Energy Explorations

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This curriculum unit is recommended for:
K-3rd grade

Keywords: energy, renewable resources, non-renewable resources, conservation

Teaching Standards: See Appendix 1 for teaching standards addressed in this unit.

Synopsis: If you are interested in teaching your students about energy in a fun and engaging way, then this unit is for you! Through the pairing of rich nonfiction science texts and high quality science experiments, your students will come away knowing a wealth of knowledge about how energy works and why we need to try and conserve it! The topics in this unit include kinetic energy, potential energy, solar power, hydropower, wind power, usage of fossil fuels, impact of non-renewable resources to our planet and conservation for the future. You can pick and choose one activity from the unit or you can choose to teach the unit in its entirety! I hope that your students have a blast learning about energy!

I plan to teach this unit during the coming year in to 48 students first grade.

Energy Explorations

Lisa Marie Lewis

Introduction

If only I had known! This is a phrase used too often by those of us who learn our lessons the hard way. This phrase will be uttered by future generations when they realize what our habits as a society have done to our world in regards to energy. We truly are in an energy crisis, yet we live like there is nothing wrong. I'm certainly as guilty as the next person, but I'm becoming aware of what a serious issue energy is! At some point, we will wish that we had made some changes.

When I asked my first graders about energy the other day, one student volunteered that energy is what his mom says he has too much of and he needs to calm down! While I agree that first graders do have a lot of energy that is not exactly what I was aiming for in my class discussion. As future stewards of our Earth, young people need to know that we are in a bit of a crisis when it comes to energy. Sure, we have enough of it right now, but what does the future hold? How can we live a better life now to ensure that we have a bright future? I certainly don't want them to say, "If only we had known!"

Rationale

I'm hoping to open my young students' eyes to the idea that we need to make positive changes now and that they can help! To do that, they need to understand what energy is, how it can be produced, and some ways to conserve it. My goal for this unit is to bring to life possible scenarios that could take place if we continue to live the way that we do. I plan to do this through the use of mentor texts that align to energy issues. Similar to the chemistry unit that I wrote for first graders last year, this unit will provide students with necessary background information and also excite them with fun and engaging experiments.

I teach first grade at a full immersion Dual Language program. My school is comprised of a diverse population of students. 13% are African American, 60% are Hispanic, 19% are White, and 8% range from Asian to Indian-American. Our LEP (Limited English Proficiency) population is 60%. That is significant to note, because it means that in each classroom ESL strategies need to be in place. With the difficult science concepts that I will be teaching, I will need to use as many visuals as possible to effectively educate and engage this diverse population.

I currently have 52 students that come to me with a range of skills, abilities, and background knowledge. As shown in the numbers above, half of the students that I teach come from homes where English is the primary language spoken. The other half speak a language other than English at home. Over the past four years, I have noted that my ESL (English as a Second Language) students struggle with reading comprehension and using key vocabulary words appropriately. To help them understand the important science concepts that I'm teaching, I plan provide visual representations of the concepts as much as possible. This unit is also very easy to apply to their lives, so I will help them understand the "bigger picture" by helping them make it applicable to them.

Background

Energy is defined as the ability to do work. It is found everywhere in the world and it comes in many forms. Energy is everywhere, but it is not always usable. Sometimes we have to make some changes in order to use it. For example, our body can make energy from the food that we eat. Plants can change sunlight into energy which helps them grow. Many buildings and machines in our world require a fuel that provides them with energy.[i]

So we see that energy can come in many forms. Potential energy is energy stored in an object. Chemical, mechanical, nuclear, gravitational, and electrical are all stored energy. Kinetic energy does the work. Light, heat, motion, and sound are examples of kinetic energy. Here's a simple example. Stretching a rubber band gives it the potential to fly. The tension created from the stretching is potential mechanical energy. When the rubber band is released, it flies through the air using motion (kinetic energy). The process of changing energy from one form into another is called energy transformation. The rubber band is transformed from potential energy into kinetic energy.[ii]

When we think of the energy that powers our cars and homes, this energy comes in two different types: renewable and non-renewable. Renewable energy comes from things that won't run out. Examples of renewable energy sources are wind, water, sunlight, and plants. This type of energy is great because it is created from things that we can use over and over again! It is often a cleaner and more eco-friendly energy source. While there are advantages, key disadvantages keep renewable energy from being our primary source. It is difficult to generate the quantities of electricity that are as large as those produced by traditional fossil fuel generators. So if we use renewable energy we will need to build more energy facilities, which are costly. There are also issues with reliability of supply. Renewable energy often relies on the weather for its source of power: hydro generators need rain to fill dams to supply flowing water; wind turbines need wind to turn the blades; solar collectors need sunshine to collect heat and make electricity. This can be unpredictable.

