Educator Guide

Offshore Wind Youth Action Program

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Credit: MHI Vestas Offshore Wind

UNIT/EDUCATOR RESOURCES

NYSERDA's Offshore Wind Youth Action program (OWYA) is a dynamic curriculum that offers several options for educators and students to engage with material about clean energy and climate action. The curriculum contains three lessons, each with reading material and activities. The reading material presents crucial background information that educators and/or students should review and understand in order to complete the activities. In addition, there are prompts with links to external resources to reinforce the background information as well as prompts to use social media. These external resources, prompts, and several of the activities provide opportunities for digital engagement with the material.

Each lesson provides students with the background knowledge they will need to successfully complete the activities and learn about climate action, clean energy, and offshore wind.

ASSESSMENT

Mastery of the essential questions and big ideas will be measured using the Key Takeaways activity at the end of each unit.

Lesson 1

UNIT NAME

What is Offshore Wind?

UNIT DESCRIPTION

Lesson 1 introduces students to OWYA, describes what offshore wind is, why it is important, and defines how it is developed. Lesson 1 begins with an explanation of how fossil fuel energy sources have contributed to climate change, providing the background information needed to understand the importance of renewable energy as a climate solution. The lesson then dives into the specifics of offshore wind and provides an overview of New York State's offshore wind projects.

ESSENTIAL QUESTIONS/ BIG IDEAS:

- What is the difference between renewable and non-renewable energy?
- What is climate change and what are its impacts in different regions of the world?
- How is offshore wind developed?
- What does offshore wind look like in New York State?

LESSON BREAKDOWN

- Background information, pages 4-37
- Five discrete activities:
  - **Activity 1** | OWYA Ice Breaker: page 9 (15 minutes)
  - **Activity 2** | Climate Impacts Research: page 17 (30 minutes -1 hour)
  - **Activity 3** | Clean Energy True or False: page 23; Activity Materials pages 80-81 (15 minutes)
  - **Activity 4** | Offshore Wind Site Planning Role Play: page 34; Activity Materials pages 82-91 (30 minutes-1 hour)
  - **Activity 5** | Lesson 1 Key Takeaways: page 35; Activity Materials pages 92-94 (15 minutes)

ACTIVITY LOOKAHEAD

Ahead of Lesson 1, let students know what activities they will be completing in order to reinforce their understanding of the lesson's content. Students will be asked to conduct and share research on the impacts of climate change, be quizzed on their clean energy knowledge, and, at the end of the lesson, participate in a stakeholder roleplay and negotiation to find an appropriate offshore wind farm site.

Lesson 2

UNIT NAME

How Does Offshore Wind Relate to My Community and Me?

UNIT DESCRIPTION

Lesson 2 dives deeper into the production of an offshore wind turbine and the impact that this new industry will have on different communities across New York State. Lesson 2 explains how different jobs and economic sectors will be involved in developing offshore wind, and explores how offshore wind relates to environmental justice, climate justice, and a 'just transition' for New Yorkers. The lesson provides crucial background information about socioeconomic and environmental disparities in New York State, and points to key legislation that aims to address these disparities.

ESSENTIAL QUESTIONS/ BIG IDEAS:

- How will offshore wind interact with different communities across New York State?
- What economic benefits does offshore wind present for New Yorkers?
- How will your community benefit from offshore wind and clean energy development?
- What is climate justice and a just transition, and why are these concepts important?
- How will clean energy development help New York State become more environmentally just?
- How does New York's Climate Act promote climate justice?

LESSON BREAKDOWN

- Background information, pages 38-59
- Four discrete activities:
  - **Activity 1** | Hometown Flyer: page 47 (30 minutes)
  - **Activity 2** | Environmental Justice Mapping: page 52 (10-30 minutes)
  - **Activity 3** | Offshore Wind News Scan: page 56 (20-30 minutes)
  - **Activity 4** | Lesson 2 Key Takeaways: page 56; Activity Materials 94-95 (15 minutes)

ACTIVITY LOOKAHEAD

In Lesson 2, students will create a flyer to educate others in their communities about the benefits of offshore wind development, utilize an online mapping tool to explore environmental justice issues in New York State, and research and compile news articles about the most recent developments in offshore wind.

Lesson 3

UNIT NAME

How Can I Get Involved in Offshore Wind in New York State?

