structures and systems with separate functions	SC09-GR.5-S.2-GLE.1	
	2. Human body systems have basic structures, functions, and needs	SC09-GR.5-S.2-GLE.2	
3. Earth Systems Science	1. Earth and sun provide a diversity of renewable and nonrenewable resources	SC09-GR.5-S.3-GLE.1	
	2. Earth's surface changes constantly through a variety of processes and forces	SC09-GR.5-S.3-GLE.2	
	3. Weather conditions change because of the uneven heating of Earth's surface by the Sun's energy. Weather changes are measured by differences in temperature, air pressure, wind and water in the atmosphere and type of precipitation	SC09-GR.5-S.3-GLE.3	

<p align="center">Colorado 21st Century Skills</p>  <p>Critical Thinking and Reasoning: <i>Thinking Deeply, Thinking Differently</i></p> <p>Information Literacy: <i>Untangling the Web</i></p> <p>Collaboration: <i>Working Together, Learning Together</i></p> <p>Self-Direction: <i>Own Your Learning</i></p> <p>Invention: <i>Creating Solutions</i></p>	<p>Intrigrated Curriculum Design: This intradisciplinary approach matches basic elements in each of the science strands – physical, life, earth systems sciences - forming overlaps in instruction of certain topics and concepts in an authentic integrated model.</p> 
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Unit Titles	Length of Unit/Contact Hours	Unit Number/Sequence
Renewable and Nonrenewable Resources	4 -6 Weeks	3

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Unit Title	Renewable and Nonrenewable Resources		Length of Unit	4 – 6 Weeks
Focusing Lens(es)	Origins	Standards and Grade Level Expectations Addressed in this Unit	SC09-GR.5-S.3-GLE.1 RWC10-GR.5-S.1-GLE.1	
Inquiry Questions (Engaging-Debatable):	<ul style="list-style-type: none"> What are the consequences to the earth of utilizing renewable and nonrenewable resources? (SC09-GR.5-S3-GLE.1) 			
Unit Strands	Earth Science			
Concepts	renewable resources, nonrenewable resources, energy, natural resources			

Generalizations My students will Understand that...	Guiding Questions	
	Factual	Conceptual
Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities. (SC09-GR.5-S3-GLE.1-EO.a)	<p>What natural resources provide energy? (SC09-GR.5-S3-GLE.1; IQ.1,2,3)</p> <p>What are the characteristics of renewable and nonrenewable resources? (SC09-GR.5-S3-GLE.1-EO.b)</p> <p>Where are natural resources found? (SC09-GR.5-S3-GLE.1-EO.b)</p>	<p>How do natural resources provide energy? (SC09-GR.5-S3-GLE.1-EO.b)</p> <p>Why are natural resources not distributed evenly across the earth? (SC09-GR.5-S3-GLE.1; RA.2)</p> <p>Why are some resources nonrenewable? (SC09-GR.5-S3-GLE.1)</p> <p>What are the effects of utilizing nonrenewable resources? (SC09-GR.5-S.3-GLE.1)</p>
Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption. (SC09-GR.5-S.3-GLE.1)	What natural resources provide energy? (SC09-GR.5-S.3-GLE.1-EO.b;IQ.1,2,3;N.1,2)	<p>How do natural resources provide energy? How can the sun be used as an energy source? (SC09-GR.5-S.3-GLE.1; IQ.1)</p> <p>How can the wind be used as an energy source? (SC09-GR.5-S.3-GLE.1; IQ.2)</p> <p>What types of energy sources exist on earth? (SC09-GR.5-S.3-GLE.1; IQ.3)</p>
The physical environment provides opportunities for and places constraints on human activities (SC09-GR.5-S3-GLE.1-EO.b ; N.1)	<p>How does the environment affect human activity?</p> <p>How does human activity affect the environment?</p>	What must be done to keep individuals and businesses from negatively affecting the environment?