Wind energy is a renewable energy sources. This type of energy is growing in popularity. Wind turbines placed at sites with strong, steady winds can economically generate electricity without producing pollutants. Wind turbines usually have two or three blades and, because winds above the ground tend to be faster and less turbulent than those near the surface, the turbines are mounted on tall towers to capture the most energy. A wind turbine converts the kinetic energy (motion) of wind into mechanical energy that is used to generate electricity. The energy is fed through a generator, converted a second time into electrical energy, and then fed into the grid to be transmitted to a power station. While there are benefits of wind energy, there are also negative environmental impacts. Wildlife deaths occur due to the incredible size of these turbines. There is also the issue of space and cost. We have a limited number of places where these wind turbines can be placed.[iii]

Solar power is another renewable energy source. Solar technologies use the sun's energy to provide heat, light, hot water, electricity, and even cooling, for homes, businesses, and industry. Despite sunlight's significant potential for supplying energy, solar power provides less than 1% of U.S. energy needs. Photovoltaic cells, or solar panels are used to create solar energy. The cells are made of semiconductor materials like those found in computer chips. When sunlight hits the cells, it knocks electrons loose from their atoms. As the electrons flow through the cell, they generate electricity. On a much larger scale, solar thermal power plants employ various techniques to concentrate the sun's energy as a heat source. The heat is then used to boil water to drive a steam turbine that generates electricity in much the same fashion as coal and nuclear power plants, supplying electricity for thousands of people.[iv]

Hydropower refers to using water to generate electricity. Water is the most common renewable source of energy in the United States today. Many hydroelectric power plants use a dam on a river to store water. Water released from behind the dam flows through a turbine, spinning it, which then turns a generator to produce electricity. Dam sites for hydropower plants are limited both by available rivers and by competing uses for those rivers, such as recreation, tourism, industry, and human settlements. Because of such limitations, water power could never generate all the electricity used in the United States. In addition, environmental impacts must be considered when locating dams.[v]

Non-renewable energy sources come from things that will eventually run out. Examples of these include oil, coal, natural gas, and uranium. Non-renewable energy is energy from fossil fuels. Fossil fuels are mainly made up of Carbon. Millions of years ago, dead sea organisms, plants and animals settled on the ocean floor and in the porous rocks. These organic matter had stored energy in them as they used the sun's energy to prepare foods (proteins) for themselves (photosynthesis). With time, sand, sediments and impermeable rock settled on the organic matter, trapping its energy within the porous rocks; this formed pockets of coal, oil and natural gas. Earth movements and rock shifts created spaces that force them to collect into these energy types in well-defined areas.

With the help of technology, engineers are able to dig or drill down into these collection areas to access the stored energy, which we commonly know now as fossil fuels.

Coal is one commonly used non-renewable energy source. Coal is milled to a fine powder, allowing it to burn more quickly. It is blown into the combustion chamber of a boiler where it is burnt at high temperature. The hot gases and heat energy produced converts water in tubes lining the boiler into steam. The high-pressure steam is passed into a turbine containing thousands of propeller-like blades. The steam pushes these blades causing the turbine shaft to rotate at high speed. The steam is condensed and returned to the boiling chamber where it is heated again. The shaft rotation engages the wire coils and magnets in a generator connected to it. This charged magnetic field produces electricity. Electricity is sent to the switchboard (transformer) where it is regulated and sent via on-land cables to homes. Using coal to produce energy causes many problems, usually on a greater scale than the use of oil or gas. These problems include acid rain, sulfur oxide emission, carbon dioxide emission, poorer land, and hazardous waste.[vi]

