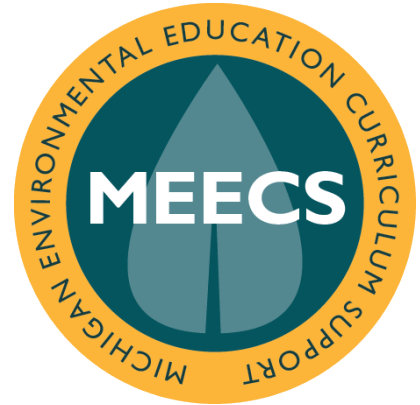


## MEECs to NextGen Alignment Documents



The Michigan Environmental Education Curriculum Support (MEECS) units were originally written to align with Michigan Content Standards for Science and Social Studies. They were reviewed for alignment with the Next Generation Science Standards (NGSS) in July 2013 in anticipation of those standards being adopted in Michigan, which occurred in November, 2015.

The following documents focus on Disciplinary Core Ideas addressed by each lesson in the MEECS units. Depending on how lessons are implemented in the classroom, MEECS Units can also demonstrate a range of Scientific and Engineering Practices and Crosscutting Concepts. For lessons that intentionally incorporate all three dimensions of the NGSS, see the updated Ecosystems & Biodiversity, Water Quality, and Climate Change units being released in 2023.

### Contents

- [Land and Environment \(grades 3 and 4\)](#)
- [Ecosystems and Biodiversity \(grades 4-6\)](#)
- [Land Use \(grades 4-6\)](#)
- [Water Quality \(grades 6-8\)](#)
- [Energy Resources \(grades 7-9\)](#)
- [Air Quality \(grades 7-9\)](#)
- [Climate Change: Science & Impacts \(grades 7-9\)](#)

## MEECS Unit: Land and Environment (grade 3 and 4)

### Grade - 3

Disciplinary Core Ideas	1. Michigan's Human World	2. Michigan's Land, Air, and Water	3. Michigan Land Cover	4. Michigan's Energy Resources
3-LS4-3. 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.	X	X	X	X
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	X	X	X	X
3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	X	X	X	X

### Grade - 4

Disciplinary Core Ideas	1. Michigan's Human World	2. Michigan's Land, Air, and Water	3. Michigan Land Cover	4. Michigan's Energy Resources
4-ESS3-1. Obtain and combine information to describe information to describe that energy and fuels are derived from natural resources and their uses affect the environment.				X
4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.				X

## MEECS Unit: Ecosystems and Biodiversity: Ecosystem Lessons (grades 4-6)

**Grade - 4**

Disciplinary Core Ideas	1. Ecosystem Basics	2. It's All Connected!	3A. Nature's Recycling! Part A: The Water Cycle	3B. Nature's Recycling! Part B: Photosynthesis and the Carbon Cycle	3C. Nature's Recycling: Part C: Decomposition	4. Michigan Ecosystems: What Have They Done For YOU Lately?	5. Michigan Time Machine
4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.							<b>X</b>
4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.							<b>X</b>

MEECS Unit: Ecosystems and Biodiversity: **Ecosystem Lessons** (grades 4-6)

**Grade – 5**

Disciplinary Core Ideas	1. Ecosystem Basics	2. It's All Connected!	3A. Nature's Recycling! Part A: The Water Cycle	3B. Nature's Recycling! Part B: Photosynthesis and the Carbon Cycle	3C. Nature's Recycling: Part C: Decomposition	4. Michigan Ecosystems: What Have They Done For YOU Lately?	5. Michigan Time Machine
5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	X		X	X			
5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.		X			X		
5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.		X					
5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.						X	X

