

## Standards Connections: Energy in Ecosystems

Activity	Page	Section	Standard
1	Background		NGSS Crosscutting Concepts. 4 – Systems and System Models. 3-5. A system can be described in terms of its components and their interactions.
1	Background		NGSS Crosscutting Concepts. 5 – Energy & Matter: Flows, Cycles, & Conservation. 3-5. Energy can be transferred in various ways and between objects.
1	Background		NGSS Disciplinary Core Ideas. 5LS2.B – Cycles of Matter and Energy Transfer in Ecosystems. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die.
1	Doing the Activity	Step 1	NGSS Science and Engineering Practices. 1 – Asking Questions and Defining Problems. 3-5. Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
1	Doing the Activity	Step 2	Common Core. ELA-Literacy.RL.3.1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. Common Core. ELA-Literacy.RL.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. Common Core. ELA-Literacy.RL.5.3. Compare and contrast two or more characters, settings, or events in a story or drama, drawing on specific details in the text (e.g., how characters interact).
1	Doing the Activity	Step 6	Common Core. ELA-Literacy.RL.3.3. Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events. Common Core. ELA-Literacy.RL.5.2. Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.
1	Doing the Activity	Step 6	C3 Framework. Dimension 2. Geography.1.3-5. Construct maps and other graphic representations of both familiar and unfamiliar places.
1	Doing the Activity	Step 6	NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. 3-5. Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).

1	Doing the Activity	Step 7	<p><b>Common Core. ELA-Literacy.RI.3.2.</b> Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p><b>Common Core. ELA-Literacy.RI.4.2.</b> Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p><b>Common Core. ELA-Literacy.RI.5.2.</b> Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.</p>
1	Evaluate		<b>Common Core. ELA-Literacy.RL.3.4, RL.4.4, RL.5.4.</b> Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade-level topic or subject area.
1	Enrich		<b>NGSS Science and Engineering Practices. 5 – Using Mathematics and Computational Thinking. 3-5.</b> Organize simple data sets to reveal patterns that suggest relationships.
1	Enrich		<b>Common Core. Math.5.OA.A.1.</b> Write and interpret numerical expressions.
1	Enrich		<b>NGSS Science and Engineering Practices. 8 ñ Obtaining, Evaluating, and Communicating Information. 3-5.</b> Communicate scientific, and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.
1	Enrich		<b>NGSS Science and Engineering Practices. 2 ñ Developing and Using Models. 3-5.</b> Develop and/or use models to describe and/or predict phenomena.
1	Enrich		<b>Common Core. ELA-Literacy.RI.3.2, RI.4.2.</b> Determine the main idea of a text; recount the key details and explain how they support the main idea. <b>Common Core. ELA-Literacy.RI.5.2.</b> Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
2	Background		<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
2	Doing the Activity	Step 3	<b>NGSS Performance Expectation. 3-LS4-3.</b> Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

2	Doing the Activity	Step 5	<b>NGSS Science and Engineering Practices. 3 – Planning and Carrying Out Investigations. 3-5.</b> Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
2	Doing the Activity	Step 6	<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem
2	Doing the Activity	Step 7	<b>NGSS Science and Engineering Practices. 8 – Obtaining, Evaluating, and Communicating Information. 3-5.</b> Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts
2	Doing the Activity	Step 7	<b>C3 Framework. Dimension 2. Geography.1.3-5.</b> Construct maps and other graphic representations of both familiar and unfamiliar places.
2	Doing the Activity	Step 7	<b>Common Core. Math.3.MD.3.</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.
2	Doing the Activity	Step 7	<b>NGSS Crosscutting Concepts. 4 – Systems and System Models. 3-5.</b> Understand that a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.
2	Doing the Activity	Step 8	<b>Common Core. ELA-Literacy.SL.3.4.</b> Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. <b>Common Core. ELA-Literacy.SL.4.4.</b> Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace. <b>Common Core. ELA-Literacy.SL.5.4.</b> Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
2	Doing the Activity	Step 9	<b>NGSS Crosscutting Concepts. 4 – Systems and System Models. 3-5.</b> Understand that a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.

