

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 5

Renewable Responsibility

Unit:
RENEWABLE ENERGY

PRECEPTS

E. Awareness

E1. Address issues important to the community

F. Continuous Improvement

F5. Acquire new knowledgels



Lesson Type:
Large Group

NATIONAL STANDARDS

NA-T.K-4.2 Acting by Assuming Roles and Interacting in Improvisations

NS.K-4.5 Science and Technology

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

1. Identify five sources of *renewable* energy and their uses.
2. Match agricultural products/relationships with five *renewable* energy sources.





TIME

Instruction time for this lesson: **60 minutes.**



RESOURCES

Energy Kid's Page – Energy Information Administration, Department of Energy
www.eia.doe.gov/kids/



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ PALS.5.AS.A — 1 per student
- ✓ PALS.5.TM.A — cutout
- ✓ flashlight
- ✓ markers
- ✓ scissors to cut PALS.4.TM.A into pieces
- ✓ writing surface



KEY TERMS

renewable (energy sources)
nonrenewable (energy sources)
biomass
water – hydropower
geothermal
wind
solar

INTEREST APPROACH

This activity will help students understand the importance of energy by having them imagine what it would be like without lights, heat or any electricity. Turn the lights off in the classroom. Have a flashlight available if there is not a source of natural light in the classroom. Allow the students to quiet down before continuing.



Imagine what it would be like if we came to school every day and there were no lights. We would have to work in the dark. Imagine if the appliances in the cafeteria didn't work and the school cooks couldn't prepare a hot lunch. Imagine if the heat didn't work in the wintertime and the air conditioner didn't work in the summertime. What would it be like to be at school with no electricity and no heat?

Allow time for student responses. Mentors can respond with "Great response!" or "Awesome thought!"

Turn on the lights.



We depend on electricity and heat every day, not only in our homes but also in nearly every building in our community, including the school. Electricity and heat are two types of energy. We can get this energy from either **renewable** or **nonrenewable** sources. Today we will look at the differences between **renewable** and **nonrenewable** energy sources.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Identify five sources of renewable energy and their uses.



*Introduce students to the five types of **renewable** energy sources and how they are used as energy sources. The **renewable** energy sources are found in bold print throughout the lesson.*

Sources of **renewable** energy

- A. **Biomass** – organic material from plants and animals
 - a. Wood and wood waste – produce electricity, heating and cooking
 - b. Garbage (municipal solid waste) – food scraps, lawn clippings, leaves; generates heat, electricity and fuel
 - c. Biofuels – ethanol (sugars from corn and wheat, potato skins, rice, sugar cane, lawn clippings); biodiesel (vegetable oils, fats, greases, i.e.: soybeans); energy for motors/engines
- B. **Water (Hydropower)**
 - a. Generates electricity
- C. **Geothermal** – steam and hot **water** from Earth
 - a. Heats buildings and generates electricity
- D. **Wind**
 - a. Generates electricity
- E. **Solar** – thermal energy or electricity
 - a. Thermal energy – heats **water**, heats buildings/spaces
 - b. Electricity – i.e.: **solar** panels

*Identify the five **renewable** energy sources and help students associate each with the pictures on PALS.5.AS.A. Pass out PALS.5.AS.A for students to use to organize the material. Mentors will talk through the process of identifying the pictures with students.*



Let's look at the **renewable** energy sources. These sources are **renewable** because they can be generated or re-created as needed. Here is a list of the **renewable** energy resources. As I write them down, please take out a writing utensil.

Have extra mentor pass out PALS.5.AS.A at this time.

Record on writing surface:

Biomass

Water

Geothermal

Wind

Solar



Take a look at the five types of **renewable** energy sources on the board. Let's have five volunteers to each read one of the five types of **renewable** energy sources. Volunteers please raise your hands!

Please read for us one of the five resources.