Crude oil (a non-renewable resource) is usually found in underground areas called reservoirs. Crude oil can exist either deep down in the earth's surface or deep below the ocean beds. In oil drilling, a structure called a 'derrick' is built with pipes going down to the reservoir and bringing the oil to the surface. A great chunk of all the total crude oil in the world is processed as gasoline, which we use for our cars. They can also be processed into liquid products such as rubbing alcohol, or solid products such as nail polish, water pipes, shoes, wax and crayons, roofing, vitamin capsules, and many other items.[vii]

Natural Gas is colorless, and odorless in its pure form. Unlike other fossil fuels, natural gas is clean burning and emits lower levels of potentially harmful byproducts into the air. While natural gas is formed primarily of methane, it can also include ethane, propane, butane and pentane. It is one of the gases that are formed by the same formation of fossil fuels. Natural gas supplies about 23.8 percent of the world's energy. Gas is extracted by drilling wells deep into the ground, through many layers of rock to reach the gas deposits. Natural gas comes in two main types: the first conventional type is found in permeable sandstone reservoirs. The second, unconventional types are found in other places such as in coal deposits (eg. Coal Steam Gas, CSG) or shale rock formations (eg. Shale Gas).[viii]

Energy is lost to the environment during any energy transformation, usually as heat. Notice the heat from your computer or car after it has been in use for a while. Nothing is completely energy efficient. So which type of energy is best? The following questions need to be asked:

- Is it a renewable or nonrenewable source?
- What are the capital and setup costs?
- What are the ongoing operating costs?

- What size of energy storage is required?
- How efficient is it to produce one unit of energy?
- Can it be produced on a large scale?
- What is the cost to the consumer?
- What impact will it have on the environment?

Teaching Strategies

SIOP

Sheltered Instruction Operation Protocol model[ix]
SIOP strategies will be used throughout this unit to support my second language learners. Due to the nature or the vocabulary involved in this scientific discovery unit, teachers that have learners with a native language other than English need effective strategies in place.

As stated above, SIOP stands for Sheltered Instruction Operation Protocol and it was developed in an effort to make content comprehensible for (English Language Learners) or ELLs. It is also used to facilitate high quality instruction for English Language Learners in content area teaching. One can find the strategies used in hundreds of schools across the U.S. as well as in several other countries. According to Echevarria, Short, and Vogt, the developers of the SIOP model, there are five components that must be present in vocabulary instructions for ELL learners:

1. The words must be intentionally selected and directly related to the topic being learned.
2. Direct instruction must take place.
3. Modeling must take place. Examples of how to use the word must be delivered, as well as providing the students with visual representation of the word. This aids in the acquisition of their meaning.
4. Multiple exposures to the word are necessary. The word or words cannot be used in an isolated situation but used multiple times in various instances to engrain them in their memory.
5. There needs to be a system to track these new vocabulary words so that they can be reinforced and reviewed when necessary.

SIOP strategies are essential in this unit, especially when you consider the group of students that will be taking part in the activities. It is suggested that students have multiple exposures to newly introduced words. In fact, research done by the developers of the SIOP model state that students need at least sixteen exposures to a word to commit it to memory.

Cooperative Learning Groups

Numbered Heads Together is a cooperative learning strategy that holds each student accountable for learning the material. Students are placed in groups and each person is given a number (from one to the maximum number in each group). The teacher poses a question and students "put their heads together" to figure out the answer. The teacher calls out a specific number to identify the student who will respond as spokesperson for the group. By having students work together in a group, this strategy ensures that each member knows the answer to problems or questions asked by the teacher. Because no one knows which number will be called, all team members must be prepared. This strategy will be especially helpful after the demonstrations or hands-on demos have been utilized. The students can use each other to help ensure that they understood what they saw taking place. This takes the pressure off of a student who may not yet have an understanding of the needed vocabulary.

Socratic Seminar

The purpose of a Socratic Seminar is to achieve a deeper understanding about the ideas and values in a text. In the Seminar, participants systematically question and examine issues and principles related to a particular content, and articulate different points-of-view. The group conversation assists participants in constructing meaning through disciplined analysis, interpretation, listening, and participation. For the purpose of this unit, the students will use Socratic Seminar as a way to "sort through" the big ideas that they learn about energy.

5E Learning Cycle

The 5Es represent five stages of a sequence for teaching and learning.

ENGAGE: The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding. During this experience, students first encounter and identify the instructional task. During the ENGAGE stage, students make connections between past and present learning experiences, setting the organizational ground work for upcoming activities.