2	Evaluate		<b>Common Core. ELA-Literacy.W.5.3.</b> Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
2	Enrich		<b>NGSS Science and Engineering Practices. 3 – Planning and Carrying Out Investigations. 3-5.</b> Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
2	Enrich		<b>NGSS Science and Engineering Practices. 3 – Planning and Carrying Out Investigations. 3-5.</b> Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
2	Enrich		<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil.
3	Background		<b>NGSS Crosscutting Concepts. 4 – Systems and System Models. 3-5.</b> A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.
3	Background		<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
3	Background		<b>NGSS Crosscutting Concepts. 5 – Energy &amp; Matter: Flows, Cycles &amp; Conservation. 3-5.</b> Energy can be transferred in various ways and between objects.
3	Background		<b>NGSS Performance Expectations. 5-PS3-1.</b> Use models to describe that energy in animals food (used for body repair, growth and motion and to maintain body warmth) was once energy from the sun

3	Doing the Activity	Step 3	<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
3	Doing the Activity	Step 3	<b>Common Core. ELA-Literacy.CCRA.W.7.</b> Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. <b>Common Core. ELA-Literacy.CCRA.W.8.</b> Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. <b>Common Core. ELA-Literacy.CCRA.W.8.</b> Draw evidence from literary or informational texts to support analysis, reflection, and research.
3	Doing the Activity	Step 4	<b>C3 Framework. Dimension 3. Evaluating Sources &amp; Using Evidence. 1.3-5.</b> Gather relevant information from multiple sources while using the origin, structure, and context to guide the selection.
3	Doing the Activity	Step 5	<b>NGSS Performance Expectations. 5-LS2.1.</b> Develop a model to describe the movement of matter among plants, animals, decomposer, and the environment.
3	Doing the Activity	Step 7	<b>NGSS Science and Engineering Practices. 2 – Developing and Using Models. 3-5.</b> Develop and/or use models to describe and /or predict phenomena.
3	Doing the Activity	Step 8	<b>NGSS Crosscutting Concepts. 4 – Systems and System Models. 3-5.</b> A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.
3	Doing the Activity	Step 9	<b>Common Core. ELA-Literacy.CCRA.W.3.</b> Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
3	Doing the Activity	Step 10	<b>C3 Framework. Dimension 2. Geography.1.3-5.</b> Construct maps and other graphic representations of both familiar and unfamiliar places.
4	Background		<b>NGSS. Performance Expectations. 5-LS1-1.</b> Support an argument that plants get the materials they need for growth chiefly from air and water

4	Doing the Activity	Step 2	<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
4	Doing the Activity	Step 8	<b>NGSS Disciplinary Core Ideas. LS1.A ñ Structure and Function. 3-5.</b> Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior and reproduction.
4	Doing the Activity	Step 9	<b>NGSS Science and Engineering Practices. 3 ñ Planning and Carrying Out Investigations. 3-5.</b> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
4	Doing the Activity	Step 12	<b>NGSS Science and Engineering Practices. 5 ñ Using Mathematics and Computational Thinking. 3-5.</b> Organize simple data sets to reveal patterns that suggest relationships.
4	Doing the Activity	Step 12	<b>NGSS Science and Engineering Practices. 8 ñ Obtaining, Evaluating, and Communicating Information. 3-5.</b> Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.
4	Doing the Activity	Step 13	<b>Common Core. Math.3.MD.3.</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.
4	Doing the Activity	Step 14	<b>NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. 3-5.</b> Construct an explanation of observed relationships.
4	Doing the Activity	Step 14	<b>NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5.</b> Cause and effect relationships are routinely identified, tested, and used to explain change.
4	Doing the Activity	Step 16	<b>NGSS Science and Engineering Practices. 2 ñ Developing and Using Models. 3-5.</b> Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.

4	Enrich		<p><b>Common Core. ELA-Literacy.RI.3.2.</b> Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p><b>Common Core. ELA-Literacy.RI.4.2.</b> Determine the main idea of a text; recount the key details and explain how they support the main idea.</p> <p><b>Common Core. ELA-Literacy.RI.5.2.</b> Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.</p>
4	Enrich		<p><b>Common Core. Math.3.OA.D.8.</b> Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</p> <p><b>Common Core. Math.4.OA.A.2.</b> Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.</p>
4	Student Page		<p><b>NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5.</b> Cause and effect relationships are routinely identified, tested, and used to explain change.</p>
5	Background		<p><b>NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5.</b> Cause and effect relationships are routinely identified, tested, and used to explain change.</p>
5	Doing the Activity	Step 4	<p><b>NGSS Science and Engineering Practices. 2- Developing and Using Models. 3-5.</b> Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.</p>
5	Doing the Activity	Step 8	<p><b>NGSS Science and Engineering Practices. 4 – Analyzing and Interpreting Data. 3-5.</b> Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.</p>
5	Doing the Activity	Step 8	<p><b>NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5.</b> Cause and effect relationships are routinely identified, tested, and used to explain change.</p>
5	Doing the Activity	Step 8	<p><b>NGSS Disciplinary Core Ideas. LS2.B – Cycles of Matter and Energy Transfer in Ecosystems.</b> Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.</p>
5	Doing the Activity	Step 10	<p><b>NGSS Disciplinary Core Ideas. LS2.C – Ecosystem Dynamics, Functioning, and Resilience.</b> When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.</p>
5	Doing the Activity	Step 11	<p><b>NGSS Science and Engineering Practices ñ 6. Constructing Explanations and Designing Solutions. 3-5.</b> Apply scientific ideas to solve design problems</p>