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<p>Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth’s environment (RWC10-GR.5-S1-GLE.1-EO.a; IQ.3) and (SC09-GR.5-S3-GLE.1; N.1)</p>	<p>What are some human behaviors which effect the environment? (SC09-GR.5-S3-GLE.1-EO.b;RA.1,2,3; N.1)</p>	<p>Which human behaviors can and cannot be continued if we wish to maintain a healthy environment? (SC09-GR.5-S3-GLE.1-EO.b;RA.1,2,3; N.1)</p>
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<p>Critical Content: My students will Know...</p>	<p>Key Skills: My students will be able to (Do)...</p>
<ul style="list-style-type: none"> • Renewable or nonrenewable energy sources (SC09-GR.5-S.3-GLE.1) • Natural resources used to provide energy (SC09-GR.5-S.3-GLE.1) • Examples of nonrenewable resources provided by mining operations (SC09-GR.5-S.3-GLE.1;RA.1) • The limited nature of nonrenewable energy sources (SC09-GR.5-S.3-GLE.1) • Ways in which the distribution of resources is accomplished to meet human needs (SC09-GR.5-S.3-GLE.1; RA.2) • The reasons why towns are often built around resource extraction (SC09-GR.5-S.3-GLE.1; RA.3) • The variety of renewable and nonrenewable resources the Earth and Sun provide (SC09-GR.5-S.3-GLE.1; N.2) • The ways in which the environment affects humans and vice versa. (SS09-GR4-GLE.2; IQ.3) (SC09-GR.5-S3-GLE.1-EO.b; N.1) 	<ul style="list-style-type: none"> • Develop and communicate an evidence-based scientific explanation (SC09-GR.5-S.3-GLE.1-EO.a) • Analyze and interpret data to generate evidence (SC09-GR.5-S.3-GLE.1-EO.b) • Review and analyze information presented by peers (SC09-GR.5-S.3-GLE.1; N.1) • Provide feedback to peers based on reasonable scientific evidence (SC09-GR.5-S.3-GLE.1; N.1) • Assess scientific explanations (SC09-GR.5-S.3-GLE.1-EO.c) • Speak clearly and accurately to persuade an audience (RWC10-GR.5-S1-GLE.1-EO.a; IQ.3)

<p>Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i></p>	
<p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p>	<p><i>Energy on earth is provided from many sources. Some energy sources are limited.</i></p>
<p>Academic Vocabulary:</p>	<p>energy, energy sources, natural resources</p>
<p>Technical Vocabulary:</p>	<p>resource, renewable, nonrenewable, extraction</p>

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Unit Description:	This unit focuses on how humans, plants, and animals use renewable and non-renewable energy resources, and how the use of these resources impacts the environment both positively and negatively. The physical environment limits available resources, which dictate human use, decision-making, and activity. Beginning with the natural resources (renewable and nonrenewable), across the unit students investigate energy, info-graphics, resource availability and consumption, and the interconnectedness of humans and energy production and use. The unit culminates in a performance assessment that asks students to take the role of a city utility engineer and come up with a solution for coal depletion and present to the local city council.
Considerations:	Teachers may need to consider timing of this unit, based upon the amount of time dedicated to science each week. The authors of this unit focused the assessment on coal because that was a local concern. However, one could use other resources (e.g., natural gas, etc.) within the assessment.
Unit Generalizations	
Key Generalization:	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities
Supporting Generalizations:	Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption
	The physical environment provides opportunities for and places constraints on human activities
	Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth’s environment

Performance Assessment: <i>The capstone/summative assessment for this unit.</i>	
Claims: (Key generalization(s) to be mastered and demonstrated through the capstone assessment.)	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities.
Stimulus Material: (Engaging scenario that includes role, audience, goal/outcome and explicitly connects the key generalization)	<p>WARNING! Coal has been depleted as an energy resource and will not be available to your cities daily activities in six months. It is up to you, as a city utility engineer to come up with a solution to present to the local city council. In order to accomplish this you must:</p> <ul style="list-style-type: none"> • Identify the Impacts of coal depletion on your city; • Identify all possibilities of replacement energy resources; • Justify your choice of a replacement energy resource (you must include discussion about the sustainability of your choice, the renewable or non-renewable nature of your choice, and the geographical availability of your choice); • Justify why you did not choose the other resource options.
Product/Evidence: (Expected product from students)	The student is a city utility engineer tasked to research the depletion of coal and a possible viable resource replacement option that they will then present to the city council (e.g. oral, Power Point, Prezi, debate, etc.). They must identify the potential impacts once it is depleted and the logical options for energy replacement. They must identify the different possible sources of energy production (hydroelectric, wind, geothermal, solar, natural gas, petroleum, nuclear, etc.). They must choose a replacement resource, justify their choice, and justify why they did not choose at least three other sources of energy. They must include sustainability of their choice, renewable or non-renewable energy, and geographical availability.

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Differentiation: (Multiple modes for student expression)	<ul style="list-style-type: none"> • The teacher may allow students to use multiple presentation options (e.g. oral, Power Point, Prezi, debate, etc.). • The teacher may allow students to list a reduced number of replacement energy options and impacts. • The teacher may allow students to justify their choice and at least one replacement choice. • The teacher may allow students to use picture books to identify the different energy resources. • The teacher may allow students to use a word bank with graphics. • The teacher may allow students to use an outline/graphic organizer to assist with the planning and organization of their presentation. • The teacher may allow students to have oral presentation of assessment. • The teacher may allow students to use assistive technology. • The teacher may allow students to use extended time and/or frequent check-in on progress. • The teacher may allow students to have sections of their presentation graded in intervals. • To extend this work, students must choose a different location around the world that also relies on a non-renewable resource. Their recommendation must be written through persuasive writing.
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Texts for independent reading or for class read aloud to support the content