UNIT DESCRIPTION

Lesson 3 asks participants to envision a clean energy future, presenting a number of ways they can continue to be involved in clean energy action at different scales. The lesson calls out ways in which participants can engage with clean energy action beyond OWYA, by talking to friends and family, or through civic engagement. The lesson also highlights clean energy and offshore wind-related jobs that participants could pursue in the future.

ESSENTIAL QUESTIONS/ BIG IDEAS:

- How can I continue to support offshore wind and clean energy action in my community?
- What opportunities exist for me to get involved in offshore wind and clean energy development in the future?
- What is my vision for a just, clean energy future for New York State?

LESSON BREAKDOWN

- Background information, pages 60-77
- Four discrete activities:
  - **Activity 1** | Create a Meeting Agenda: page 65; Activity Materials page 96 (15-30 minutes)
  - **Activity 2** | Write Your Representatives: page 66; Activity Materials page 97 (15 minutes)
  - **Activity 3** | Clean Energy Roadmap: page 72; Activity Materials pages 98-99 (15 minutes)
  - **Activity 4** | Lesson 3 Key Takeaways: page 72; Activity Materials pages 100-101 (15 minutes)

ACTIVITY LOOKAHEAD

In Lesson 3, students are presented with a number of activities that will assist them in taking action on offshore wind and clean energy development outside of OWYA. Activities include creating a meeting agenda to start a clean energy club at school, writing to their elected officials, and creating an action plan to achieve a clean energy future.

NYS DEPARTMENT OF EDUCATION SOCIAL STUDIES STANDARDS GRADES 6-12

	LESSON 1	2	3
A. GATHERING, INTERPRETING, AND USING EVIDENCE			
A2. Identify, describe, and evaluate evidence about events from diverse sources (including written documents, works of art, photographs, charts and graphs, artifacts, oral traditions, and other primary and secondary sources).		●	
A3. Analyze evidence in terms of content, authorship, point of view, bias, purpose, format, and audience.		●	
A4. Describe, analyze, and evaluate arguments of others.	●		
A6. Deconstruct and construct plausible and persuasive arguments, using evidence.	●		
B. CHRONOLOGICAL REASONING AND CAUSATION			
B1. Articulate how events are related chronologically to one another in time and explain the ways in which earlier ideas and events may influence subsequent ideas and events.	●	●	
B2. Identify causes and effects using examples from different time periods and courses of study across several grade levels.	●	●	
B3. Identify, analyze, and evaluate the relationship between multiple causes and effects.	●	●	
B4. Distinguish between long-term and immediate causes and multiple effects (time, continuity, and change).	●	●	
C. COMPARISON AND CONTEXTUALIZATION			
C2. Identify, compare, and evaluate multiple perspectives on a given historical experience.		●	
C5. Recognize the relationship between geography, economics, and history as a context for events and movements and as a matrix of time and place.		●	
C6. Connect historical developments to specific circumstances of time and place and to broader regional, national, or global processes and draw connections to the present (where appropriate).		●	

NYS DEPARTMENT OF EDUCATION SOCIAL STUDIES STANDARDS GRADES 6-12

	LESSON 1	2	3
D. GEOGRAPHIC REASONING			
D1. Ask geographic questions about where places are located, why their locations are important, and how their locations are related to the locations of other places and people.		●	
D2. Identify, describe, and evaluate the relationships between people, places, regions, and environments by using geographic tools to place them in a spatial context.		●	
D3. Identify, analyze, and evaluate the relationship between the environment and human activities, how the physical environment is modified by human activities, and how human activities are also influenced by Earth's physical features and processes.	●	●	●
D5. Recognize and analyze how place and region influence the social, cultural, and economic characteristics of civilizations.	●	●	●
F. CIVIC PARTICIPATION			
F1. Demonstrate respect for the rights of others in discussions and classroom debates; respectfully disagree with other viewpoints and provide evidence for a counter-argument.	●	●	●
F2. Participate in activities that focus on a classroom, school, community, state, or national issue or problem.	●	●	●
F5. Participate in persuading, debating, negotiating, and compromising in the resolution of conflicts and differences.	●		
F7. Work to influence those in positions of power to strive for extensions of freedom, social justice, and human rights.			●
F8. Fulfill social and political responsibilities associated with citizenship in a democratic society and interdependent global community by developing awareness of and/or engaging in the political process			●

THEMES

3) Time, Continuity, and Change (TCC)
4) Geography, Humans, and the Environment (GEO)
5) Development and Transformation of Social Structures (SOC)
6) Power, Authority, and Governance (GOV)
7) Civic Ideals and Practices (CIV)
9) Science, Technology, and Innovation (TECH)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 6-8