**MEECS Unit: Ecosystems and Biodiversity: Ecosystem Lessons (grades 4-6)**

**Middle School (6-8)**

Disciplinary Core Ideas	1. Ecosystem Basics	2. It's All Connected!	3A. Nature's Recycling! Part A: The Water Cycle	3B. Nature's Recycling! Part B: Photosynthesis and the Carbon Cycle	3C. Nature's Recycling: Part C: Decomposition	4. Michigan Ecosystems: What Have They Done For YOU Lately?	5. Michigan Time Machine
MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	X	X			X		
MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	X	X	X	X			X
MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth's systems.	X		X	X			X
MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		X				X	

**MEECS Unit: Ecosystems and Biodiversity: Ecosystem Lessons (grades 4-6)**

**Middle School (continued)**

Disciplinary Core Ideas	1. Ecosystem Basics	2. It's All Connected!	3A. Nature's Recycling! Part A: The Water Cycle	3B. Nature's Recycling! Part B: Photosynthesis and the Carbon Cycle	3C. Nature's Recycling: Part C: Decomposition	4. Michigan Ecosystems: What Have They Done For YOU Lately?	5. Michigan Time Machine
MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.		<b>X</b>				<b>X</b>	<b>X</b>
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		<b>X</b>				<b>X</b>	
MS-ESS2-4. Develop a model to describe the cyclin of water through Earth's driven by energy from the sun and the force of gravity			<b>X</b>				
MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.				<b>X</b>			

MEECS Unit: Ecosystems and Biodiversity: **Ecosystem Lessons** (grades 4-6)

**Middle School (continued)**

Disciplinary Core Ideas	1. Ecosystem Basics	2. It's All Connected!	3A. Nature's Recycling! Part A: The Water Cycle	3B. Nature's Recycling! Part B: Photosynthesis and the Carbon Cycle	3C. Nature's Recycling: Part C: Decomposition	4. Michigan Ecosystems: What Have They Done For YOU Lately?	5. Michigan Time Machine
MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming molecules that support growth and/or release energy as this matter moves through an organism.				<b>X</b>			
MS-LS2-5. Evaluate competing design solutions for maintain biodiversity and ecosystem services.							<b>X</b>
MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.							<b>X</b>

MEECS Unit: Ecosystems and Biodiversity: **Biodiversity Lessons** (grades 4-6)

**Grade - 4**

Disciplinary Core Ideas	6. Michigan's Web of Life	7. Biodiversity Study	8. Threats and Protections for Michigan Biodiversity	9. Most Unwanted: Invaders of the Great Lakes Region	10. Michigan's Threatened Species
4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	X		X	X	X
4-ESS-2. Analyze and interpret data from maps to describe patterns of Earth's features.		X			

MEECS Unit: Ecosystems and Biodiversity: **Biodiversity Lessons** (grades 4-6)

**Grade - 5**

Disciplinary Core Ideas	6. Michigan's Web of Life	7. Biodiversity Study	8. Threats and Protections for Michigan Biodiversity	9. Most Unwanted: Invaders of the Great Lakes Region	10. Michigan's Threatened Species
5-LS-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	X				



## MEECS Unit: Ecosystems and Biodiversity: **Biodiversity Lessons** (grades 4-6)

### Middle School

Disciplinary Core Ideas	6. Michigan's Web of Life	7. Biodiversity Study	8. Threats and Protections for Michigan Biodiversity	9. Most Unwanted: Invaders of the Great Lakes Region	10. Michigan's Threatened Species
MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem			X		
MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	X	X	X	X	X
MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	X		X	X	X
MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	X				
MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.		X			X
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		X	X		

## MEECS Unit: Land Use (grades 4-6)

### Grade - 4

Disciplinary Core Ideas	1. Observing Land Use	2. Measuring Land Use and Land Cover	3. Classifying Land Use	4. Reflecting on How the Land Is Used	5. Analyzing Land Use Changes: State	6. Analyzing Agricultural Land Use Changes: County	7. Solving Land Use Conflicts	8. Investing Land Use, Water, and Air Relationships
4-ESS-2. Analyze and interpret data from maps to describe patterns of Earth's features.	X	X	X					
4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.							X	
4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	X		X	X			X	X