Awesome! Let's take a moment to match each of these energy sources with the pictures on our activity sheet. The picture in the upper left-hand corner is a tree. This tree represents **biomass**, so under the tree write **biomass**. The picture below the tree is a geyser, which is a source of hot **water** from underground. The geyser represents **geothermal** energy, so under the geyser write **geothermal**. Below the geyser is a picture of the sun. Who can tell us which source from our list should match up with the sun? Right, **solar**. So, let's write **solar** below the picture of the sun. On the right-hand side at the top, we have two lines that represent a river. Which of the sources from our list should the river represent? Exactly, **water**! Let's write **water** under the picture of the river. Finally, we have a picture of a **wind** turbine. The **wind** turbine represents **wind** energy, so let's write **wind** below the picture of the **wind** turbine.

Help students understand some of the reasons energy is needed. You can do so by creating a list of them on the writing surface.



Now that we've looked at the sources of **renewable** energy, let's think about what we need energy for. Think about some of the reasons we need energy. When you have an answer, raise your hand.

Elicit responses, record student ideas on writing surface. Examples might include: electricity for our homes, fuel for our automobiles and heat for our homes.



We have a great list! We need energy for all of the reasons mentioned as well as many, many others.

*The next activity will allow you to help students understand what each **renewable** energy source is used for. You will use the Choral Response e-Moment to guide students through this process. While you are going through the Choral Response e-Moment, students will record uses of each **renewable** energy source. You will help them by recording information on the writing surface.*

Choral Response e-Moment

The Choral Response e-Moment is a quick, simple and highly effective strategy. Its use fosters vocabulary development, proper pronunciation, attentiveness and retention through repetition. With a Choral Response, students repeat aloud a key phrase or word. Simply ask students to state the terms or you state them and then ask them to repeat.



Now let's think about the five energy sources we have in front of us on the activity sheet (*PALS.5.AS.A*) and how each of them might meet our energy needs. For each source we are going to record some information. Look at the handout and think for a moment about what each energy source might be used for (heat, electricity and fuel, etc.) *Pause and allow 20-30 seconds for students to look at handout.*

As we talk about each energy source, write down what each one is used for. Meanwhile, I will write them on the writing surface. We will also make a sound for each **renewable** energy source. *Select a marker to use for this activity.*

Let's look first at **biomass**. Our sound for **biomass** is "timber!" So, after I say **biomass**, say "timber!"

BIOMASS...TIMBER!



What is in the picture for **biomass**?

Allow students time to respond. Right! We have trees, which represent wood, crops such as corn and even garbage! How might we be able to use wood, corn or garbage to produce energy?

We might burn wood to generate electricity, cook or heat a building. We can also use our garbage to heat buildings and to generate electricity. Crops such as corn and soybeans can be used to make biofuels such as ethanol and biodiesel, which can be used instead of gasoline and diesel in cars and trucks. So, next to the **biomass** picture, let's write down the following uses:

Record on the writing surface:

Heat
Fuel
Cooking
Electricity



OK, now we can examine **water**, or **hydropower**. What picture on the handout represents **water**? That's right, the picture of the river. Our sound for **water** is "swoosh!" Let's practice. What do we say for **Biomass**? Timber! And again, what's our sound for **water**? Swoosh! Great! **Water** in rivers can be used to generate electricity. So, let's write electricity next to **water**.



Who can tell us what picture represents **geothermal** energy?

That's right, the geyser. Below the Earth are areas of steam and hot **water**. We can convert this steam and hot **water** to **geothermal** energy. The sound for **geothermal** energy is "splash!" So far we have three **renewable** energy sources: **Biomass** and the word for that is ... timber! **Water**... swoosh! **Geothermal** . . . splash! Who has ideas on how we might use **geothermal** energy? Awesome! We can use **geothermal** energy to heat buildings and to create electricity. Using our markers, let's write down heat and electricity next to the picture of the geyser that represents **geothermal** energy.

Some places in the United States have large **wind** turbines; they are similar to **windmills** we used to see on farms. You can see there is a picture of a **wind** turbine on the handout. Our sound for **wind** energy is woosh! To review, we have **Biomass** ... timber! **Water** ... swoosh! **Geothermal** ... splash! And now **wind** ... woosh! Let's think about how **wind** might be used as an energy source. The **wind** turbines can be used to generate electricity. So, using the markers, let's write electricity next to the **wind** turbine.

