



Energize Me... the Alternative Way!

Middle School Food and Agricultural Literacy Curriculum

Precepts

- G. Physical Growth
- G1. Practice healthy eating habits.

National Standards

- PST.01.01.a. Identify renewable and nonrenewable energy sources and pathways of delivery.
- CS.02.01.01.c. Practice healthy eating habits.
- NL-ENG.K-12.3 – Evaluation Strategies
- NL-ENG.K-12.5 – Communication Strategies
- NL-ENG.K-12.12 – Applying Language Skills
- NS.5-8.2 – Physical Science

Student Learning Objectives

- As a result of this **unit** the students will...
- Describe alternative energy sources utilized in the United States.
- As a result of this **lesson** the students will ...
- Identify alternative energy sources.

Content Outline

Objective 1. Identify **alternative energy** sources

- I. **Alternative Energy: describes energy sources that are still in development.**
 - A. Types of **alternative energy**
 - 1. **Solar energy** – energy that is produced from the sun whether it's in the form of sunlight particles that can create electricity (solar electricity or photovoltaics) or in the form of heat to warm water or air space.
 - 2. **Wind energy** – energy that is produced from the natural movement of the wind; also considered a form of **solar energy** because wind is created by differences in the amount of heat that the sun sends to different parts of the earth.

Time

Instruction time for this lesson: 45 minutes.

Resources

Arms, K. (2004). Environmental Science. Austin, TX: Holt, Rinehart and Winston. — National FFA Organization. (2003). LifeKnowledge Precepts and signs of success. — Texas State Energy Conservation Office. (2005). Renewable energy resources for Texas. Retrieved August 24, 2009, from <http://www.infinitepower.org/pdf/No7%2096-812B.pdf>

Tools, Equipment, and Supplies

Writing surface
Transparencies and projector
Self-adhesive flip chart paper (6 sheets) or use any large paper such as end roll paper and attach with tape
MS.NR.6.1.TM.A – one per teacher (alternative energy definition)
MS.NR.6.1.TM.B – one per teacher (terms and meanings)
MS.NR.6.1.AS.A – one per student (notes page with blanks)
MS.NR.6.1.AS.B – one section per student (alternative energy cards: cut apart)
MS.NR.6.1.TM.C – one per teacher (category answers for alternative energy cards)
MS.NR.6.1.TM.D – one per teacher (chart for Descartes e-Moment)
Plain white copy paper – one sheet per student
Assortment of markers
MS.NR.6.1.ASSESS.A – one per student

Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

Alternative energy

Solar energy

Wind energy

Biomass energy

Geothermal energy

Hydroelectric energy

Tidal/wave energy

- 3. **Biomass energy** – energy that comes from materials that were once living, like plants or animal waste.
- 4. **Geothermal energy** – energy that comes from heat generated deep inside the earth from items like hot rocks, hot water, and steam
- 5. **Hydroelectric energy** – energy that is produced from moving or falling water.
- 6. **Tidal/wave energy** – energy that is produced when ocean tides or waves change or move across the ocean or sea.



Energize Me... the Alternative Way!

Before class, copy the **alternative energy** categories individually on flip chart paper and place them up around the classroom. Also, print **MS.NR.6.1.AS.B** and cut the sections apart for the **alternative energy** cards. One section per student. (It does not matter if the card has to be duplicated for more than one student)

Students should receive a piece of plain white copy paper when they enter the room for the day's activity. It would also be helpful to create your K-W-L chart for the *Descartes e-Moment*® on the board before class or project **MS.NR.6.1.TM.D**. The interest approach below is designed to start the students thinking about energy. Be sure to emphasize the word, "energy," and be dramatic as you share the announcement. Also, before class, print the notes page for the students and distribute it as they enter the room.

Interest Approach

Good morning. We have an announcement about the schedule tomorrow so please listen carefully! Tomorrow, we have to be at school at 6:00 a.m. We will be here working until 8:00 p.m. We will need a lot of energy to get us through the day, but we can only choose one thing to be our personal source of energy throughout the day. When I say OOMPH you will have 10 seconds to decide what one item you would choose to give you the energy you will need to make it through the day. What questions do you have? OOMPH

Allow think time, and then call on volunteers to suggest the one item they have chosen. Expect answers such as coffee, chocolate, and different types of energy drinks.

