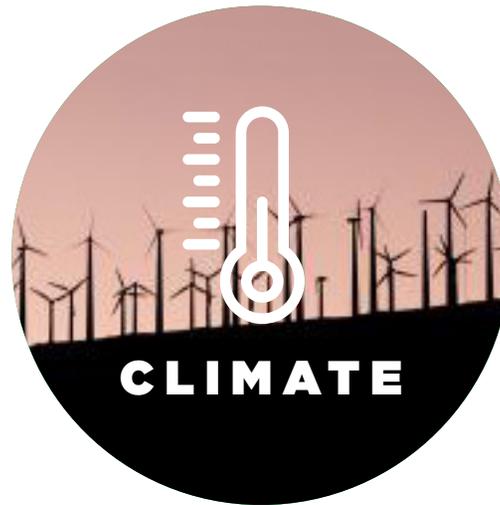


5<sup>TH</sup> GRADE  
STEAM & SOCIAL STUDIES





## SAVING SOME GREEN

### Driving Question:

What amount of carbon is saved by one individual household if they switch to green energy? How would the amount of carbon emission released change if an entire class switched to green energy?

### Materials Needed:

Copy of utility bill or the average amount of KWH a student's family uses monthly, calculator, paper or notebook, graph paper

### In this lesson, students will:

- How can we use what we know about the carbon footprint of alternative energies to calculate the amount of carbon we can save by switching to them?

### National Learning Standards:

Science: 5-ESS3-1  
 Math: 5.OA.1; 5.OA.2; 5.NBT.5; 5.NBT.6; 5.NBT.7  
 Social Studies: VII,h  
 Art: Cr1.2.5a; Cr2.3.5a; Re.7.1.5a



## SPINNING THE COCOON

Ask students what sources of energy they are familiar with and write student responses on the board. Responses should include coal, nuclear, hydroelectric, solar, wind, and geothermal. Some energy sources, such as geothermal, might be new to students. Watch a quick [video](#) about the difference between renewable and nonrenewable energy. As a class, separate the list you compiled into renewable and nonrenewable energy. For each one, brainstorm pros and cons.

Ask students what they have heard about climate change and write student ideas on the board. Tell students that, according to some research done by NASA, it is theorized that carbon emissions contribute strongly to climate change. Carbon emissions from our chosen energy source is one way that almost all people of any age contribute to the increase of greenhouse gases. By choosing greener energy sources, we can all reduce our carbon emissions and contribute less to climate change. Look at the chart showing the amount of carbon per KWH below and discuss the different amounts with students and what they mean for the environment.

Ask students why they think some people choose nonrenewable over renewable energy. Talk to students about barriers to using green energy such as homeowners cost to install or people who rent being limited to only certain utility companies.

### KERNEL OF KNOWLEDGE

Texas' largest wind farm, Roscoe Wind Farm, is about 4.5 times the size of Manhattan in New York City. It has a 781-megawatt capacity and can power 230,000 homes.



# METAMORPHOSIS

Students will obtain an energy bill or monthly kilowatt usage from their parents. If parents are unable or unwilling to share their energy consumption, students or teachers can call the utility company to ask for average consumption per household size or students can research the information online. Students will look at what renewable energy source is the most viable in their area. For example, if it is frequently stormy or if they live in a heavily forested area, solar might not be the best option. If they are far from water sources, hydroelectric is out. Students should use the carbon footprint of their chosen renewable source and calculate the total amount of carbon they would use based on their utility bill if they switched to that electricity source. Students will then calculate their energy carbon footprint if they used the same kilowatts with a nonrenewable source and compare them. Students will come together as a class to compile their calculations and compare the total amount of carbon emitted with renewable versus nonrenewable energy.



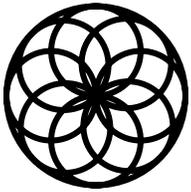
## THROUGH THE LENS

Have student record themselves presenting their designs. They can then upload this to Flipgrid, or you can play their presentations for the class.

Have the students take pictures or short videos of examples of green energy that they find around their community. Combine each of the photos and videos into one presentation and present it to the rest of the school to inform them of how community is working to become greener. This would also kickstart a great conversation on steps that could be taken to utilize more renewable or green resources in the area.

## UPCYCLE

Students will use their chosen renewable energy source to research the cost of installing a renewable system on their home. Students will use the square footage of their home or their energy consumption to determine the size of the system needed and find online quotes or call companies to estimate the total cost. Students will then use their current cost of energy to determine if they can offset the cost of installation by not having to pay a utility bill. Students will create a yearlong budget for utilities with their current provider and another with monthly payments that would pay off a new renewable system to determine how many years it would take to break even on the cost of their system.