Informational/Non-Fiction	Fiction
<p><i>The Magic School Bus and the Climate Challenge</i> –Joanna Cole [lexile level 610] <i>Energy Island</i>- Allen Drummond [lexile level 910] <i>Boy who Harnessed the Wind</i> – William Kamkuwamba and Bryan Mealer [lexile level 910] <i>Biofuels</i> –Andrew Solway [lexile level 900] <i>Wind Power (Energy for the Future)</i> – Kathy Allen [lexile level 830] <i>Water Power</i> –Andrew Solway [lexile level 860] <i>Hydrogen Fuel</i> –Andrew Solway [lexile level 800] <i>Oil and Gas</i> – Ron and Adrianna Edwards [lexile level 1100] <i>How do Humans Depend on Earth?</i>- Julie Lundgren [lexile level 800-1200]</p>	<p><i>The City of Ember</i>-Jeanne DuPrau [lexile level 680] <i>People of Sparks</i>-Jeanne DuPrau [lexile level 760]</p>

Ongoing Discipline-Specific Learning Experiences

1.	Description:	Communicating like a scientist: Using scientific literacy	Teacher Resources:	<p>http://www.brainpop.com/educators/community/bp-jr-topic/scientific-method/(Near middle of teacher resource page; includes lesson plans on scientific method)</p> <p>http://undsci.berkeley.edu/teaching/misconceptions2.php (Tips for introducing and teaching scientific method)</p> <p>http://undsci.berkeley.edu/article/howscienceworks_16 (“Scrutinizing Science: Peer Review” gives information about the role of peer review process in science)</p>
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			Student Resources:	http://www.brainpop.com/educators/community/bp-jr-topic/scientific-method/ (Near middle of teacher resource page; includes lesson plans on scientific method) http://undsci.berkeley.edu/article/howscienceworks_16 ("Scrutinizing Science: Peer Review" gives information about the role of peer review process in science) http://undsci.berkeley.edu/article/whatissscience_03 (Explains what is science and includes a scientific checklist)
	Skills:	Building and reviewing academic and technical language Engage in discussions Communicating cause and effect Engage in peer review	Assessment:	The student will be assessed within learning experiences
2.	Description:	Researching like a scientist: Using credible sources	Teacher Resources:	http://library.albany.edu/usered/dr/prisci.html (These reference charts define primary and secondary sources in science and list examples of each type of resource.) http://www.loc.gov/teachers/usingprimarysources/ (Teacher resource site for using primary resources.) http://content.easybib.com/students/writing-guide/ii-research/c-evaluating-sources-for-credibility/ (Helps educators provide students with the tools they need to do credible and ethical research) http://historyexplorer.si.edu/PrimarySources.pdf (Teacher's guide to engaging students with primary sources)
			Student Resources:	http://library.albany.edu/usered/dr/prisci.html (These reference charts define primary and secondary sources in science and list examples of each type of resource.) http://content.easybib.com/students/ (Helps students plan, research, organize, write and cite sources)
	Skills:	Read and interpret maps Participate in class and group discussions Analyze data Explain energy processes Synthesizing information from multiple sources Communicate evidence-based scientific explanations Provide peer feedback	Assessment:	The student will be assessed within learning experiences

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Prior Knowledge and Experiences

Students should have knowledge of recycling, sources of energy for humans, plants and animals and the way they harness and use energy in their everyday lives, ecosystems, endangered animals, and where energy comes from. They must also have mapping skills, be able to compare and contrast, and be able to present information to a group.

Vertical Articulation: Students have last seen concepts related to this unit in 1st grade and Preschool.

Learning Experiences # 1 – 3 Instructional Timeframe: Weeks 1-2

Learning Experience # 1

The teacher may brainstorm natural resources (e.g., solar, wind, coal, natural gas) so that students can begin defining and categorizing renewable and nonrenewable resources used by humans.