EXPLORE: The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding. In the EXPLORATION stage the students have the opportunity to get directly involved with phenomena and materials. As they work together in teams, students build a set of common experiences which prompts sharing and communicating. The teacher acts as a facilitator, providing materials and guiding the students' focus.

EXPLAIN: The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.

EXPLAIN is the stage at which learners begin to communicate what they have learned. Language provides motivation for sequencing events into a logical format.

EXTEND: The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways.

EVALUATE: The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place. EVALUATE, the final "E", is an on-going diagnostic process that allows the teacher to determine if the learner has attained understanding of concepts and knowledge. Evaluation and assessment can occur at all points along the continuum of the instructional process.

Inquiry Journals

Inquiry journals will be used to track the questions that we have, will have drawings and label pictures drawn after our experiments, and be a place to describe or draw new science concepts that have been learned. As the teacher, I will use these journals to determine if the students understand the concepts presented. This can help me identify misconceptions that the students have and can help me identify students that are ready for more advanced vocabulary.

Gallery Walk

Gallery Walk gets students out of their chairs and actively involves them in synthesizing important concepts, in consensus building, in writing, and in public speaking. In Gallery Walk teams rotate around the classroom, composing answers to questions as well as reflecting upon the answers given by other groups. Questions are posted on charts or just pieces of paper located in different parts of the classroom. Each chart or "station" has its own question that relates to an important class concept. The technique closes with an oral presentation or "report out" in which each group synthesizes comments to a particular question. The students in my classroom have very diverse abilities. Therefore, I will use the activity to help differentiate this diversity in the unit. Some students will participate in a Gallery Walk with questions posted that they need to read. Some students will analyze some photographs and discuss what they see taking place.

Activities

Each day we will add more to what to we know about energy through the use of a variety of nonfiction texts written for younger audiences. These texts break down the concepts of energy, renewable and nonrenewable resources, and conservation efforts. Through this two week study we will build the framework of what types of energy exists, what options we have for the future, and how we can make a difference at the age of 6 or 7. These goals will be done through fun experiments that help bring the texts that we read alive.

Day 1: Energy Basics

Book: Aliens and Energy - written in cartoon format, this fun book uses aliens to explain energy.

Experiment: Ping Pong Ball Shooters

Materials: ping pong balls, plastic cups, balloons, scissors

Procedure:

- Cut the bottom third off of a plastic cup
- Tie a balloon shut – with no air in it.
- Cut the top off the balloon.
- Stretch the balloon around the mouth end of the cup.
- To shoot, simply pull on the knot end of the balloon and let go!

Purpose: This experiment helps the students to understand the difference between kinetic and potential energy in a very fun way. When you stretch the balloons, they have potential energy, and when you release them, they have kinetic energy which they transfer to the ping pong balls, thus shooting it across the room. The students will have "out of this world" fun with this experiment!

Day 2: Energy Basics (part 2)

Book: Energy Makes Things Happen - in this book, you can find out all the ways you and everyone on earth need energy to make things happen.

Experiment: Popsicle Chain Reaction

Materials: popsicle sticks

Procedure:

- Start off with two popsicle sticks. Lay them in an "X" on a flat surface.
- Weave the end of a third popsicle stick underneath the end of the popsicle stick on the bottom of the "X." The rest of the third stick should go over top of the popsicle stick on the top of the "X." Make sure to keep pressure on the third stick.
- Repeat step 2 with a fourth popsicle stick. This time, start underneath the second popsicle stick and weave over the third.
- Continue adding popsicle sticks in this fashion until you have a really long chain!

- Once you've extended the chain to your heart's content… let go! The popsicles will release in a chain reaction that will have everyone in the area jumping for joy.

Purpose: The key to the Popsicle Chain Reaction comes from potential and kinetic energy. As you weave the popsicle sticks together, you are continually building potential energy. Each popsicle stick is bent over the stick before it and pinned under the stick before that, creating tension in the wood. When you finally have the chain length that you want, you let go and all of the tension and potential energy is released in a chain reaction of kinetic energy!

Days 3 and 4- Types of Energy - Solar

Book: Energy from the Sun - this book defines energy and explains how energy from the sun provides us with heat, light, plants, food, and other necessary thing for life on Earth.

