

Lesson 1 - Phenomenon Exploration

 NGSS 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	Materials: Thinking log Pencil Video Solar/wind Water test Salt Tap water One bottle of commercial water	Thinking Log P.1 	At the end of the lesson, students will... Share their ideas about the phenomenon and think of possible questions to investigate.
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Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
 p.1-4	Asking Questions and Defining Problems	ESS2.C: The Roles of Water in Earth's Surface Processes	Structure and Function
	Students will... Observe phenomenon about the four spheres, saltwater and freshwater, and how we create energy.	Students will... think about energy sources and water sources around the world.	Students will... understand what makes up saltwater and freshwater and the difference between the two.

Instructional Sequence

- In this phenomenon exploration lesson the teacher will set up four stations before the lesson begins. The teacher will put students in groups and give them five minutes to explore the station and then three minutes to reflect in their journals. After they reflect they will rotate to the next station until they have been to all four. Below is a description of the stations:
 - Station 1** - a [Youtube video](#) of a spaceship returning to Earth and interacting with the atmosphere. The purpose of this station is to get students to think about the different spheres, but especially the atmosphere. Most students will likely be able to identify the hydrosphere, biosphere, and geosphere, but might not think about the atmosphere. This will connect to [5-ESS2-1](#) later on.
 - Station 2** - [Mini solar/wind](#) energy. Have the students take turns playing with the items. You may want to set this station up next to the window to make sure they get the solar energy they need. This station will connect to the investigation aligned to [4-ESS3-1](#).
 - Station 3** - [Water test](#) Set up Three cups of water. In the first one pour in some salt, in the second one pour in regular tap water, and in the third pour in some commercially bought water like Evian, Fiji, or any other filtered water (if you forget to bring some you can also use water from the drinking fountain). Have the students run the water test by dipping the strip into the water and then hold it up to the color wheel. This will connect to the investigation aligned to [5-ESS2-2](#).
 - Station 4** - In the last station students will open to [p.1](#) in their thinking log and draw pictures of the different parts of the Earth. Tell them to draw every type of place on Earth and think about how these different places interact. This will connect to [5-ESS2-1](#) later on.

Next Lesson: Students will develop the Big Idea and investigation questions.

Lesson 2- Develop the Big Idea and question for Investigation #1

NGSS  5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	Materials: Thinking log Pencil Materials from	Thinking Log p. 5 	At the end of the lesson, students will... Develop a Big Idea for the unit a list of questions to possibly test.
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Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
 P. 5 and 6	Asking Questions and Defining Problems Students will... Identify the big idea for the unit and develop a list of investigable questions.	ESS2.A: Earth Materials and Systems Students will... Think about questions they have about energy and water.	Patterns Students will... identify patterns about different parts of the Earth, water sources, and energy sources

Instructional Sequence

- Begin the lesson by asking students to review what they learned in the previous lesson and what questions they still have. After letting the students describe what they learned ask them questions similar to these:
 - What do you think the atmosphere does for us?
 - Do you think humans can affect the atmosphere?
 - Do you think other parts of the Earth, like the ocean or plants, can affect the atmosphere?
 - How much water do you think is on Earth?
 - Do you think most of the water on Earth is drinkable?
 - How do you think people get most of their energy?
- After some discuss co-construct a Big Idea with the students. The Big Idea should be something similar to: The Earth has many different systems and ways to create energy.
- After creating the Big Idea, tell students to write out as many questions they have that they would like to investigate. Tell them the questions must fit under the big idea, must be safe, and we must be able to be performed at school.
- Let the students create their own questions and if their questions fit the content of the standards feel free to use theirs. However, you can also include yourself in the question creation process.
 - The next lesson will be the investigation into [5-ESS2-1](#). So you could pose the question: “How do different parts of the Earth interact with each other?”