Well, those are all interesting choices but what would it do for our health if we consumed just energy drinks or just chocolate for an entire day or even a week?

Allow students to respond.

You are exactly right! It is not healthy for our bodies for us to get the energy we need from just one source and it is also not good for our environment for us to get all the energy we use from one source. Just as we must ensure our bodies get a balance of foods to give us the energy we need to carry on our daily activities, we must also consider other sources for mankind's energy needs to stop the pollution and environmental problems brought on by our huge dependence on energy from one source, fossil fuels.

We will not be arriving early for school and staying late tomorrow, but today we will start a new unit on **alternative energy**. This is a very important topic as our country struggles with how to supply all of the energy needs of Americans while working to be good stewards of our environment and natural resources. In order to make wise decisions about energy sources and use we will identify these **alternative energy** sources in today's lesson. This lesson requires you to listen carefully, think creatively, and share your ideas with the class. We will need our notebooks out ready to record the important information we will be discovering today.

You will use the *Descartes e-Moment* to assess students' prior knowledge about **alternative energy**. Before class, you will make a large chart on your board in which you will write the student responses (or project **MS.NR.6.1.TM.D**). At the top of the columns will be the titles: 1) What do you know about **alternative energy**? 2) What do you want to know about **alternative energy**? and 3) What you learned about **alternative energy**. You will ask students to record their responses for the first column (What you know about **alternative energy**?) and allow for time to share. Then you will repeat the process for the second column (What do you want to know about **alternative energy**?) and allow time to share. You will record the students' responses and leave the chart displayed throughout the lesson. The last column (What you have learned) will be completed as a review of what was learned today at the end of the lesson. The purpose of this activity is to determine what students know about **alternative energy** and to identify and correct any misconceptions before the lesson proceeds. Also, letting students express what they want to know gives your students buy-in for the lesson.

Summary of Content and Teaching Strategies

Objective 1. Identify **alternative energy** SOURCES.

- I. **Alternative Energy:** describes energy sources that are still in development.

Now, before we begin, let's take a moment to see where we are before we can know where to go. Please copy the chart on the board in your notebook.



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Allow time for the students to copy the chart from the board.

Here are two questions to think about. When you hear the first question, quietly write the response in the first column of the chart. We will only have one minute for each answer, so record as quickly as possible. Here is the first question: If asked, "What do you know about **alternative energy**?" how would you respond?

Allow students to write in their notebook.

Next, what if someone asked, "What do we want to know about **alternative energy**?" Record answers in the second column of the chart. Be ready to share all answers in a few moments!

Allow students to write their answers in their notebooks. Then ask volunteers to share their answers for both columns and capture them on the class chart. Discuss their responses.

We have some very good information here that has shed some light on the topic of **alternative energy** so now is a good time for us to get a definition in our notebooks.

Project **MS.NR.6.1.TM.A** **alternative energy** definition) and allow students time to copy it into their notes.

As the transparency says, "**Alternative energy** describes energy sources that are still in development and are renewable." There are several types of **alternative energy** that we will discuss in this unit. These forms of energy are important for us and our future because they come from renewable sources so they will always be available. You may recognize some of the forms of energy we will study, but hold on to your hats because we will also be introduced to some cutting edge methods to produce energy! Continue to be engaged learners as we capture those forms of energy in your notes.

Project **MS.NR.6.1.TM.B**. Read over the terms and their meanings. Allow students to fill in the blanks on the notes page **MS.NR.6.1.AS.A**.

A. Types of **alternative energy**

1. **Solar energy** – energy that is produced from the sun whether it's in the form of sunlight particles that can create electricity (solar

electricity or photovoltaics) or in the form of heat to warm water or air space.

2. **Wind energy** – energy that is produced from the natural movement of the wind; also considered a form of **solar energy** because wind is created by differences in the amount of heat that the sun sends to different parts of the earth.
3. **Biomass energy** – energy that comes from materials that were once living, like plants or animal waste.
4. **Geothermal energy** – energy that comes from heat generated deep inside the earth from items like hot rocks, hot water, and steam.
5. **Hydroelectric energy** – energy that is produced from moving or falling water.
6. **Tidal/wave energy** – energy that is produced when ocean tides or waves change or move across the ocean or sea.