## MEECS Unit: Land Use (grades 4-6)

### Grade - 5

Disciplinary Core Ideas	1. Observing Land Use	2. Measuring Land Use and Land Cover	3. Classifying Land Use	4. Reflecting on How the Land Is Used	5. Analyzing Land Use Changes: State	6. Analyzing Agricultural Land Use Changes: County	7. Solving Land Use Conflicts	8. Investing Land Use, Water, and Air Relationships
5.ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.	X	X	X	X	X	X	X	
5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	X	X						
5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	X			X				

## MEECS Unit: Land Use (grades 4-6)

### Middle School

Disciplinary Core Ideas	1. Observing Land Use	2. Measuring Land Use and Land Cover	3. Classifying Land Use	4. Reflecting on How the Land Is Used	5. Analyzing Land Use Changes: State	6. Analyzing Agricultural Land Use Changes: County	7. Solving Land Use Conflicts	8. Investing Land Use, Water, and Air Relationships
MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.		X	X	X	X	X	X	
MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.				X			X	
MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.					X	X	X	

## MEECS Unit: Land Use (grades 4-6)

### Middle School (continued)

Disciplinary Core Ideas	1. Observing Land Use	2. Measuring Land Use and Land Cover	3. Classifying Land Use	4. Reflecting on How the Land Is Used	5. Analyzing Land Use Changes: State	6. Analyzing Agricultural Land Use Changes: County	7. Solving Land Use Conflicts	8. Investing Land Use, Water, and Air Relationships
MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.					X	X	X	
MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.								X
MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.								X
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.								X

## MEECS Unit: Water Quality (grades 6-8)

### Middle School

Disciplinary Core Ideas	1. Where is All the Water in the World?	2. How do We Use Water?	3. Do You Know YOUR Watershed?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Groundwater?	6. Would You Drink This Water?	7. How Healthy is This Stream?	8. How Can We Stop Storm Water?	9. Bio-accumulation and the Great Lakes Ecosystem
<b>MS-ESS2-4.</b> Develop a model to describe the cycling of water through Earth’s systems driven by energy from the sun and force of gravity.	X		X	X	X	X			X
<b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth’s systems.	X	X	X		X	X	X		X
<b>MS-ESS2-6.</b> Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	X								

**MEECS Unit: Water Quality (grades 6-8)**

**Middle School (continued)**

Disciplinary Core Ideas	1. Where is All the Water in the World?	2. How do We Use Water?	3. Do You Know YOUR Watershed?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Ground-water?	6. Would You Drink This Water?	7. How Healthy is This Stream?	8. How Can We Stop Storm Water?	9. Bio-accumulation and the Great Lakes Ecosystem
<p><b>MS-LS4-4.</b> Construct an explanation based on evidence that describe how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.</p>	X								
<p><b>MS-LS4-5.</b> Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p>	X								
<p><b>MS-ESS3-1.</b> Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.</p>	X								

## MEECS Unit: Water Quality (grades 6-8)

### Middle School (continued)

Disciplinary Core Ideas	1. Where is All the Water in the World?	2. How do We Use Water?	3. Do You Know YOUR Watershed ?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Ground-water?	6. Would You Drink This Water?	7. How Healthy is This Stream?	8. How Can We Stop Storm Water?	9. Bio-accumulation and the Great Lakes Ecosystem
<b>MS-LS2-1.</b> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		X		X				X	X
<b>4-ESS3-2.</b> Analyze and interpret data from maps to describe patterns of Earth's features.		X					X	X	
<b>MS-LS2-4.</b> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	X		X		X	X		X	



## MEECS Unit: Water Quality (grades 6-8)

### Middle School (continued)

Disciplinary Core Ideas	1. Where is All the Water in the World?	2. How do We Use Water?	3. Do You Know YOUR Watershed ?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Ground-water?	6. Would You Drink This Water?	7. How Healthy is This Stream?	8. How Can We Stop Storm Water?	9. Bio-accumulation and the Great Lakes Ecosystem
<b>MS-ETS1-1.</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.		X		X	X				
<b>MS-LS2-3.</b> Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.			X	X					
<b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.			X	X	X	X		X	X