Next Lesson: Plan investigation #1

Lesson 3 Math-Infusion

 5-ESS2-1. <u>Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.</u>		Materials: Thinking log Pencil	Thinking Log p. 6-7 	At the end of the lesson, students will... understand how the biosphere can impact the atmosphere.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
 P. 8-9	Using Mathematics and Computational Thinking	ESS2.A: Earth Materials and Systems	Systems and System Models	
	Students will... Solve a math problem to help them understand the interaction between the biosphere and atmosphere.	Students will... learn about Earth's systems interacting by solving a math problem.	Students will... think about models of Earth's systems and how they interact.	

Instructional Sequence

- This lesson is a math-infusion and history lesson about a real-life example of the biosphere interacting with the atmosphere. On [p. 6](#) the students will read a story about how scientists in the late 70's discovered that the ozone layer was getting thinner. Later they discovered that chlorofluorocarbons (CFCs) were causing the issue. After banning CFCs the ozone layer has almost completely recovered.
- Next, on page 7 the students will solve a math problem aligned to the Common Core math standard below:
 - *5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.*
 - Students will learn that The ozone layer is actually very thin. In fact, it is only 3 millimeters thick or the thickness of three pennies stacked on top of each other. When CFCs were being used From 1978 to 1988, ozone levels decreased by 3%. Students will be asked How thin did the ozone layer get when CFCs were being used?
 - The purpose of doing this math problem is to have students learn about an actual interaction between the biosphere and atmosphere where human activity could have caused real damage and even killed people if scientists didn't intervene.

This lesson will let your students practice math and let them begin to think about spheres interacting, which will be the focus of the modeling lesson.

Next Lesson: Students will develop a model about how Earth's spheres interact.

Lesson 4 - Develop a model of understanding

5-ESS2-1. <u>Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.</u> NGSS 		Materials: Thinking logs, pencil, Materials around the classroom. Google Doc	Thinking Log p. 8 	At the end of the lesson, students will... create a model that describes the interaction between Earth's spheres
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
 P. 10	Developing and Using Models	ESS2.A: Earth Materials and Systems	Systems and System Models	
	Students will... Develop a model to show how different spheres interact.	Students will... Use their model to explain their understanding of Earth systems in their own words.	Students will... Use their model to explain their understanding of Earth systems in their own words.	

Instructional Sequence

- **Note-This lesson might take a few days so plan accordingly.* You will begin the lesson by telling your students that they will be put in small groups and research about different spheres and how they interact.
- Start out by sending them this [Google Doc](#) where they will learn basic information about the geosphere, biosphere, hydrosphere, and atmosphere. Next, give them this [Google Doc](#)
- After the students read the second [Google Doc](#), have a discussion about various ways that Earth's spheres interact with each other.
- Next, tell the students to select one of the following interactions (short descriptions are in the second [Google Doc](#))
 - The water cycle
 - Erosion/Weathering/Deposition
 - Oxygen/Carbon Dioxide cycle
 - Air/Water cycle
 - Or any other interactions in the Google Doc
- Over the next few days students will develop a model about one of these sphere interactions. Students can use the information in the Google Docs and possibly use your school library or help them search online for more information. Let the students be creative in developing the type of "model" they want to create. A model could be a physical model, an analogue model (an abstract idea like a cell city), a powerpoint presentation, a skit that explains the interaction, a story, or any other way that students can represent their understanding.

Next Lesson: Students will present their models to the class

Lesson 5- Present Models

 NGSS 5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.		Materials: Materials Rubric	NA Feedback Forms	At the end of the lesson, students will... present their models of understanding about Earth's spheres.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
 P. 11	Developing and Using Models	ESS2.A: Earth Materials and Systems	Systems and System Models	
	Students will... Present their model to show how different spheres interact.	Students will... Use their model to explain their understanding of Earth systems in their own words.	Students will... Use their model to explain their understanding of Earth systems and how they interact.	