Experiment (Day 3): Solar Ovens

Materials: pizza boxes, foil, tape, scissors, marshmallows, chocolate, graham crackers, black construction paper, wooden skewer, sheet protectors

Procedure:
1. On the lid of a pizza box, use a ruler and pen to measure and draw a square that is 1-2" from the sides of the box.
2. Cut along three sides of the square you just made by using box cutters or a pair of scissors.
3. Measure and cut a large piece of foil to line the bottom of the pizza box.
4. Apply glue to the bottom of the pizza box and glue the large piece of foil into place, smoothing in down.
5. Measure and cut another large piece of foil to cover the bottom of the flap you cut on the pizza box lid.
6. Apply glue to the bottom of the pizza box lid and glue the tin foil piece into place.
7. Use scissors to cut a piece of black construction paper that is 1-2" smaller at each edge than the bottom of the pizza box.
8. Use clear masking or packing tape to tape the black construction paper to the bottom of the pizza box. Try to center the black construction paper.
9. Find a sheet protector and pull the two pieces apart. Tape these pieces together at one of their long edges. Tape the new, large piece of plastic on the inside of the box lid, NOT the flap. The plastic should span the flap opening. If it doesn't, make a larger plastic sheet!
10. Use a wooden skewer to poke two small holes (don't poke the skewer all the way through) on the lid between the flap and the side of the lid. Poke the holes about 2" apart.
11. Wrap a thin piece of tape around the skewer, near the flat end, so that one end of the tape is above the other end.

12. Tape the skewer to the flap so that the flat end of the skewer is near the end of the flap. Use the skewer and the holes you poked in the lid as a kickstand for the flap.
13. If you want to see just how hot your Solar Oven gets, tape a thermometer to the bottom of the box so that it can be seen through the plastic window.
14. Set up your oven with the flap up and place it in the sun. It may take a little while, but you'll watch your s'mores heat up, melt, and be ready to eat!

Purpose: The Solar Oven is what is more widely known as a solar cooker and works on the principle of converting sunlight to heat energy and retaining the heat for cooking. To make the process work, you cover as much of the box as possible with reflective material in order to catch as much sunlight as possible. In this case, you are using tin foil. The cooking surface is black construction paper because it retains heat very well. As heat is retained, the air inside the oven also heats. Next thing you know, you're eating delicious, melt-in-your-mouth s'mores!

Experiment (Day 4): Solar Energy Balloon Blow-up

Materials: 2 empty soda bottles (1 painted black and 1 painted white), balloons

Procedure:

- Attach a balloon to the mouth of 1 soda bottle painted white and 1 soda bottle painted black.
- Place the bottles in the sun.

Purpose: This activity has the same principle behind it as the solar oven experiment. The air in the black bottle will heat up faster than the air in the white bottle. This will cause the balloon over the black bottle to expand more quickly. We can connect this to the solar oven experiment by discussing how the black color retains heat.

Day 5: Types of Energy - Wind

Book: The Boy who Harnessed the Wind - in this book, a young boy builds a windmill out of scraps to help his community maintain their dying crops.

Experiment: Collecting Wind Data

Materials: empty pasta jar lids, Vaseline, strong tape

Procedure:

- Apply a thick layer of Vaseline to the inside of each clean, empty pasta jar lid.
- Hang the lids in various places outside. (choose locations that will be surrounded by heavy amounts of wind and locations that will encounter little to no wind)
- Allow several hours or even a few days to pass before checking on the lids again.

- When the time you've chosen is over, observe any items that are now stuck to the lids. You may now see leaves, bugs, trash, etc. stuck to the lid.
- Discuss how these items got there and why each lid has a different amount of "stuff" inside of it.

Purpose: This activity is designed to get the students thinking about what areas provide the most wind. When the boy in the story designed his windmill, could his community have survived if he had placed it where it would receive little to no wind? Of course not! If we are to use more wind power in the world, what do we need to know first? We need to know where we will have the most wind and therefore we can generate the maximum amount of power. This will also help them to see how fickle wind can be and how it is potentially risky to put all of our efforts into wind energy.

Day 6 - Types of Energy - Hydropower

Book: Water Power: Energy for Today – this book describes how wind can be used to provide us with energy and alerts readers to the dangers of using only non-renewable energy resources.