5	Doing the Activity	Step 12	NGSS Science and Engineering Practices. 7 – Engaging in Argument from Evidence. 3-5. Construct and/or support an argument with evidence, data, and/or a model.
5	Doing the Activity	Step 13	Common Core. ELA-Literacy.W.3.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly. Common Core. ELA-Literacy.W.4.1.D, 5.1.D. Provide a concluding statement or section related to the opinion presented.
5	Doing the Activity	Step 15	NGSS Science and Engineering Practices. 5 – Using Mathematics and Computational Thinking. 3-5. Describe, measure, estimate, and/or graph quantities (e.g., area, volume, weight, time) to address scientific and engineering questions and problems.
5	Doing the Activity	Step 15	NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5. Cause and effect relationships are routinely identified, tested, and used to explain change.
5	Enrich		NGSS Science and Engineering Practices. 2- Developing and Using Models. 3-5. Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.
5	Enrich		NGSS Science and Engineering Practices. 5 – Using Mathematics and Computational Thinking. 3-5. Describe, measure, estimate, and/or graph quantities (e.g., area, volume, weight, time) to address scientific and engineering questions and problems.
5	Enrich		NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. 3-5. Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
6	Doing the Activity	Step 2	Common Core. ELA-Literacy.RI.3.1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. Common Core. ELA-Literacy.RI.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. Common Core. ELA-Literacy.RI.5.1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
6	Doing the Activity	Step 2	NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5. Cause and effect relationships are routinely identified, tested, and used to explain change.
6	Doing the Activity	Step 4	Common Core. ELA-Literacy.W.3.7. Conduct short research projects that build knowledge about a topic. Common Core. ELA-Literacy.W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic. Common Core. ELA-Literacy.W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.



6	Doing the Activity	Step 4	<b>NGSS Disciplinary Core Ideas. LS2.A – Interdependent Relationships in Ecosystems.</b> A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
6	Doing the Activity	Step 4	<b>Common Core. ELA-Literacy.W.3.2, W.4.2, W.5.2.</b> Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
6	Doing the Activity	Step 4	<b>C3 Framework. Dimension 2. Geography.1.3-5.</b> Construct maps and other graphic representations of both familiar and unfamiliar places.
6	Doing the Activity	Step 4	<b>NGSS Crosscutting Concepts. 2 – Cause and Effect. 3-5.</b> Cause and effect relationships are routinely identified, tested, and used to explain change.
6	Doing the Activity	Step 4	<b>NGSS Crosscutting Concepts. 5 – Energy and Matter: Flows, Cycles, and Conservation. 3-5.</b> Energy can be transferred in various ways and between objects.
6	Doing the Activity	Step 4	<b>NGSS Crosscutting Concepts. 7- Stability and Change. 3-5.</b> Change can be measured in terms of differences over time.
6	Doing the Activity	Step 5	<b>NGSS Science and Engineering Practices. 8 – Obtaining, Evaluating, and Communicating Information. 3-5.</b> Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.
6	Doing the Activity	Step 7	<b>Common Core. ELA-Literacy.SL.3.4.</b> Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. <b>Common Core. ELA-Literacy.SL.4.4.</b> Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace. <b>Common Core. ELA-Literacy.SL.5.4.</b> Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
6	Doing the Activity	Step 9	<b>NGSS Science and Engineering Practices. 6 – Constructing Explanations and Designing Solutions. 3-5.</b> Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
6	Doing the Activity	Step 9	<b>Common Core. Math.MP1.</b> Make sense of problems and persevere in solving them.

6	Enrich	<p><a href="#">Common Core. ELA-Literacy.SL.3.1.B</a>. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). <a href="#">Common Core. ELA-Literacy.SL.4.1.C</a>. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. <a href="#">Common Core. ELA-Literacy.SL.5.1.C</a>. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.</p>
6	Enrich	<p><a href="#">Common Core. ELA-Literacy.CCRA.W.7</a>. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. <a href="#">Common Core. ELA-Literacy.CCRA.W.8</a>. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. <a href="#">Common Core. ELA-Literacy.CCRA.W.9</a>. Draw evidence from literary or informational texts to support analysis, reflection, and research.</p>