**MEECS Unit: Water Quality (grades 6-8)**

**Middle School (continued)**

Disciplinary Core Ideas	1. Where is All the Water in the World?	2. How do We Use Water?	3. Do You Know YOUR Watershed ?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Ground-water?	6. Would You Drink This Water?	7. How Healthy is This Stream?	8. How Can We Stop Storm Water?	9. Bio-accumulation and the Great Lakes Ecosystem
MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.			X	X					
4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.			X	X				X	
MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales.						X			X
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.						X	X		

**MEECS Unit: Water Quality (grades 6-8)**

**Middle School (continued)**

Disciplinary Core Ideas	1. Where is All the Water in the World?	2. How do We Use Water?	3. Do You Know YOUR Watershed?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Ground-water?	6. Would You Drink This Water?	7. How Healthy is This Stream?	8. How Can We Stop Storm Water?	9. Bio-accumulation and the Great Lakes Ecosystem
<b>MS-PS1-2.</b> Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.							<b>X</b>		
<b>MS-LS1-6.</b> Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.							<b>X</b>		
<b>MS-ETS1-3.</b> Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.							<b>X</b>		<b>X</b>

## MEECS Unit: Energy Resources (grades 7-9)

### Middle School

Disciplinary Core Ideas	1. Energy Use in Michigan – Then and Now	2. Michigan’s Energy Resource Mix	3. Generating Michigan’s Electricity	4. Non-Renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product’s Life Cycle	8. Leaving Smaller Footprints.
<b>MS-LS2-4.</b> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.								X
<b>MS-LS2-2.</b> Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	X	X					X	X
<b>MS-LS2-5.</b> Evaluate competing design solutions for maintaining biodiversity and ecosystem service.						X		X
<b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth’s systems.		X				X	X	X

## MEECS Unit: Energy Resources (grades 7-9)

### Middle School (continued)

Disciplinary Core Ideas	1. Energy Use in Michigan – Then and Now	2. Michigan’s Energy Resource Mix	3. Generating Michigan’s Electricity	4. Non-Renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product’s Life Cycle	8. Leaving Smaller Footprints.
<b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.			X	X			X	X
<b>MS-ETS1-1.</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	X		X	X	X	X		
<b>MS-LS2-3.</b> Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.		X	X					

## MEECS Unit: Energy Resources (grades 7-9)

### Middle School (continued)

Disciplinary Core Ideas	1. Energy Use in Michigan – Then and Now	2. Michigan’s Energy Resource Mix	3. Generating Michigan’s Electricity	4. Non-Renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product’s Life Cycle	8. Leaving Smaller Footprints.
<b>MS-ESS3-1.</b> Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.		<b>X</b>						

## MEECS Unit: Energy Resources (grades 7-9)

### High School

Disciplinary Core Ideas	1. Energy Use in Michigan – Then and Now	2. Michigan’s Energy Resource Mix	3. Generating Michigan’s Electricity	4. Non-Renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product’s Life Cycle	8. Leaving Smaller Footprints.
HS-LS2-7. Design, evaluate, and refine solution for reducing the impacts of human activities on the environment and biodiversity.				X				X
HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	X		X		X	X	X	X
HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.		X	X	X	X	X		
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.				X	X		X	

## MEECS Unit: Energy Resources (grades 7-9)

### High School (continued)

Disciplinary Core Ideas	1. Energy Use in Michigan – Then and Now	2. Michigan’s Energy Resource Mix	3. Generating Michigan’s Electricity	4. Non-Renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product’s Life Cycle	8. Leaving Smaller Footprints.
HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.				X				
HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changed in climate have influenced human activity.				X	X		X	