Instructional Sequence

- In this lesson students will present their model of understanding to the rest of the class.
- There is no right or wrong way to have the students present. A few options are:
 - Traditional presentation where groups come up to the front of the class and present.
 - A “Model” fair where students set up their models in the cafeteria.
 - Make videos.
 - Create podcasts.
- However, make sure that all of your students give each other feedback. This [link](#) will take you to an evaluation form for your students to fill out. Print out as many as you need and have them rate each presentation by checking yes or no to the questions Did the model describe the spheres? Did the model describe how the spheres interact with each other? And a section for comments.
- If a group does not meet the expectations of the rubric (the model doesn't meet the expectations of the rubric. Allow the group to go back and make adjustments to their model and re-present.

Next Lesson: Design Investigation #2

Lesson 6- Design Investigation #2

 NGSS 5-ESS2-2. <u>Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</u>		Materials: Water filtration system Water test Homemade filtration system	Thinking Log p. 9 	At the end of the lesson, students will... Design an investigation about saltwater and freshwater on Earth.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
 P. 12	Planning and Carrying Out Investigations	ESS2.C: The Roles of Water in Earth's Surface Processes	Scale, Proportion, and Quantity	
	Students will... Design an experiment where they will test water.	Students will... learn about the amount of freshwater on Earth and what type of water is drinkable.	Students will... learn about the amount of freshwater there is on Earth.	

Instructional Sequence

- Begin the lesson by reviewing the model of how the biosphere and hydrosphere interact. Have a discussion about how humans need to prioritize keeping freshwater clean and drinkable.
- Ask students: How much of Earth is made of water? How much of that water is drinkable?
 - Let the students engage in argumentation and then after some time give them this [Google Doc](#)
- After students read the information and realize only 2.5% of the Earth's water is freshwater, ask your students what questions do you have about drinkable water? Tell students that you have a [Water filtration system](#), [Homemade filtration system](#), and the [Water test](#) strips from the phenomenon exploration. They can use it if they want. Some questions might include:
 - Can we make saltwater drinkable?
 - For this question you could make salt water and then use the [Water filtration system](#) and test it with the [Water test](#) strips (**note-the water filtration system would not make the saltwater drinkable*)
 - How do we make dirty water clean?
 - Does a homemade filter system work as good as a store bought one?
 - For this question you could make dirty water and then run some through [Water filtration system](#) and some through [Homemade filtration system](#) and then test them with the [Water test](#) strips.
- You can have students do one of these tests or they could do multiple tests.
- Have students fill out [page 9](#) in the experimental design and use this [experimental design guide](#) to help you guide the students to the experiment.
 - Here is a [teacher key](#) for the salt water test and here is [one](#) for the homemade vs. commercial. Please allow students the chance to design the investigation first and then have a whole group discussion about what the design should look like.

Next Lesson: Complete the investigation

Lesson 7- Investigation #2

 NGSS 5-ESS2-2. <u>Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</u>		Materials: Water filtration system Water test Homemade filtration system	Thinking Log p. 10 	At the end of the lesson, students will... Conduct the water experiment.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
 P. 13	Obtaining, Evaluating, and Communicating Information	ESS2.C: The Roles of Water in Earth's Surface Processes	Scale, Proportion, and Quantity	
	Students will... conduct an experiment to determine if they can filter dirty or salt water.	Students will... learn about the amount of freshwater on Earth and what type of water is drinkable.	Students will... learn about the amount of freshwater there is on Earth.	

Instructional Sequence

- In this lesson students will complete the investigation they developed in the previous lesson. Your lesson will depend on the question you ended up deciding to investigate. However, the end goal of the investigation is to get your students to think about which type of water is drinkable and which isn't. Ultimately we will show students that only a small amount of water on Earth is drinkable and they will display this on a map.
- If you complete the saltwater investigation, have students test the water with salt water in it before it is filtered. Then they should test the regular cup of tap water.
- If you complete the "dirty" water test students will recognize that the contaminated cup will have things in it that will make it unsafe to drink.
 - *Note- after the students filter that water and record their observations on [p.10](#) don't let them drink the water. Tell them that we should do some more research before we drink the water.*
- After the students finish filtering the water they should notice that the dirty or saltwater cups are clearer. Next ask your students:
 - "Since the cups are clear, does that mean it is safe to drink?"
- This will be our guiding question for the negotiation lesson.