Our last picture is of the sun. This represents **solar** energy. Our sound for **solar** energy is sss...! Now that we have all five of our **renewable** energy sources covered: **Biomass** ... timber! **Water** ... swoosh! **Geothermal** ... splash! **Wind** ... woosh! And **solar** ... sss...! Who has ideas on how **solar** energy might be used to meet our energy needs? Excellent! Let's write down: heat water, heat buildings and provide electricity.



We've done an awesome job of identifying the five **renewable** energy sources and how we use them. Let's practice our sounds again: **Biomass** ... timber! **Water** ... swoosh! **Geothermal** ... splash! **Wind** ... woosh! **Solar** ... sss...!



Now let's look further into our **renewable** energy sources and how they are related to agriculture!

OBJECTIVE 2. | Match agricultural relationships with five renewable energy sources.



*For this objective, you will help students make connections between **renewable** energy and agriculture. To do this you will use the Party Host e-Moment. See the description of the Party Host e-Moment below.*

Party Host e-Moment

The Party Host e-Moment tests students' knowledge of a concept through role-play. Students are asked to attend a fictitious party and act out the characteristics of an assigned person, place or thing while one student, the "party host," tries to guess who or what each actor is depicting.



There are many connections to **renewable** energy sources and agriculture. When you attend a party sometimes you meet new people and make new friends. To make the connections between **renewable** energy and agriculture, we are going to throw a party! In a moment, each of you will receive a piece of paper that has a clue on it. It will also have an answer on it that only you will know. When you get your paper, read through the clue and ask a mentor if you need help with any of the words. Once you have finished reading your clue, turn it over so we know you are ready to move on.

Pass out slips of paper created from PALS.5.TM.A. Students can be grouped or two sets of PALS.5.TM.A can be developed, depending on how many students are in the class. Mentors should work with students to practice reading the clues out loud. Mentors should demonstrate what the Party Host e-Moment looks like by role-playing one or two of the clues to show students how this activity will work.



OK, now that we are ready to read our clues, we are ready for the party. When I say BOOGIE, we are going to go out to the hallway while the mentors get ready for the party. When you come in, be ready to read your clue to the party host who will be right inside the door. Remember not to tell your answer until the end. Then, go into the room and read your clue to the other students in the room. Your job is to try to match up with another student. The mentors will help you find your match. Just to see what this will look like, let's have a couple of mentors show us what they would do if they were coming to the party.

One mentor should serve as the host, while one or two other mentors role-play the party host e-Moment by reading one or two clues.

What questions are there?

OK, BOOGIE!

One or two mentors should go into the hallway with the students. The rest of the mentors should quickly prepare the room for the party. For example, a sign that says "The party's here," could be created. One mentor should be chosen as the party host who will be right inside the door to greet each student. The other mentors should be in the room helping students find their matches. Remember that the students should only read their own clue and keep their answers to themselves. To help students make matches with other students, mentors should ask them questions such as, "What might this description match with?"

Agricultural relationships with **renewable** energy sources

A. Biomass

1. Agricultural relationship examples – corn, soybeans
2. **Renewable** energy examples – car (ethanol), tractor (biodiesel)

B. Water

1. Agricultural relationship example – fields of crops with river running through them
2. **Renewable** energy example – a dam that generates electricity

C. Geothermal

1. Agricultural relationship example – a livestock building heated by steam
2. **Renewable** energy example – description of a **geothermal** energy (geyser)

D. Wind

1. Agricultural relationship example – bare field
2. **Renewable** energy example – **wind** turbine

E. Solar

1. Agricultural relationship example – greenhouse heated by sun
2. **Renewable** energy example – sun

Once students have paired up, have the pairs read their clues and their answers.



OK, now that we have made our matches, let's share with the class what they are.

Each group reads their clue and answer to the class.



Awesome job! We've made some great connections between agriculture and our **renewable** sources.