## MEECS Unit: Air Quality (grades 7-9)

### Middle School

Disciplinary Core Ideas	1. What Gets into the Air?	2. Why Should We Be Concerned About Air Quality?	3. What Are the Sources of Air Pollution?	4. How Can We Monitor Air Quality?	5. How Can We Tell What the Quality of the Air is Today?	6. What Has Been Done About Air Pollution?	7. What Can We Do About Air Pollution?	8. How Can Our Actions Impact the World?
<b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth’s systems.	X	X	X	X	X			X
<b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	X	X	X	X	X	X	X	X
<b>MS-PS1-5.</b> Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	X							
<b>MS-ESS2-5.</b> Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.								X

## MEECS Unit: Air Quality (grades 7-9)

### High School

Disciplinary Core Ideas	1. What Gets into the Air?	2. Why Should We Be Concerned About Air Quality?	3. What Are the Sources of Air Pollution?	4. How Can We Monitor Air Quality?	5. How Can We Tell What the Quality of the Air is Today?	6. What Has Been Done About Air Pollution?	7. What Can We Do About Air Pollution?	8. How Can Our Actions Impact the World?
<b>HS-ESS3-6.</b> Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	X	X	X	X	X	X		X
<b>HS-LS2-5.</b> Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	X							X
<b>HS-LS4-6.</b> Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.			X		X		X	

## MEECS Unit: Air Quality (grades 7-9)

### High School (continued)

Disciplinary Core Ideas	1. What Gets into the Air?	2. Why Should We Be Concerned About Air Quality?	3. What Are the Sources of Air Pollution?	4. How Can We Monitor Air Quality?	5. How Can We Tell What the Quality of the Air is Today?	6. What Has Been Done About Air Pollution?	7. What Can We Do About Air Pollution?	8. How Can Our Actions Impact the World?
HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individual conditions in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.			X					
HS-LS2-7. Design, evaluate, and refine solution for reducing the impacts of human activities on the environment and biodiversity.				X			X	
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.				X			X	

MEECS Unit: Air Quality (grades 7-9)

High School (continued)

Disciplinary Core Ideas	1. What Gets into the Air?	2. Why Should We Be Concerned About Air Quality?	3. What Are the Sources of Air Pollution?	4. How Can We Monitor Air Quality?	5. How Can We Tell What the Quality of the Air is Today?	6. What Has Been Done About Air Pollution?	7. What Can We Do About Air Pollution?	8. How Can Our Actions Impact the World?
HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.						X	X	

## MEECS Unit: Climate Science (grades 7-9)

### Middle School

Disciplinary Core Ideas	1. What is Climate?	2. Earth's Energy Balance	3. The Greenhouse Effect	4. The Carbon Cycle: Sources and Sinks	5. Climate Forcing and Uncertainty	6. Evidence of Change	7. Climate Models Making Global Predictions
<b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		X					X
<b>MS-ESS2-5.</b> Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	X						
<b>MS-ESS2-6.</b> Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.		X					
<b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth's systems.		X	X	X	X		

## MEECS Unit: Climate Science (grades 7-9)

### Middle School (continued)

Disciplinary Core Ideas	1. What is Climate?	2. Earth's Energy Balance	3. The Greenhouse Effect	4. The Carbon Cycle: Sources and Sinks	5. Climate Forcing and Uncertainty	6. Evidence of Change	7. Climate Models Making Global Predictions
<b>MS-ESS3-2.</b> Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	X	X					
<b>MS-ESS3-5.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperature over the past century.		X	X		X	X	

## MEECS Unit: Climate Science (grades 7-9)

### High School

Disciplinary Core Ideas	1. What is Climate?	2. Earth's Energy Balance	3. The Greenhouse Effect	4. The Carbon Cycle: Sources and Sinks	5. Climate Forcing and Uncertainty	6. Evidence of Change	7. Climate Models Making Global Predictions
<b>HS-ESS2-2.</b> Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that cause changes to other Earth's Systems.	X		X				
<b>HS-ESS3-5.</b> Analyze geoscience data that results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.	X		X		X		X
<b>HS-ESS2-4.</b> Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	X						X
<b>HS-ESS3-6.</b> Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	X		X	X			X
<b>HS-LS4-6.</b> Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.		X					