TOPIC: WEATHER AND CLIMATE

SECTION OF OWYA: LESSON 1 (MS-ESS3-5)

Performance expectation: MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Science and Engineering Practice	DCI	Crosscutting Concept
Ask questions to identify and clarify evidence of an argument. (MS ESS3-5)	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)	Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)

Connections to other DCIs in this grade-band: MS.PS3.A (MS-ESS3-5)

Articulation of DCIs across grade-bands: HS.PS3.B (MS-ESS3-5); HS.PS4.B (MS-ESS3-5); HS.ESS2.A (MS-ESS3-5); HS.ESS2.D (MS-ESS3-5); HS.ESS3.C (MS-ESS3-5); HS.ESS3.D (MS-ESS3-5)

New York State Next Generation Learning Standards: ELA/Literacy: 6-8.RST.1 Cite specific textual evidence to support analysis of science and technical texts, charts, graphs, diagrams, etc. Understand and follow a detailed set of directions. (MS-ESS3-5)

Mathematics: MP.2 Reason abstractly and quantitatively. (MS-ESS3-5); NY-6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem. Understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-5); NY-7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS3-5)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 6-8

TOPIC: ENGINEERING DESIGN

SECTION OF OWYA: LESSON 1 (MS-ETS1-2)

Performance expectation: MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Science and Engineering Practice	DCI	Crosscutting Concept
Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2)	There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2)	

Connections to MS-ETS1.A: Defining and Delimiting Engineering Problems include: Physical Science: MS-PS3-3; Connections to MS-ETS1.B: Developing Possible Solutions Problems include: Physical Science: MS-PS1-6, MS-PS3-3, Life Science: MS-LS2-5; Connections to MS-ETS1.C: Optimizing the Design Solution include: Physical Science: MS-PS1-6

Articulation of DCIs across grade-bands: 3-5.ETS1.A (MS-ETS1-2); 3-5.ETS1.B (MS-ETS1-2); 3-5.ETS1.C (MS-ETS1-2); HS.ETS1.A (MS-ETS1-2); HS.ETS1.B (MS-ETS1-2)

New York State Next Generation Learning Standards: ELA/Literacy: 6-8.RST.1 Cite specific textual evidence to support analysis of science and technical texts, charts, graphs, diagrams, etc. Understand and follow a detailed set of directions. (MS-ETS1-2); 6-8.RST.9 Compare and contrast the information gained from two or more experiments, simulations, videos, multimedia sources, readings from texts, graphs, charts, et., on the same topic. (MS-ETS1-2); 6-8.WHST.7 Conduct short research projects to answer a question (including a self-generated question by the end of grade 8), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2); 6-8.WHST.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-ETS1-2)

Mathematics: MP.2 Reason abstractly and quantitatively. (MS-ETS1-2)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 6-8

TOPIC: INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS

SECTION OF OWYA: LESSON 1 (MS-LS2-5)

Performance expectation: MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and protecting ecosystem stability.

Science and Engineering Practice	DCI	Crosscutting Concept
Evaluate competing design solutions based on jointly developed and agreed upon design criteria. (MS-LS2-5)	(NYSED) Biodiversity describes the variety of species found in Earth's ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5) Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (Secondary to MS-LS2-5) (NYSED) Humans impact biodiversity both positively and negatively. (Secondary to MS-LS2-5)	The use 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 in differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-LS2-5) Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5)

Connections to other DCIs in this grade-band: MS.ESS3.C (MS-LS2-5)

Articulation of DCIs across grade-bands: HS.LS2.A (MS-LS2-5); HS.LS2.C (MS-LS2-5); LS4.D (MS-LS2-5); HS.ESS3.A (MS-LS2-5); HS.ESS3.C (MS-LS2-5); HS.ESS3.D (MS-LS2-5)

New York State Next Generation Learning Standards: ELA/Literacy: 6-8.RST.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source by applying discipline specific criteria used in the social sciences or sciences; and quote or paraphrase the data/accounts and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS2-5); 8.R.8 Trace and evaluate an argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient and recognizing when irrelevant evidence is introduced. (MS-LS2-5)

Mathematics: MP.4 Model with mathematics. (MS-LS2-5); NY-6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-LS2-5); NY-6.SP.5 Summarize quantitative data sets in relation to their context. (MS-LS2-2)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 6-8