To help students identify the different types of **alternative energy**, distribute the **alternative energy** cards (cut apart from **MS.NR.6.1.AS.A**). Students will take their card and go to the place in the room labeled with the type of energy they think their card represents.

Great job capturing that information! Now let's continue our discovery! In order to further understand these different types of energy and where they are generated from, we will be using some **alternative energy** cards. These cards will help us recognize different examples for each type of energy. Each **Alternative Energy Card** has an example of one of the types of energy that we see displayed on the chart paper as we look around the room. When I say MOVE, we will have 20 seconds to go quickly and quietly to the location that best categorizes the energy example on the card. Stand there silently until all students have chosen a location. What questions do you have? MOVE

When all students are in place you will project **MS.NR.6.1.TM.C** with the correct answers.

Excellent! Now let's check the transparency and make sure we are in the correct location. Now move to the correct location if needed.

Allow students in the incorrect category to check the transparency and move to the correct category.



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Starting with the group on my left, one at a time, read the example on your card.

Go around the room and allow students to share the example on their card. Allow all groups to read their cards.

Wow! We should certainly feel energized! When I say ZAP, we will leave the **alternative energy** cards by the chart label, move quickly and quietly back to our seats, and capture the examples in our notes. What questions are there? ZAP

Students will leave the cards by the category labels, go back to their seats, and add the examples to their notes.

Let's pause for a moment to catch our breath. We've just learned about some different types of **alternative energy** and their sources. Now we will take that information and represent it pictorially. Continue to be focused and creative as we draw what each type of energy means to each of us.

Review/Summary

Students will use a blank sheet of paper to assimilate information they have just gleaned in a Picasso e-Moment. They will fold their paper to make six separate squares following the directions below. Model the folding process as you tell them how to do it. They will draw what each type of energy means to them with a different type – solar, wind, biomass, geothermal, hydroelectric and tidal – in each square.

Take the sheet of plain white paper and fold it hot dog style. Now fold it in thirds lengthwise. When you open your paper you will have six equal squares.

Allow students to fold their paper.

Super folding! Now, when I say DRAW, in each of the squares, draw a picture that represents a different type of **alternative energy** learned today. Be sure to label each type. What questions do you have? DRAW

Allow students time to draw. Ask several volunteers to share their drawings.

Great drawings! Good job being so creative. Now, focus on the board for completion of our last column. It says, "What I have learned." When I say GO, take one minute to write the information we have learned today in this column in your notebook. What questions are there? GO

Allow students to write in their notebooks.

Excellent! Please raise your hand and share one fact you learned today about **alternative energy**.

Call on volunteers to share answers as you write them on the board. Be sure every type of **alternative energy** is included.

Wow! We did it! We actually identified types of **alternative energy** and where those types come from, but there is so much more to learn! Tomorrow we will apply what we have learned to explore how **alternative energy** sources are used in agriculture. Knowing how our nation's largest industry is using **alternative energy** will help us to be more effective and environmentally responsible citizens. Thanks for your attention today. Come to class tomorrow with that same focus and be ready to re-energize your brain with more information on **alternative energy**!



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Application

Extended classroom activity:

Take a field trip to a facility involved in producing some type of **alternative energy**.

FFA activity:

Invite a professional in the industry to come to a meeting and speak about how their business produces **alternative energy**.

SAE activity:

Design and build a model of a solar-powered car for an agricultural mechanics design and fabrication or energy systems SAE.

Evaluation

MS.NR.6.1.ASSESS.A

Answers to Evaluation

1. B
2.
 - A. Solar energy – energy that is produced from the sun whether it's in the form of sunlight particles that can create electricity (solar electricity or photovoltaics) or in the form of heat to warm water or air space.
 - B. Wind energy – energy that is produced from the natural movement of the wind; also considered a form of solar energy because wind is created by differences in the amount of heat that the sun sends to different parts of the earth.
 - C. Biomass energy – energy that comes from materials that were once living, like plants or animal wastes.
 - D. Geothermal energy – energy that comes from heat generated deep inside the earth from items like hot rocks, hot water, and steam.
 - E. Hydroelectric energy – energy that is produced from moving or falling water.
 - F. Tidal/wave energy – energy that is produced when ocean tides or waves change or move across the ocean or sea.