Generalization Connection(s):

Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities

Teacher Resources:

<http://www.eia.gov/> (Energy information website)
http://www.eia.gov/kids/energy.cfm?page=nonrenewable_home-basics (Non-renewable resources)
http://www.eia.gov/kids/energy.cfm?page=renewable_home-basics (Renewable resources)
http://www.eia.gov/kids/energy.cfm?page=about_sources_of_energy-basics (Energy sources)
http://www.eia.gov/kids/energy.cfm?page=teacher_guide (Energy based teacher's guides)
http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Moon_Munchies_Lesson_1.html (Lesson plans for educators that help students identify natural resources on earth).
<http://www.enchantedlearning.com/graphicorganizers/venn/> (Website with various graphic organizers)
<http://www.neok12.com/Energy-Sources.htm> (Video clips on energy and natural resources)
[http://education.nationalgeographic.com/education/encyclopedia/non-renewable-energy/?ar_a=1\(energy\)](http://education.nationalgeographic.com/education/encyclopedia/non-renewable-energy/?ar_a=1(energy)) (Website and terms defined)
<http://www.ducksters.com/science/energy.php> (Energy website and terms defined)
<http://beyondpenguins.ehe.osu.edu/issue/energy-and-the-polar-environment/teaching-about-natural-resources-and-energy-sources> (Website with multiple sources on energy)

Student Resources:

http://www.eia.gov/kids/energy.cfm?page=nonrenewable_home-basics (Non-renewable resources)
http://www.eia.gov/kids/energy.cfm?page=renewable_home-basics (Renewable resources)
http://www.eia.gov/kids/energy.cfm?page=about_sources_of_energy-basics (Energy sources)
<http://www.childrensuniversity.manchester.ac.uk/interactives/science/energy/renewable/>
<http://www.ducksters.com/science/energy.php> (Energy website and terms defined)
<http://beyondpenguins.ehe.osu.edu/issue/energy-and-the-polar-environment/teaching-about-natural-resources-and-energy-sources> (Website with multiple sources on energy)

Assessment:

Students will create a diagram categorizing non-renewable and renewable energy resources (t-chart, Venn diagram, etc.).
<http://www.enchantedlearning.com/graphicorganizers/venn/> (Website with various graphic organizers)

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Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	N/A	The student may produce a visual using pictures instead of words
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to investigate sources of non-renewable energy resources http://www.enchantedlearning.com/graphicorganizers/chain/ (Chain graphic organizer)	The student may create a process graphic organizer linking non-renewable energy to its source
Critical Content:	<ul style="list-style-type: none"> • Different types of natural resources • Natural resources connection to energy use • Types of non-renewable energy (fossil fuels) • Types of renewable energy (wind, sun energy) • Basic understanding of energy • Uses of energy • Harnessing energy 	
Key Skills:	<ul style="list-style-type: none"> • Identify non-renewable and renewable energy • Compare non-renewable and renewable energy • Explain energy processes • Brainstorm concepts regarding energy consumption • Identify possible energy replacements 	
Critical Language:	Resources, renewable, non-renewable, identify, compare, fossil fuels, explain, brainstorm, compare, contrast, create	

Learning Experience # 2		
The teacher may present a variety of different maps of non-renewable and renewable resources use (local or state) so that students identify energy specific to geographic location.		
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities	
Teacher Resources:	www.eia.gov (Energy website) http://www.eia.gov/maps/ (Search maps based on energy use) http://www.eia.gov/kids/energy.cfm?page=teacher_guide (Lesson plans for teachers) http://earthobservatory.nasa.gov/Features/RenewableEnergy/renewable_energy.php (How satellite data help humans exploit Earth's natural resources) http://www.nasa.gov/topics/earth/features/quickcat-20080709.html (Ocean wind power map reveals possible wind energy source)	

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Student Resources:	http://www.eia.gov/kids/ (Energy website) http://www.eia.gov/maps/ (Search maps based on energy use) http://www.windpoweringamerica.gov/maps_template.asp?stateab=co (Colorado wind power map)	
Assessment:	Given an energy map (local, state, U.S., etc.) students will read and interpret the map in order to identify what energy resource is available to humans.	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may create an access map with reduced amount of information The teacher may allow for flexible grouping/support during discussion	The student may use images to represent the energy resource
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may have students use inquiry learning of non-renewable and renewable resource maps http://www.zeemaps.com (Site with various maps) http://www.teacherspayteachers.com/Product/Renewable-and-Nonrenewable-Energy-Summative-Project-673280 (Renewable and nonrenewable resource site—Fees charged)	The student may create a resource map of Colorado
Critical Content:	<ul style="list-style-type: none"> The understanding of geographical connections to human use of resources can limit/enhance resource use specific to location 	
Key Skills:	<ul style="list-style-type: none"> Read maps Interpret maps Participate in class/group discussion 	
Critical Language:	Energy, resource, non-renewable, renewable, discuss, interpret, geographic location, interpret, read, identify, discuss	

Learning Experience # 3	
The teacher can utilize info-graphics to illustrate the percentage of resource consumed by a specific geographic location (local or state) so that students can analyze and interpret data regarding resource use.	
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities
Teacher Resources:	www.eia.gov (Energy website) http://www.eia.gov/kids/energy.cfm?page=teacher_guide (Lesson plans for teachers) Use local utility educational outreach website www.brainpop.com/educators/community/bp-topic/solar-energy (Lesson ideas) www.brainpop.com/educators/community/bp-topic/wind-energy (Lesson ideas) www.brainpop.com/educators/community/bp-topic/fossil-fuels (Lesson ideas)