## MEECS Unit: Climate Science (grades 7-9)

### High School (continued)

Disciplinary Core Ideas	1. What is Climate?	2. Earth's Energy Balance	3. The Greenhouse Effect	4. The Carbon Cycle: Sources and Sinks	5. Climate Forcing and Uncertainty	6. Evidence of Change	7. Climate Models Making Global Predictions
HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.			X				
HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.				X			
HS-LS2-7. Design, evaluate, and refine solution for reducing the impacts of human activities on the environment and biodiversity.		X	X	X	X		X
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.		X	X	X	X		X
4-ESS3-1. Obtain and combine information to describe information to describe that energy and fuels are derived from natural resources and their uses affect the environment.							X



## MEECS Unit: Climate Impacts (grades 7-9)

### Middle School

Disciplinary Core Ideas	8. Climate Change Indicators	9. Plant and Animal Phenology	10. Ecosystem Relationships	11. Water Balance and the Great Lakes	12. What Can I Do?	13. Community Conversation	14. Climate Change in the News
<b>MS-ESS3-5.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperature over the past century.			X	X		X	
<b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	X	X			X	X	
<b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		X					
<b>MS-ESS2-6.</b> Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	X		X			X	
<b>MS-LS2-4.</b> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		X			X		

## MEECS Unit: Climate Impacts (grades 7-9)

### Middle School (continued)

Disciplinary Core Ideas	8. Climate Change Indicators	9. Plant and Animal Phenology	10. Ecosystem Relationships	11. Water Balance and the Great Lakes	12. What Can I Do?	13. Community Conversation	14. Climate Change in the News
<b>MS-LS2-1.</b> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		X					
<b>MS-LS2-2.</b> Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.		X					
<b>MS-ESS3-1.</b> Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.					X		
<b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.					X		X

## MEECS Unit: Climate Impacts (grades 7-9)

### High School

Disciplinary Core Ideas	8. Climate Change Indicators	9. Plant and Animal Phenology	10. Ecosystem Relationships	11. Water Balance and the Great Lakes	12. What Can I Do?	13. Community Conversation	14. Climate Change in the News
HS-LS2-7. Design, evaluate, and refine solution for reducing the impacts of human activities on the environment and biodiversity.	X						
HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	X					X	
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	X				X		
HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.		X	X				X

## MEECS Unit: Climate Impacts (grades 7-9)

### High School (continued)

Disciplinary Core Ideas	8. Climate Change Indicators	9. Plant and Animal Phenology	10. Ecosystem Relationships	11. Water Balance and the Great Lakes	12. What Can I Do?	13. Community Conversation	14. Climate Change in the News
HS-ESS3-5. Analyze geoscience data that results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.		X	X			X	
HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.			X				
HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.			X	X			
HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.				X			

## MEECS Unit: Climate Impacts (grades 7-9)

### High School (continued)

Disciplinary Core Ideas	8. Climate Change Indicators	9. Plant and Animal Phenology	10. Ecosystem Relationships	11. Water Balance and the Great Lakes	12. What Can I Do?	13. Community Conversation	14. Climate Change in the News
<p><b>HS-LS2-6.</b> Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.</p>				X			
<p><b>HS-LS2-2.</b> Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.</p>				X			
<p><b>HS-ESS3-6.</b> Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.</p>				X	X		
<p><b>HS-LS4-6.</b> Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.</p>						X	

## MEECS Unit: Climate Impacts (grades 7-9)

### High School (continued)

Disciplinary Core Ideas	8. Climate Change Indicators	9. Plant and Animal Phenology	10. Ecosystem Relationships	11. Water Balance and the Great Lakes	12. What Can I Do?	13. Community Conversation	14. Climate Change in the News
<b>HS-LS4-5.</b> Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individual conditions in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.						X	

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