Experiment: Build a water wheel

Materials: 4 Styrofoam plates, pencils, stiff plastic straws, 9 small plastic cups (per group), masking tape, 1½ inch wide, string, and hose or water container

Procedure:

- Put 2 plates back-to-back and tape together.
- Find the center of the plate-wheel by balancing it on the eraser end of a pencil.
- Punch through the 2 plates with the pencil tip. Repeat with the other plates.
- Tear off a strip of masking tape 25 inches long. Stick the cups to the tape as shown.
- Wrap the strip of cups around one of the wheels, adjusting cups as necessary, and fasten.
- Use a short piece of tape to secure each cup.
- Tape the two sets of plates together. Tape one end of the string onto the empty plate and wind up. You'll want enough string to pull up an object from the floor.
- Slide the straw through the hole of your waterwheel. This is your axle.
- You are now ready to test your waterwheel!

Purpose*:* This project is a simple way to show kids how water power was used in the old days to turn machinery and power entire factories. It can also be used to help them to connect to the ways that water is used to generate electricity today!

Day 7 - Types of Energy - Fossil Fuels

Book: What's so bad about gasoline? : fossil fuels and what they do - this book teaches about how fossil fuels are used in our world today and encourages the reader to research alternate energy sources for the future.

Experiment: Mining for Fossil Fuels

Materials: cookies with raisins, nuts, and chocolate chips, toothpicks, napkins,

Procedure:

- Explain that we are going to be "mining" or finding the resources that we need from the land. The land is the cookie. The nuts represent oil, the raisins represent coal, and the chocolate chips represent natural gas.
- Your job is to mine out these resources without looking at the bottom of the cookie. You can create a pile for each resource.
- You also need to try and keep the harm done to the land as minimal as possible.

Purpose: The students will discover that not harming the land is virtually impossible. Even the most careful students will have large piles of land crumbling into dust. This activity is to help the students visually understand the impact that mining for resources has on our land. It will likely spark some dialogue about alternate ways to produce energy and may help them to want to be more conscious of energy use.

Day 8 - Energy Eye Openers

Book: Shocking Truth About Energy – this book contains facts about energy usage and promotes ways the we can conserve energy.

Experiment: Fossil Fuel Exploration

Materials: access to the DiscoveryEducation.com

Purpose: Students will take a self-guided tour through an energy exploration of fossil fuels. They will create various scenarios in which they use specific types of fossils fuels and view the outcome of their choice.

Day 9 - Energy Eye Openers (continued)

Book: Why Should I Save Energy – this book gives students some important reasons for saving energy and ways that they can start today!

Experiment: How Big is your Footprint Virtual Lab

Materials: access to DiscoveryEducation.com

Purpose: This virtual lab allows student to manipulate a digital world of their own where they can decide what types of energy that want to use in their world and how much of it. After making their selections, it calculates the cost for a week and tells them their carbon footprint. They can them make changes to improve upon their initial decisions.

Day 10 - Decision Making for the Future

Book: Our House is Round: A Kids Book About Why Protecting our Earth Matters – this book provides students with the rationale behind conserving energy and gives them practical tips for the future.

At the point, I would like for the students to make a decision about what major change they want to make in their lives in order to conserve energy. They may come up with some awesome ideas that I haven't even thought of. I'm including an idea below that you can use if you are utilizing this unit and need some guidance.

Culminating Unit Idea

Have the students create light switch reminder plates. Using cardboard or cardstock, have several light switch templates. Ask the students to look at home and see what types of light switch covers they have. When they know, have them choose several to decorate for their homes. They could write creative sayings on them such as, "Do what's right and turn off the light!" The idea is that they will take them home and tape them over their existing lights switch covers as a reminder to turn off the lights!

Conclusion

It is my hope that students will gain an understanding of what energy is, the types of energy that exist, and how to make positive changes that will impact the future. The energy crisis that we face is very much their problem. I hope that these young minds come away with some important tools to prepare them for what is to come and some mind-blowing solutions to these problems!

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In cartoon format,this book uses aliens to explain the science of energy.

Bradley, Kimberly Brubaker, and Paul Meisel. *Energy Makes Things Happen*. New York: HarperCollins, 2003.
In this book, you can find out all the ways you and everyone on earth need energy to make things happen.

Fowler, Allan. *Energy from the Sun*. New York: Children's Press, 1997.
This book defines energy and explains how energy from the sun provides us with heat, light, plants, food, and other necessary thing for life on Earth.