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Student Resources:	http://www.eia.gov/kids/ (Energy website) http://www.bbc.com/future/story/20120618-global-resources-stock-check (Chart of timeframe for depletion of global natural resources)	
Assessment:	Students will create a graph that represents human use of a specific natural resource (e.g., coal, natural gas, wind power, solar energy, etc.) specific to city, county, or Colorado. http://nces.ed.gov/nceskids/createagraph/default.aspx (Online way to create different types of graphs)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow for student choice or graph type	The student may graph human use of resources using a given template http://nces.ed.gov/NCESKIDS/createagraph/default.aspx (Basic graph template)
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to explore the “Renew a Bean” activity: http://www.womeninmining.org/activities/Renew_a_Bean.pdf (Activity on women and mining)	The student may create a data chart based on their explorations
Critical Content:	<ul style="list-style-type: none"> The understanding of geographical connections to human use of resources can limit/enhance resources used specific to location. 	
Key Skills:	<ul style="list-style-type: none"> Read maps Interpret maps Analyze data 	
Critical Language:	Credible sources, resource, renewable, non-renewable, energy, geographic location, interpret, analyze	

Learning Experiences # 4 – 6 Instructional Timeframe: Weeks 3-4

Learning Experience # 4	
The teacher may use artifacts (and/or a guest speaker) to present information about energy use and daily life so that students can begin evaluating how energy is used in their own lives.	
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption

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Teacher Resources:	Utilize local utility educational outreach program for guest speakers: http://www.xcelenergy.com/ (Xcel energy website) http://www.neok12.com/Energy-Sources.htm (Various video clips on Energy and Natural Resources (games & quizzes available for \$) http://www.neok12.com/Energy-Sources.htm (Various video clips on Energy and Natural Resources (games & quizzes available for a fee) www.brainpop.com/educators/community/bp-topic/solar-energy (Lesson ideas) www.brainpop.com/educators/community/bp-topic/wind-energy (Lesson ideas) www.brainpop.com/educators/community/bp-topic/fossil-fuels (Lesson ideas)	
Student Resources:	http://www.sciencenotebooks.org (Lab/science notebooks)	
Assessment:	Students will track and record how they use energy in their daily life for a week in the science notebooks. http://nces.ed.gov/NCESKIDS/createagraph/default.aspx (Basic graph template)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may use extended time The teacher may use vocabulary cards with graphics The teacher may use repetition of instruction The teacher may use peer assistance/grouping The teacher may use alternate grading	N/A
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to apply their knowledge of energy to their own lives day to day	The student may create a diagram of their home or school identifying energy and terms associated with energy
Critical Content:	<ul style="list-style-type: none"> • Basic understanding of energy • Uses of energy • Harnessing energy 	
Key Skills:	<ul style="list-style-type: none"> • Explain energy process • Brainstorm concepts regarding energy consumption • Identify possible energy replacements 	
Critical Language:	Energy, generate, consumption, opportunities, renewable, nonrenewable, identify, brainstorm, explain, identify, brainstorm	

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Learning Experience # 5		
The teacher may use examples of human, plant and animal energy consumption so that students can begin seeing the ways in which all organisms depend on/deplete environmental resources.		
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth's environment Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption	
Teacher Resources:	http://eia.gov/consumption/residential/ (Data on energy consumption) http://education.nationalgeographic.com/education/activity/energy-use-in-the-americas/?ar_a=1 (Activity on energy usage) http://www.energystar.gov/index.cfm?c=kids.kids_index (Teacher and student information website) http://www.xof1.com/energyConsumption.php (Multi-source energy website with graphs) http://nation.time.com/2013/10/24/interactive-see-how-americas-energy-appetite-has-changed-over-40-years/ (Energy article with graphs)	
Student Resources:	http://www.sciencenotebooks.org/ (Science notebooks) http://www.energystar.gov/index.cfm?c=kids.kids_index (Teacher and student information website) http://www.xof1.com/energyConsumption.php (Multi-source energy website with graphs)	
Assessment:	Students will use a graphic organizer (multi flow) to document cause and effect of energy consumption and depletion. http://www.educationoasis.com/curriculum/GO/GO_pdf/causeeffect_events.pdf (Cause and Effect graphic organizer)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may use vocabulary cards with graphics The teacher may use peer assistance/grouping	The student may present the graphic organizer verbally to the teacher
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to research energy consumption over time http://education.nationalgeographic.com/education/activity/energy-use-in-the-americas/?ar_a=1 (National Geographic activity on energy consumption)	The student may create a longitudinal graph by looking at the information over time
Critical Content:	<ul style="list-style-type: none"> • Basic understanding of energy • Uses of energy • Harnessing energy 	
Key Skills:	<ul style="list-style-type: none"> • Explain energy process • Brainstorm concepts regarding energy consumption • Identify possible energy replacements 	
Critical Language:	Energy, generate, consumption, opportunities, renewable, nonrenewable, identify, brainstorm, explain	