TOPIC: HUMAN IMPACTS

SECTION OF OWYA: LESSON 1 (MS-ESS3-3)

Performance expectation: MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Science and Engineering Practice	DCI	Crosscutting Concept
Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3)	Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) 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-ESS3-3)	Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS ESS3-3) 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-ESS3-3)

Connections to MS-ETS1.A: Defining and Delimiting Engineering Problems include: MS.LS2.A (MS-ESS3-3); MS.LS2.C (MS-ESS3-3); MS.LS4.D (MS-ESS3- 3)

Articulation of DCIs across grade-bands: 3.LS2.C (MS-ESS3-3); 3.LS4.D (MS-ESS3-3); 5.ESS3.C (MS-ESS3-3); HS.LS2.C (MS-ESS3-3); HS.LS4.C (MS-ESS3-3); HS.LS4.D (MS-ESS3- 3); HS.ESS2.C (MS-ESS3-3); HS.ESS2.D (MS-ESS3-3); HS.ESS2.E (MS-ESS3-3); HS.ESS3.C (MS-ESS3-3); HS.ESS3.D (MS-ESS3-3)

New York State Next Generation Learning Standards: ELA/Literacy: 6-8.WHST.7 Conduct short research projects to answer a question (including a self-generated question by the end of grade 8), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ESS3-3); 6-8. WHST.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS ESS3-3)

Mathematics: NY-6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS3-3)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 9-12

TOPIC: HUMAN SUSTAINABILITY

SECTION OF OWYA: LESSON 1 (HS-ESS3-1; HS-ESS3-2; HS-ESS3-4)

Performance expectation: HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

Science and Engineering Practice	DCI	Crosscutting Concept
Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) 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. (HS ESS3-1)	Resource availability has guided the development of human society. (HS-ESS3-1)	*Cause and Effect:* Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS3-1)

Performance expectation: HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Science and Engineering Practice	DCI	Crosscutting Concept
Design or refine a solution to a complex real-world problem, based on scientific knowledge, student generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4)	Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (Secondary to HS-ESS3-4)	Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) Engineers continuously modify these systems to increase benefits while decreasing costs and risks. (HS-ESS3-4)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 9-12

TOPIC: HUMAN SUSTAINABILITY

SECTION OF OWYA: LESSON 1 (HS-ESS3-1; HS-ESS3-2; HS-ESS3-4)

Performance expectation: HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

Science and Engineering Practice	DCI	Crosscutting Concept
Evaluate competing design solutions to a real world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). (HS-ESS3-2)	All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2); When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary to HS-ESS3-2)	Engineers continuously modify these systems to increase benefits while decreasing costs and risks. (HS-ESS3-2) Analysis of costs and benefits is a critical aspect of decisions about technology. (HS-ESS3-2) Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions. (HS-ESS3-2) Science knowledge indicates what can happen in natural systems—not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge. (HS-ESS3-2) Many decisions are not made using science alone, but rely on social and cultural contexts to resolve issues. (HS-ESS3-2)

Connections to other DCIs in this grade-band: HS.PS3.B (HS-ESS3-2); HS.PS3.D (HS-ESS3-2); HS.LS2.A (HS-ESS3-2); HS.LS2.B (HS ESS3-2), HS.LS2.C, (HS-ESS3-4), HS.LS4.D (HS-ESS3-2), (HS-ESS3-4); HS.ESS2.A (HS-ESS3- 2)

Articulation of DCIs across grade-bands: MS.PS3.D (HS-ESS3-2); MS.LS2.A (HS-ESS3-1),(HS-ESS3-2); MS.LS2.B (HS-ESS3-2); (HS-ESS3-4); MS.LS4.D (HS-ESS3-1),(HS-ESS3-2); MS.ESS2.A (HS-ESS3-1), (HS-ESS3-4); MS.ESS3.A (HS-ESS3-1),(HS-ESS3-2); MS.ESS3.B (HS-ESS3-1),(HS-ESS3-4); MS.ESS3.C (HS-ESS3- 2), (HS-ESS3-4); MS.ESS3.D (HS-ESS3-4)

New York State Next Generation Learning Standards: ELA/Literacy: 11-12.RST.1 Cite specific evidence to support analysis of scientific and technical texts, charts, diagrams, etc., attending to the precise details of the source, and attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-ESS3-1),(HS-ESS3-2),(HS-ESS3-4) 9-10.WHST.2 Write informative/explanatory text focused on discipline-specific content. (HS-ESS3-1; 11-12.WHST.2 Write explanatory and analytical text focused on discipline-specific content and which uses strategies for conveying information like those used in the respective discipline. (HS-ESS3-1)