# KALEIDOSCOPE

Write on the board “Free Enterprise” and have students take turns writing words around it that come to mind. Some students will write words like “marketing,” “supply/demand,” “competition,” “consumer” and “profit.” Explain to students that the United States was not always this way. The Industrial Revolution brought more competition and allowed for business to grow, which in turn gave consumers choice. With the United States being a free enterprise economy, supply and demand drives consumers to buy certain goods.

Group students and give them different scenarios. Some sample ones are below. Be sure to explain that they are the typical consumer in these instances, and they are in the market for the largest savings.

1. You are in the market for a new computer. You are looking at two types that have the same exact features. One is an HP for \$400 and the other is a Toshiba for \$360. Which one would you, as a consumer, buy? Explain.
2. You are in the market for a vacuum. One you are viewing is similar to the other. It has the same power, the same detachable parts as the other, but is shaped a bit differently. One of the vacuums is \$100 and the other is \$90. As a typical consumer, which one would you purchase? Explain.
3. You are at the store and viewing hair shampoo. The two you have narrowed it down to have the same ingredients. One is \$3.50 and the other is \$5.25, as a typical consumer, which do you choose? Explain.

As students are deciding which products they would buy and with their group explaining their answers, ask questions like, “Does the price weigh heavily on the products you purchase?” “If there was only one product to buy and no choices, would price have much or any bearing on what you would purchase?”

When you’ve given students ample time (5-10 min), ask for volunteers from each group to write their reasoning on the board. Go through each with the class, clarifying any misunderstandings as some students may not have any concept of the importance of saving money for other purchases. If needed, explain budgeting and why consumers as a whole tend to lean toward lower prices.

As a wrap-up, pose the following question to your students: Knowing what you know now about carbon footprints, the costs of renewable versus nonrenewable, and about the condition of where we live in the United States, would you purchase solar panels if they went on sale for 60% off? Why?



## eARTh

Wind turbines can come in a variety of shapes, sizes and colors. Talk with your students about the importance of wind energy as an option for a renewable energy source. Now, show them some of the examples found on this [site](#). As you look at the examples, ask the students what they notice about the designs. What colors are used? What shapes? Why did the designers make these choices? What principles of design do the students see in the turbines?

Now, have the students create some sketches of their own designs for wind turbines. To do this, they can work in pairs or on their own. Give them full creative freedom on this. Tell them there are no rules—anything goes. Their design should take into consideration the best way to harness energy in their town, as well as what would be aesthetically pleasing. Once they have worked through a number of ideas through sketches, have them either create a prototype of their turbine, or create a 2D artwork of their design.

When everyone is finished, the students should present their designs to the class. Each student or pair of students needs to discuss why their design would be a good fit for your area, as well as why they made the creative choices that they did.

### Community Garden

- As a class, discuss the different options that consumers have regarding renewable energy for their homes or businesses and write these on the board. Divide the students into groups of two, and assign each group one of the energy sources. Now, have them each create a drawing based on that energy source. It will only be a line drawing, so no color. Attach all of the pages together to create a coloring book. Make copies and sell the book! You could offer it to fellow teachers, students, and the community. Use the money to take steps to make your classroom and/or school greener.



## CAREER CONNECTION

**Wind Power Engineer** - Engineers in the wind power industry are involved in the design and development of wind turbines. They also work in testing, production, and maintenance. Engineers may also supervise production, test manufactured products, and troubleshoot design or component problems. They also estimate the time and cost required to complete projects and look for ways to make production processes more efficient. Most positions require a bachelor's degree in energy engineering, mechanical engineering, or a relevant field of engineering.

**Machinist** - Machinists set up and operate a variety of machine tools to produce precision parts and instruments. Some are precision instrument makers who fabricate, modify or repair mechanical instruments. A high school diploma or GED along with an apprenticeship or training certificate is required for most machinists.

**Quality Control Inspector** - These inspectors read and understand blueprints and specifications, monitor or observe operations to ensure that they meet production standards, recommend adjustments to the process or assembly and inspect, test, or measure materials or products being produced. Quality control inspectors need a high school diploma or GED, and receive up to one year of on-the-job training.

## CAREER HIGHLIGHT



Leilani Münter is a race car driver, environmental activist, and self-proclaimed vegan hippie chick. She is an advocate for renewable energy, solar power and electric cars who actively works to offset her carbon footprint as a race car driver. Münter was featured in the film, *Racing Extinction* by Academy Award winning filmmaker Louis Psihoyos.