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Learning Experience # 6		
The teacher may bring in sources related to energy consumption (e.g., school energy bill) so that students can make basic inferences or logical predictions about energy use.		
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth's environment Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption	
Teacher Resources:	http://www.maps.com/rand-mcnally-maps/ (Rand McNally online maps) http://library.albany.edu/usered/dr/prisci.html (These reference charts define primary and secondary sources in science and list examples of each type of resource.) http://www.loc.gov/teachers/usingprimarysources/ (Teacher resource site for using primary resources.) http://content.easybib.com/students/writing-guide/ii-research/c-evaluating-sources-for-credibility/ (Helps educators provide students with the tools they need to do credible and ethical research) http://historyexplorer.si.edu/PrimarySources.pdf (Teacher's guide to engaging students with primary sources)	
Student Resources:	http://www.maps.com/rand-mcnally-maps/ (Rand McNally online maps) http://library.albany.edu/usered/dr/prisci.html (These reference charts define primary and secondary sources in science and list examples of each type of resource.) http://content.easybib.com/students/ (Helps students plan, research, organize, write and cite sources)	
Assessment:	The students will record their inferences and predictions of the schools energy use for this coming winter in their science notebooks. http://www.sciencenotebooks.org (Lab/science notebooks)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow strategic grouping to support all students	The student may present their thinking one-on-one with the teacher
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to investigate other forms of energy consumption at their school	The student may present their findings to the class
Critical Content:	<ul style="list-style-type: none"> Energy available in each environment, why people live where they live 	
Key Skills:	<ul style="list-style-type: none"> Map reading, synthesizing information from multiple sources 	
Critical Language:	Physical map, political map, resource map, synthesize, solar power, wind power, hydro power, geothermal, petroleum, coal, natural gas, environment, ecosystem, renewable, nonrenewable, synthesize, map, credibility	

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Learning Experiences # 7-8
Instructional Timeframe: Weeks 5-6

Learning Experience # 7

The teacher may use contemporary natural maps of Colorado (physical and resource) to enable students to discuss the connection between availability of resources and the location of human settlements.

Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth's environment Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption	
Teacher Resources:	http://education.nationalgeographic.com/education/media/fort-worth-gas-waste-and-water/?ar_a=1 (Video discussing Fort Worth, TX use of its natural gas resource under the city). http://www.windpoweringamerica.gov/maps_template.asp?stateab=co (Wind power map) http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22SB91+Report.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251746588092&ssbinary=true (2007 Report of the Task Force on Renewable Resource Generation Development Areas) http://apps1.eere.energy.gov/states/maps.cfm/state=CO?print (Colorado Renewable Energy Resource Maps) http://www.nrel.gov/csp/maps.html (Concentrating Solar Power Resource Maps) http://www.eia.gov/state/?sid=CO (Energy Maps, graphs, and quick facts for Colorado and US) http://education.nationalgeographic.com/education/mapping/interactive-map/?ar_a=1 (National Geographic Interactive Maps)	
Student Resources:	http://apps1.eere.energy.gov/states/maps.cfm/state=CO?print (Colorado Renewable Energy Resource Maps) http://www.nrel.gov/csp/maps.html (Concentrating Solar Power Resource Maps) http://www.eia.gov/state/?sid=CO (Energy Maps, graphs, and quick facts for Colorado and US) http://education.nationalgeographic.com/education/mapping/interactive-map/?ar_a=1 (National Geographic Interactive Maps)	
Assessment:	Student will produce a ticket out of class identifying how the physical environment provides/limits natural resources. http://www.readwritethink.org/files/resources/printouts/Exit%20Slips.pdf (Scaffolded exit tickets)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	N/A	The student may verbally identify how the physical environment provides/limits natural resources

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Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to specifically look at their local area and identify specific limitations of natural resources http://nces.ed.gov/nceskids/createagraph/default.aspx (Online way to create different types of graphs)	The student may create a graphic demonstrating how the local environment limits natural resources
Critical Content:	<ul style="list-style-type: none"> Energy available in each environment, why people live where they live 	
Key Skills:	<ul style="list-style-type: none"> Map reading, synthesizing information from multiple sources, being able to communicate evidence-based scientific explanations 	
Critical Language:	Physical map, political map, resource map, synthesize, solar power, wind power, hydro power, geothermal, petroleum, coal, natural gas, environment, ecosystem, renewable, nonrenewable, synthesis, create, identify	