Next Lesson: Students will engage in argumentation about freshwater.

Lesson 8 Negotiation Lesson



5-ESS2-2. [Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.](#)

Materials:
Thinking log
Pencil
Results of the investigation.

[Thinking Log p. 11](#)



At the end of the lesson, students will...construct claims based on the observations they make from the investigation.

Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
 P. 14-20	Engaging in Argument from Evidence	ESS2.C: The Roles of Water in Earth's Surface Processes	Scale, Proportion, and Quantity
	Students will... Make claims based on their observations.	Students will... demonstrate their understanding of where water reserves are on earth through negotiation.	Students will... demonstrate an understanding of the scale of saltwater compared to freshwater by engaging in negotiation.

Instructional Sequence-NEGOTIATION DAY

- In this lesson students will attempt to make sense of the data they collected in the investigation in the previous lesson. The most important part of this lesson is to get kids to discuss their ideas on why the car moved faster or with more strength when you added more twists of the rubber band.
- Start the lesson by reviewing the [negotiation rules](#) and then starting with a question about why the car moved the way it did. When a student makes a claim, ask them what their evidence is and then ask other kids if they agree or disagree. ” Ideally, you would like to have students raise two competing ideas, but if they don’t you can pose the following wedge question.



WEDGE QUESTION: Last year my students had different ideas about how you can tell if water is safe to drink. Some students thought that if the water was clear it still wasn’t safe to drink. Other students thought that since it was clear it was safe. What do you think?

- Do a quick review of claims, evidence, and reasoning. Then, at the end of the lesson, have every student open to page 11 in their thinking log and record your claim and evidence for how the number of turns affects how fast the car goes.
Claim: I don’t think we should test the water even though it is clear.
Evidence: No one drank the water so we don’t know if it is safe
Reasoning: clear liquids can be dangerous so we should wait until we can do a better test.

Next Lesson: Check with the experts and revised claim

Lesson 9- Check with the experts and revised claim

NGSS 5-ESS2-2. <u>Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</u>			Materials: Thinking logs and pencil CWE #1 CWE#2	Thinking Log p. 12 	At the end of the lesson, students will... Think about their initial claim, check with experts, and consider revising or adding to their original claim.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts		
 P. 20-23	Engage in Argument from Evidence	ESS2.C: The Roles of Water in Earth's Surface Processes	Scale, Proportion, and Quantity		
	Students will... expand their understanding of fresh and saltwater by checking with the experts.	Students will... understand water's role on Earth by reading what the experts have written.	Students will...check their understanding of the scale of saltwater compared to freshwater on Earth by reading what the experts have written.		

Instructional Sequence

- Begin, you will teach students a mini lesson about finding a reliable source. Have the students look at [page 21](#) on the instructional slides and ask them
 - a. “We found a scientist. Let’s look at what she knows and decide if we should listen to him.
 - b. Then have a whole group discussion about why they trusted one author over the other. Hopefully, the students will support the author because he has expertise (he is the Chief Water Quality Engineer for the largest water purifiers in the United States and he is a doctor), he has integrity (he was awarded the Water Quality Association’s Excellence Award) and he is sharing her information for free and to help young people learn science. These factors correlate with research about how people trust science. There are three major factors that play into trust:
 - c. **Expertise-** The person has an advanced degree or is a professional in the field.
 - d. **Integrity-** The person’s work has been recognized by other experts in the field as high quality work.
 - e. **Benevolence** - The person is sharing their work to advance the field (scientists work together to push science forward).
 - i. Next, give them this [bad check with the experts](#) that support the wrong idea. Have them look at the author and hopefully they will recognize it is an untrustworthy source.
- Next, read the [good check with the experts](#) and ask the students to think about how the text helped answer the question.
- Finally, have your students watch this [video](#) from NASA about water distribution across the world.