REVIEW / SUMMARY



Today we learned some cool information about **renewable** energy sources that we might not have known before. We know how important energy is for our homes and community. Let's think back to each of the **renewable** sources and the sounds we made for each.



What was the sound we made for **biomass**? (Timber!)

How about the sound for **water**? (Swoosh!)

Great! How about the sound for **geothermal**? (Splash!)

Now, what's the sound for **wind**? (Woosh!)

And, finally, **solar**? (Sss...!)

Then, we made great connections between agriculture and the **renewable** sources. For example, we know that corn is used to make ethanol, and that a bare field might turn in to a **wind** farm. Recognizing the importance of using **renewable** resources can help make sure that people in our community will always have access to electricity and other forms of energy.

APPLICATION



Small Group Suggestion: *With the assistance of mentors, small groups can take pictures of how energy is used within the school and put together a PowerPoint presentation or short (two- to three-minute) movie of ways that energy is used in the school, while identifying how **renewable** energy sources might be used.*



One-on-One Session: *Individuals might make a map of their home and identify how energy is used in the home. Uses of energy could be color coded, i.e.: electrical (yellow; example: air-conditioner), heat (red; example: furnace), etc. Mentors could discuss with mentees what types of **renewable** energy could be used in the home. For example, **solar** energy and **wind** energy could be used for electricity in the home.*

EVALUATION

Use the Eyewitness News e-Moment as an evaluation tool for objectives one and two. The Eyewitness News e-Moment is a strategy that challenges students to role-play a talk show host, news anchor, interviewer or multiple interviewees in order to learn or review a concept. Capturing the news as it breaks helps students review and communicate what they learn.

Establish the two roles each student will play. Explain that when the students are the experts, they stand tall and take on the air of an expert (a know-it-all with a pleasant personality). When they are the interviewer, students address an imaginary camera, with microphone (pen) in hand, and they welcome the viewing audience to “Moments with Dr. (fill in the student’s name).” Then they pose questions to the expert about the content just learned in class. For example: Facing the camera:



Welcome to our show. Today we are interviewing the world-renowned expert in **renewable** energy, Dr. (student’s name).



Turning to the expert: Please tell us, Dr. (student), what is so important about **renewable** energy?



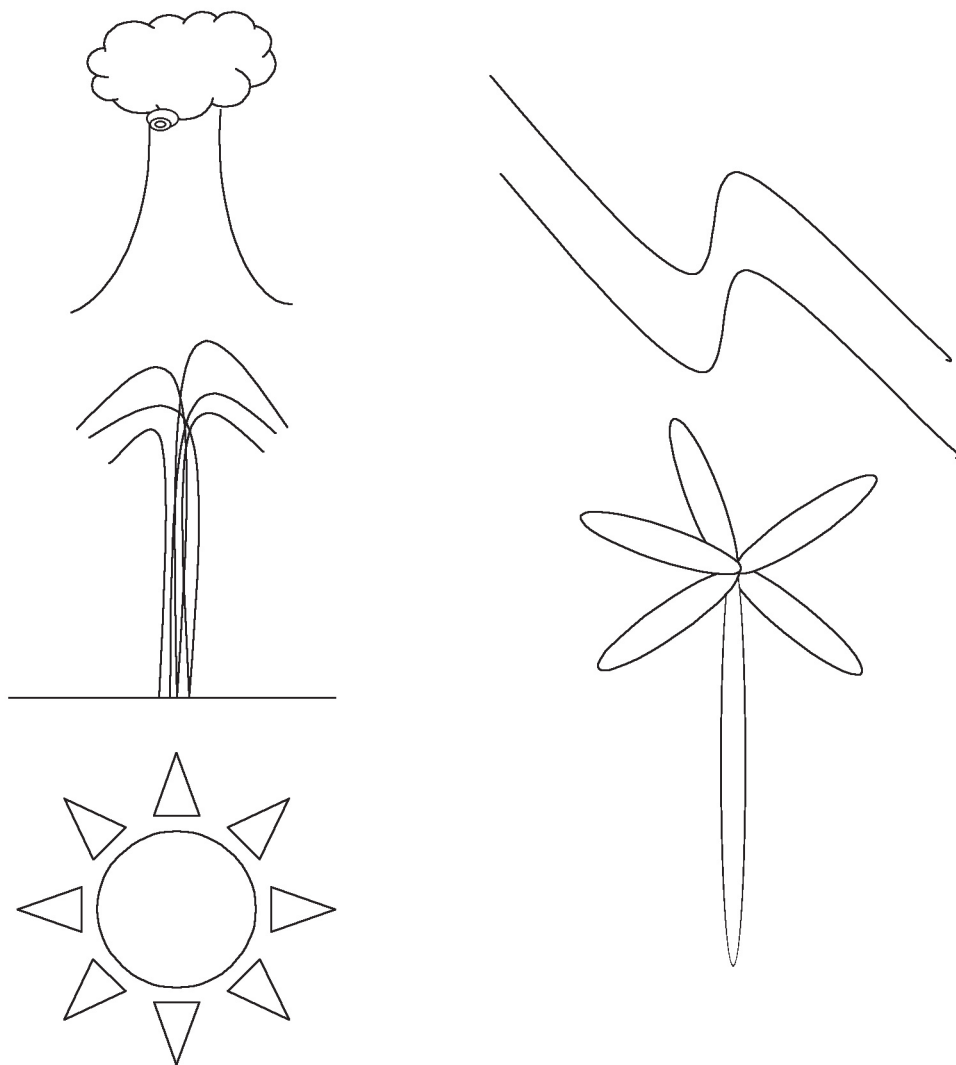
Point the microphone in the direction of the expert. Note: This activity works best when students generate appropriate questions prior to the interview.