Learning Experience # 8		
The teacher may provide primary or secondary sources related to human settlements so that students can deepen their understanding of the ways in which the physical environment dictates human settlements.		
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth's environment Many natural resources provide sources of energy which humans, plants, and animals can harness for consumption	
Teacher Resources:	http://resiliency.lsu.edu/resources/land-use-and-human-settlement/ (Teacher resource on human settlements) http://www.education.com/study-help/article/us-history-settlement-colonization-first-peoples/ (Teacher and student resource on human settlements) http://www.unhabitat.org/downloads/docs/GRHS2009/GRHS.2009.pdf (Planning for sustainable cities)	
Student Resources:	http://www.education.com/study-help/article/us-history-settlement-colonization-first-peoples/ (Teacher and student resource on human settlements) http://www.unhabitat.org/downloads/docs/GRHS2009/GRHS.2009.pdf (Planning for sustainable cities) http://www.enchantedlearning.com/usa/label/states/colorado/ (Open-ended program for creating individual Colorado maps)	
Assessment:	Students will map the locations of fossil fuels (extraction and mining locations) in Colorado, which could emphasize or delineate renewable and non-renewable forms of energy, and explain how these could dictate human settlements. http://www.enchantedlearning.com/usa/label/states/colorado/ (Open-ended program for creating individual Colorado maps)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may provide less complex scenarios	The student may explain their understanding verbally

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Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to research human settlements and movements in history to support the idea of human settlement is dictated by physical environments	The student may present their findings visually to the class with justifications for their ideas
Critical Content:	<ul style="list-style-type: none"> • Energy available in each environment, why people live where they live 	
Key Skills:	<ul style="list-style-type: none"> • Map reading, synthesizing information from multiple sources, being able to communicate evidence-based scientific explanations 	
Critical Language:	Physical map, political map, resource map, synthesize, solar power, wind power, hydro power, geothermal, petroleum, coal, natural gas, environment, ecosystem, renewable, nonrenewable, scenario, synthesis	

**Learning Experiences # 9-11
Instructional Timeframe: Weeks 7-8**

Learning Experience # 9	
The teacher may use real-life scenarios of the depletion of natural resources in Colorado, so that students can develop and analyze the human impact on energy use and depletion.	
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities The physical environment provides opportunities for and places constraints on human activities Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth's environment
Teacher Resources:	http://education.nationalgeographic.com/education/activity/non-renewable-energy-resources/?ar_a=1 (Students participate in a simulation of energy through the roles of consumer, energy companies, and fuel companies) http://energyxroads.com/index.html (Short video clips from a larger documentary called "Energy Crossroads") http://energyxroads.com/ecofacts.htm (PDF of eco-facts/consumption/ depletion) http://www.crwcd.org/media/uploads/200708_climate_change_impacts_USGS.pdf (Climate change impact on water resources in Colorado)
Student Resources:	http://education.nationalgeographic.com/education/activity/non-renewable-energy-resources/?ar_a=1 (Students participate in a simulation of energy through the roles of consumer, energy companies, and fuel companies) http://energyxroads.com/index.html (Short video clips from a larger documentary called "Energy Crossroads") http://energyxroads.com/ecofacts.htm (PDF of eco facts/consumption/ depletion) http://www.crwcd.org/media/uploads/200708_climate_change_impacts_USGS.pdf (Climate change impact on water resources in Colorado)
Assessment:	Students will produce an exit ticket that lists at least two environmental concerns centered on resources and energy. http://www.readwritethink.org/files/resources/printouts/Exit%20Slips.pdf (Scaffolded exit tickets)

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Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow for independent reading level text The teacher may allow for peer assistance/grouping The teacher may allow for time management support	The student may produce a graphic organizer of environmental concerns and the connections to resources The student may present orally one-on-one with the teacher
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to investigate a local issue related to energy consumption https://voicethread.com (Voice Thread presentation style)	The student may create a presentation on the results of their investigation
Critical Content:	<ul style="list-style-type: none"> Current Environment concerns (depletion of rainforests, glaciers melting, agriculture, deforestation, global warming, etc.) 	
Key Skills:	<ul style="list-style-type: none"> Apply knowledge of unit to explain how natural resources impact human activities. Discussion of credible sources Provide feedback to peers on presentation 	
Critical Language:	Apply, resources, energy, credible sources, depletion, global warming, deforestation, glaciers, agriculture, discuss, application	