Next Lesson: Formative Assessment

Lesson 10- Formative Assessment

NGSS 5-ESS2-2. <u>Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.</u>			Materials: Thinking Log	Thinking Log p. 13-14 	At the end of the lesson, students will...Express their understanding of where freshwater and saltwater distribution on Earth by completing multiple types of assessment.
<u>Instructional Slides</u>	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts		
 P. 25-26	<u>Using Mathematics and Computational Thinking</u>	<u>ESS2.C: The Roles of Water in Earth's Surface Processes</u>	<u>Scale, Proportion, and Quantity</u>		
	Students will... calculate and graph the distribution of water on Earth.	Students will... write and draw images of different bodies of water.	Students will...calculate the percentage of different types of water on Earth.		

Instructional Sequence

- In this formative assessment students will represent their understanding of water distribution on Earth through various ways.
- First, print out or give them these two Check With the Experts [CWE#1](#) and [CWE#2](#)
- Next, have the students open to [page 12](#) and write the question at the top of the page. Then have them read the lines of evidence on the page (taken directly from the check with experts).
 - a. If your question was “Can we make dirty or salt water drinkable?” the first two pieces of evidence don’t really help answer that question. However, the third piece of evidence will answer the question that yes, dirty and salt water can be changed into drinking water.
 - i. This assignment is connected to Common Core Literacy standard: *LA.5.W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.*
- Next, have the student fill out the formative assessment on [p. 13](#). Students can draw a picture to describe their understanding of how water is distributed. They can draw an image of a glacier, oceans, groundwater, and surface water (lakes, rivers, and ponds). Then they can write about how the majority of water is saltwater and both salt and freshwater can be cleaned and used.
- Finally, students will look at [CWE#2](#) and have the students write down the percentage of water that is saltwater, glaciers, lakes, and rivers. Let them pick a color to represent each body of water and then color them in on the map of the Earth.
 - a. Then, have students create a bar graph of the percentage of saltwater and freshwater on Earth.

Next Lesson: Engineering Challenge

Lesson 11-Engineering Challenge

 NGSS 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment	Materials: Engineering Challenge Thinking log	Thinking Log p. 15-17 	At the end of the lesson, students will...brainstorm ideas for their engineering challenge.
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Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
 P. 27-28	Obtaining, Evaluating, and Communicating Information Students will... share information with their group partners about how they will use science to build an energy efficient city.	ESS3.A: Natural Resources Students will... think about which type of natural resources are the best for building a new city.	Cause and Effect Students will...think about how human activity can impact the environment and decide which energy source would be the best for the environment of their model.

Instructional Sequence

- This is the beginning of the Engineering Challenge, which is different from regular investigations. Instead of having students develop questions with the teacher the students will be given a problem that then they will have to come up with a solution.
- Begin the lesson by either printing or emailing your students the [Engineering Challenge](#) document. In the document the student will read about how they have been asked to create a model of a new city being built outside of Las Vegas (a fictional town called Guttenberg, Nevada). The developer asks you to come up with a form of public transportation (so the people of Guttenberg don't have to drive to and from Las Vegas), an energy source to power the town, and ways to preserve freshwater (the town is being built in a desert).
- The goal of this lesson is to brainstorm ideas of how they will build the model. Get the students in groups of 3 or 4 and let them decide what to do. They could:
 - Make a physical model by using milk cartons  and then making models of public transportation, water preservation, and an energy source.
 - They could make a large drawing by using butcher paper or a poster that looks like this:
 - Or they could attempt to make a model online. Possible programs include: [Icograms](#) or [scratch](#)
 - *These might be a bit more challenging because it would require knowledge of these programs*



Next Lesson: Research different energy sources for their city

Lesson 12- Investigation #3 Research Project

 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.		Materials: Engineering Challenge Thinking log	Thinking Log p. 17 	At the end of the lesson, students will... identify the type of energy source they will choose to run their city.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
 P. 27-28	Obtaining, Evaluating, and Communicating Information	ESS3.A: Natural Resources	Cause and Effect	
	Students will... Read about different energy sources, how each one will impact their environment	Students will... think about how all energy on Earth originated from natural resources; beginning with the sun.	Students will... think about the cause and effect relationship between the input and output of an energy source.	