Green, Jen, and Mike Gordon. *Why Should I save Energy?* Hauppauge, NY: Barrons Educational Series, 2005.
Today, some of the most important questions kids ask are related to the natural environment. The enlightening and entertaining four-book Why Should I? series demonstrates the importance of protecting nature. Books present brief, entertaining stories that answer children's questions and feature amusing color illustrations on every page.

Kamkwamba, William, and Bryan Mealer. *The Boy Who Harnessed the Wind: Creating Currents of Electricity and Hope*. New York, NY: William Morrow, 2009.
When fourteen-year-old William Kamkwamba's Malawi village was hit by a drought, everyone's crops began to fail. Without enough money for food, let alone school, William spent his days in the library . . . and figured out how to bring electricity to his village. Persevering against the odds, William built a functioning windmill out of junkyard scraps, and thus became the local hero who harnessed the wind.

Kondonassis, Yolanda, and Joan Brush. *Our House Is Round: A Kid's Book about Why Protecting Our Earth Matters*. New York: Skyhorse Pub., 2012.
This book teaches the “whys” behind earth conservation in a colorful, positive way that encourages maturity, responsibility, and problem-solving discussion.

Leedy, Loreen. *The Shocking Truth about Energy*. New York: Holiday House, 2010.
Comical characters explain the basics, including the many forms energy can take. Readers can learn how energy changes from one from to another so that the Sun's energy can end up in a lunch box and eventually in people's muscles. Easy-to-follow diagrams show different ways energy can be harnessed.

Rockwell, Anne F., and Paul Meisel. *What's so Bad about Gasoline?: Fossil Fuels and What They Do*. New York: Collins, 2009.
Learn about what fossil fuels are and how they impact our environment when they are used for energy.

Appendix 1: Implementing Teaching Standards

CCSS.ELA-Literacy.RI.1.1
Ask and answer questions about key details in a text.
Students will have the chance to discuss vocabulary words and clarify unknown words as they learn about energy through the exposure to nonfiction texts.

CCSS.ELA-Literacy.RI.1.3
Describe the connection between two individuals, events, ideas, or pieces of information in a text.
Students will identify the various energy types and be able to compare them to one another by utilizing this standard.

CCSS.ELA-Literacy.RI.1.9
Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).
As they learn about energy, students will be able to compare and contrast texts written about the same topic and start to develop their own opinion.

Science 1.E.2.1
Summarize the physical properties of Earth materials, including rocks, minerals, soils and water that make them useful in different way.
Students will be learning about coal and fossil fuels and will determine how they can used to create energy.

3.P.3
Recognize how energy can be transferred from one object to another.
This objective is the focal point of the unit. Students will identify where energy comes from and how we can use it.

Notes

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[i] "Railroad Commission - Energy Education Programs - Energy Curriculum." Railroad Commission - Energy Education Programs - Energy Curriculum. Accessed November 17, 2014. http://www.energyeducation.tx.gov/.

[ii] "Railroad Commission - Energy Education Programs - Energy Curriculum." Railroad Commission - Energy Education Programs - Energy Curriculum. Accessed November 17, 2014. http://www.energyeducation.tx.gov/.

[iii] "Energy Kids: Energy Information Administration." EIA Energy Kids -. Accessed November 17, 2014. http://www.eia.gov/KIDS/index.cfm.

[iv] "Solar Energy." SEIA. Accessed November 17, 2014. http://www.seia.org/about/solar-energy.

[v] "Energy.gov." Hydropower Basics. Accessed November 17, 2014.

[vi] "Energy Kids: Energy Information Administration." EIA Energy Kids -. Accessed November 17, 2014. http://www.eia.gov/KIDS/index.cfm.

[vii] "Energy Kids: Energy Information Administration." EIA Energy Kids -. Accessed November 17, 2014. http://www.eia.gov/KIDS/index.cfm.

[viii] "Energy Kids: Energy Information Administration." EIA Energy Kids -. Accessed November 17, 2014. http://www.eia.gov/KIDS/index.cfm.

[ix] Echevarria, Jana, Deborah J. Short, and Maryellen Vogt. *Making Content Comprehensible for English Learners: The SIOP Model.* Boston: Allyn&Amp, 2007.