**Alternative energy
describes energy
sources that are still in
development and are
renewable.**



Solar energy – energy that is produced from the sun whether it's in the form of sunlight particles that can create electricity (solar electricity or photovoltaics) or in the form of heat to warm water or air space.

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Name _____

Solar energy – energy that is produced from the _____ whether it's in the form of sunlight particles that can create _____ (solar electricity or photovoltaics) or in the form of _____ to warm water or air space.

Wind energy – energy that is produced from the _____ also considered a form of solar energy because wind is created by differences in the amount of heat that the sun sends to different parts of the earth.

Biomass energy – energy that comes from materials that were once living, like _____ or _____ .

Geothermal energy – energy that comes from _____ generated deep inside the earth from items like hot _____, hot _____ and _____ .

Hydroelectric energy – energy that is produced from _____ or _____ .

Tidal/wave energy – energy that is produced when _____ or _____ change or move across the ocean or sea.



Name _____

1. Sun shines on a window and heats a room. _____
2. Sun's energy is gathered by collectors and used to heat water. _____
3. Photovoltaic cells power a calculator. _____
4. A windmill pumping water on a remote farm. _____
5. Turbines turning to generate electricity in the desert. _____
6. Bacteria ferment manure and the resulting methane gas is used for cooking in China. _____
7. Cars and trucks are powered by a form of alcohol called ethanol that comes from corn. _____
8. Landfills generate electricity by using the methane created as a result of the decomposition of trash.

9. A dam across a river in Norway produces a reservoir, and that water is released to turn a turbine and produce electricity. _____
10. Dams used for this type of energy generation also provide other benefits such as flood control, water for drinking, agriculture, industry, and recreation. _____
11. Energy produced when a turbine is allowed to float free in a small stream. _____
12. The power plant pumps heated water or steam from rock formations to power a turbine. _____
13. The Geysers is the name for this type of power plant in California. _____
14. Water is trapped behind a dam at high tide and at low tide the water rushes through a gate in the dam and turns a turbine. _____
15. France and Britain used the rise and fall of sea level in their country to power mills nearly a thousand years ago with this type of power generation. _____



1. Sun shines on a window and heats a room. **Answer: SOLAR Energy**
2. Sun's energy is gathered by collectors and used to heat water. **Answer: SOLAR Energy**
3. Photovoltaic cells power a calculator. **Answer: SOLAR Energy**
4. A windmill pumping water on a remote farm. **Answer: WIND Energy**
5. Turbines turning to generate electricity in the desert. **Answer: WIND Energy**
6. Bacteria ferment manure and the resulting methane gas is used for cooking in China.
Answer: BIOMASS Energy
7. Cars and trucks are powered by a form of alcohol called ethanol that comes from corn. **Answer: BIOMASS Energy**
8. Landfills generate electricity by using the methane created as a result of the decomposition of trash. **Answer: BIOMASS Energy**
9. A dam across a river in Norway produces a reservoir and that water is released to turn a turbine and produce electricity. **Answer: HYDROELECTRIC Energy**
10. Dams used for this type of energy generation also provide other benefits such as flood control, water for drinking, agriculture, industry and recreation.
Answer: HYDROELECTRIC Energy
11. Energy produced when a turbine is allowed to float free in a small stream.
Answer: HYDROELECTRIC Energy
12. The power plant pumps heated water or steam from rock formations to power a turbine. **Answer: GEOTHERMAL Energy**
13. The Geysers is the name for this type of power plant in California.
Answer: GEOTHERMAL Energy
14. Water is trapped behind a dam at high tide and at low tide the water rushes through a gate in the dam and turns a turbine. **Answer: TIDAL/WAVE POWER**
15. France and Britain used the rise and fall of sea level in their country to power mills nearly a thousand years ago with this type of power generation.
Answer: TIDAL/WAVE POWER

11



Name _____

Directions: Read the statement and decide if it is true or false

1. _____ **Alternative energy is generated from fossil fuels.**

- A. True
- B. False

Short Answer:

2. **List 6 types of alternative energy that were identified in class. Include the source for each type.**

- A. _____

- B. _____

- C. _____

- D. _____

- E. _____

- F. _____