- 2. Establish the process. Explain that this activity is to aid in understanding and rehearsing today's topic. Point out that the power is in how well students can play the roles and use the information they just learned. It is a timed event and they will switch roles midway through the event. Note: The time allocated is dependent upon the amount of content students will be rehearsing. An average time limit is three to five minutes, switching roles midway through.*
- 3. Begin the Eyewitness Moment. Have students stand, pair up and get ready to go "live" at your signal. Mentors will need to help students. Small groups can be created to facilitate this activity.*
- 4. Switch roles. Midway through, get everyone's attention. Students now switch roles. Note: The new expert usually picks up from where the other left off. If the first expert covered all the information, then the new expert simply starts at the beginning.*
- 5. Conclude the activity. After everyone has played both roles at least once, students acknowledge each other with a hearty, "Thank you!" You can now randomly select individuals to tell what their expert said, as a way to check for understanding and increasing individual accountability to the content.*

PALS.5.AS.A

(These are example images. National FFA to provide final images.)

Renewable Energy Sources



PALS.5.TM.A

Clue: I grow in fields and can be eaten by humans and animals, but I can also be used to make gasoline. Answer: Corn	Clue: I grow in fields and can be eaten by animals and humans, but I can also be used to make diesel fuel. Answer: Soybeans
Clue: I am used to drive families around. I use fuel that can be made from biomass. Answer: Car that uses ethanol	Clue: Farmers use me to plant crops in the field. I use fuel that can be made from biomass. Answer: Tractor that uses biodiesel
Clue: I am a body of water that runs through fields of corn and soybeans. Answer: River running through fields	Clue: I am found on a river. I slow down the water, and I am used to generate power.
Clue: I am a building that has animals in it that are used to make sausage. In order to keep the animals warm, the building is heated from the earth. Answer: Pig barn heated by steam	Clue: I am a source of heat that comes from the ground. Answer: Geyser, geothermal energy
Clue: Farmers used to use me to grow corn and soybeans, but now I can be used to make energy, like electricity. Answer: Bare field	Clue: I look like an old-fashioned windmill and can be used to make electricity. Answer: Wind turbine
Clue: I am a building made up of glass. Inside, flowers are grown. Answer: Greenhouse heated by sun	Clue: I rise and set every day. I can be used to create heat inside certain buildings. Answer: Sun (solar energy)