Learning Experience # 10		
The teacher may bring in different perspectives on current environmental energy concerns so that students can analyze and identify different proposed solutions.		
Generalization Connection(s):	Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities The physical environment provides opportunities for and places constraints on human activities Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth's environment	
Teacher Resources:	http://greenliving.lovetoknow.com/Non_Renewable_Resources (Use of non-renewable energy) http://www.solarschools.net/resources/stuff/advantages_and_disadvantages.aspx (Pros and Cons of renewable energy) http://www.nrdc.org/issues/ (Environmental energy concerns)	
Student Resources:	http://greenliving.lovetoknow.com/Non_Renewable_Resources (Use of non-renewable energy) http://library.thinkquest.org/26026/Science/energy_issues.html (Thinkquest on energy issues)	
Assessment:	Students will produce a graphic organizer showing their understanding between the concern and the solution. http://www.worksheetworks.com/miscellanea/graphic-organizers/tchart.html (T-Chart graphic organizer examples)	
Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow for peer assistance/grouping	N/A

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Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to investigate how they personally could change their activities to decrease environmental impact related to energy usage	The student may write a proposal for altering their “environmental footprint”
Critical Content:	<ul style="list-style-type: none"> • Current Environment concerns (depletion of rainforests, glaciers melting, agriculture, deforestation, global warming, etc.) • What are we doing to contribute to or deplete earth’s resources? (Human Impact and Choice) 	
Key Skills:	<ul style="list-style-type: none"> • Apply knowledge of unit to explain how natural resources impact human activities • Discussion of credible sources 	
Critical Language:	Renewable, non-renewable resources, apply, resources, energy, credible sources, depletion, global warming, deforestation, glaciers, agriculture, solutions, discuss, investigate	

Learning Experience # 11		
The teacher may engage students in a debate (e.g., structured academic controversy) about one current natural resource issue so that students can present arguments supported by credible scientific evidence.		
Generalization Connection(s):	<p>Natural resources, generated by the sun or the Earth and used by humans, provide energy for daily activities</p> <p>The physical environment provides opportunities for and places constraints on human activities</p> <p>Humans, more than any other animal, have the power to make decisions that contribute to the protection or endangerment of Earth’s environment</p>	
Teacher Resources:	<p>http://pachyderm.cdl.edu/elixr-stories/integrative-learning-communication/ (Structured academic controversy site describing a debate assignment on climate change)</p> <p>http://www.huffingtonpost.com/news/colorado-fracking/ (Article on fracking)</p> <p>http://www.colorado.edu/engineering/features-cue-home/fracking-fracas (Article on fracking)</p> <p>http://www.scientificamerican.com/article/colorado-creates-rules-to-reduce-fracking/ (Article on fracking)</p> <p>http://www.world-nuclear.org/info/Current-and-Future-Generation/The-Nuclear-Debate/ (Article on nuclear power)</p> <p>http://www.livescience.com/5227-energy-debates-nuclear-power.html (Article on nuclear power)</p>	
Student Resources:	<p>http://www.huffingtonpost.com/news/colorado-fracking/ (Article on fracking)</p> <p>http://www.colorado.edu/engineering/features-cue-home/fracking-fracas (Article on fracking)</p> <p>http://www.scientificamerican.com/article/colorado-creates-rules-to-reduce-fracking/ (Article on fracking)</p> <p>http://www.world-nuclear.org/info/Current-and-Future-Generation/The-Nuclear-Debate/ (Article on nuclear power)</p> <p>http://www.livescience.com/5227-energy-debates-nuclear-power.html (Article on nuclear power)</p>	
Assessment:	<p>Students will create an exit ticket documenting the consensus reached by their group during the debate/structured academic controversy.</p> <p>http://exitticket.org/?gclid=CMKZt6Xsir0CFQ5qfgod_YEAFw (Online exit tickets)</p>	

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Differentiation: (Multiple means for students to access content and multiple modes for student to express understanding.)	Access (Resources and/or Process)	Expression (Products and/or Performance)
	N/A	N/A
Extensions for depth and complexity:	Access (Resources and/or Process)	Expression (Products and/or Performance)
	The teacher may allow students to write a persuasive paper/letter about an environmental issue	The student may write a letter to an environmental agency persuading them to focus on the concern they are passionate about The student may write a newspaper editorial persuading and informing citizens to support an environmental concern with giving information of different ways people can help
Critical Content:	<ul style="list-style-type: none"> • Current Environment concerns (depletion of rainforests, glaciers melting, agriculture, deforestation, global warming, etc.) • What are we doing to contribute to or deplete earth’s resources? (Human Impact and Choice) 	
Key Skills:	<ul style="list-style-type: none"> • Apply knowledge of unit to explain how natural resources impact human activities. • Discussion of credible sources • Explain • Persuasive speaking and writing 	
Critical Language:	Renewable, non-renewable resources, decision, contribute, endanger, protect, harness, power, energy, apply, resources, energy, credible sources, depletion, global warming, deforestation, glaciers, agriculture, explain, discuss, persuasion	