Mathematics: MP.2 Reason abstractly and quantitatively. (HS-ESS3-1), (HS-ESS3-2), (HS-ESS3-4), AI-N.Q.1 Select quantities and use units as a way to: i) interpret and guide the solution of multi-step problems; ii) choose and interpret units consistently in formulas; and iii) choose and interpret the scale and the origin in graphs and data displays. (HS-ESS3-1), (HS-ESS3-4); AI-N.Q.3 Choose a level of accuracy appropriate to limitations on measurement and context when reporting quantities. (HS-ESS3-1), (HS-ESS3-4)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 9-12

TOPIC: ENGINEERING DESIGN

SECTION OF OWYA: LESSON 1 (HS-ETS1-2; HS-ETS1-3)

Performance expectation: HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Science and Engineering Practice	DCI	Crosscutting Concept
Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-2)	Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade offs) may be needed. (HS-ETS1-2)	

Performance expectation: HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Science and Engineering Practice	DCI	Crosscutting Concept
Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-3)	When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)	New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology. (HS ETS1-3)

Connections to other DCIs in this grade-band: Physical Science: HS-PS2-3, HS-PS3-3; Connections to HS-ETS1.B: Designing Solutions to Engineering Problems include: Earth and Space Science: HS-ESS3-2, HS-ESS3-4, Life Science: HS-LS2-7, HS-LS4-6; Connections to HS-ETS1.C: Optimizing the Design Solution include: Physical Science: HS-PS1-6, HS-PS2-3

Articulation of DCIs across grade-bands: MS.ETS1.A (HS-ETS1-2),(HS-ETS1-3); MS.ETS1.B (HS-ETS1-2),(HS-ETS1-3); MS.ETS1.C (HS ETS1-2)

New York State Next Generation Learning Standards: ELA/Literacy: 11-12.RST.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-ETS1-3); 11-12.RST.8 Evaluate the data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-ETS1-3); 11-12.RST.9 Compare and contrast findings presented in a source to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. (HS-ETS1-3)

Mathematics: MP.2 Reason abstractly and quantitatively. (HS-ETS1-3); MP.4 Model with Mathematics. (HS-ETS1-2),(HS-ETS1-3)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 9-12

TOPIC: INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS

SECTION OF OWYA: LESSON 1 (HS-LS2-7)

Performance expectation: HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Science and Engineering Practice	DCI	Crosscutting Concept
Design, evaluate, and refine a solution to a complex real world problem, based on scientific knowledge, student generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-LS2-7)	Anthropogenic changes (induced by human activity) in the environment— including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7) Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (Secondary to HS-LS2-7) When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (Secondary to HS LS2-7)	Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS ESS3-3) 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-ESS3-3)

NYS DEPARTMENT OF EDUCATION SCIENCE STANDARDS GRADES 9-12

TOPIC: INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS

SECTION OF OWYA: LESSON 1 (HS-LS2-7)

Connections to MS-ETS1.A: Defining and Delimiting Engineering Problems include: HS.ESS2.D (HS-LS2-7); HS.ESS2.E (HS-LS2-7); HS.ESS3.A (HS-LS2- 7); HS.ESS3.C (HS-LS2-7)

Articulation of DCIs across grade-bands: MS.LS2.C (HS-LS2-7); MS.ESS3.C (HS-LS2-7); MS.ESS3.D (HS-LS2-7)

New York State Next Generation Learning Standards: ELA/Literacy: 9-10.RST.8 Assess the extent to which the reasoning and evidence in a source support the author's claim or a recommendation for solving a scientific or technical problem. (HS-LS2-7); 11-12.RST.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-7); 11-12.RST.8 Evaluate the data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS2-7); 11-12.WHST.5 Conduct short as well as more sustained research projects to answer a question (including a self-generated question), analyze a topic, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS2-7)

Mathematics: MP.2 Reason abstractly and quantitatively. (HS-LS2-7); AI-N.Q.1 Select quantities and use units as a way to: i) interpret and guide the solution of multi-step problems; ii) choose and interpret units consistently in formulas; and iii) choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-7); AI-N.Q.3 Choose a level of accuracy appropriate to limitations on measurement and context when reporting quantities. (HS-LS2-7)

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LSR-OSW-OWYA-educator-gm-1-v1 8/21