Instructional Sequence

- This lesson is a part of the engineering challenge, but will focus strictly on how energy sources are derived from natural resources. Give the students this report about the [climate of Guttenberg, Nevada](#), which will help them decide which energy source to select (Guttenberg is very hot, very dry, very sunny, and has average wind speeds.
 - After they read about each available energy source they will make an evidence-based decision about which energy source would be best to power their city.
- Students will read the following documents about renewable energy resources:
 - [Wind Energy](#)
 - [Solar Energy](#)
- Then they will read the following documents about non-renewable energy resources:
 - [Coal Energy](#)
 - [Nuclear Energy](#)
- Next, the group will meet and vote which energy source they think should power their town. Each group member should read the pros and cons of each energy source and watch the videos at the end of each document. After they read the documents each group member should make a claim about which energy source is the best fit for the building site.
- Finally, each group member will fill out [Thinking Log p. 17](#) and then present their final vote.
- After the group decides which energy source they will use in their model they will finish the lesson by deciding how they will build a model for the energy source they selected.
 - If they plan on drawing their model they can simply search the internet for images of the energy source and draw a copy.
 - If they plan on building a physical model there are links to youtube videos describing how to build the structures below:
 - [Wind Energy](#) [Solar Energy](#)
 - [Coal Energy](#) [Nuclear Energy](#)

Next Lesson: Students will build their energy source model

Lesson 13-Developing a Model (this lesson may take more than one day)

 NGSS 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.				Materials: Thinking log Paper Scissors tape	Thinking Log p. 15-17	At the end of the lesson, students will... Create a model of the energy source they selected to power their town.
Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts			
 P. 27-28	Developing and Using Models	ESS3.A: Natural Resources	Cause and Effect			
	Students will... create a physical, analogue, or some other type of model.	Students will... demonstrate their understanding of natural resources by building a model	Students will...students will consider how their model will effect the environment			

Instructional Sequence

- Students will work in groups to build their model of the energy source that will power their town.
- If they plan to build a physical model they can use these videos that show how to make them:
 - [Wind Energy](#)
 - [Solar Energy](#)
 - [Coal Energy](#)
 - [Nuclear Energy](#)
- Remind the students that it is fine to select any energy source, but they will need to justify why they selected it.
- After the students select their energy source they will need to work on deciding how they will preserve freshwater and which form of public transportation they will build.
 - Use these resources to help them [Ways to conserve water](#), [public transportation](#).
 - Students will add ways to conserve water and the type of public transportation to their models.

Next Lesson:Presenting the Plan

Lesson 14-Engineering Challenge/Multimodal Communication



[5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment](#)

Materials:
Any materials that the students used to create their models.

[Thinking Log p. 15-17](#)

At the end of the lesson, students will...
Present their models to the class or an alternative audience.

Instructional Slides	Science and Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
 P. 27-28	<u>Obtaining, Evaluating, and Communicating Information</u> Students will... represent their understanding of how people use science to protect natural resources.	<u>EESS3.C: Human Impacts on Earth Systems</u> Students will... display their understanding of how humans would impact the desert if they built a town outside of Las Vegas.	<u>Systems and System Models</u> Students will... represent how systems interact by explaining how the biosphere (humans) impact the geosphere (the land they are building on) in their model.

Instructional Sequence

- In this lesson students will present their model of understanding to the rest of the class.
- There is no right or wrong way to have the students present. A few options are:
 - Traditional presentation where groups come up to the front of the class and present.
 - A “Model” fair where students set up their models in the cafeteria.
 - Make videos.
 - Create podcasts.
- However, make sure that all of your students give each other feedback. This [link](#) will take you to an evaluation form for your students to fill out. Print out as many as you need and have them rate each presentation by checking yes or nothe questions.
- If a group does not meet the expectations of the rubric (the model doesn't meet the expectations of the rubric. Allow the group to go back and make adjustments to their model and re-present.

Next Lesson: NA