10 Sources of Energy

Teacher Lesson Plan

Part 1: What is Energy?

Background Information:

- Everything in the Universe is either matter or energy.
- Matter is anything that has volume (takes up space) and weight. Mass is the correct term, but weight is acceptable at third grade. Mass does not change but weight is dependent on gravity.
- Energy can be defined as the ability to cause a change in an object. It can be a change in shape, location or state of matter. It is the ability to do work.
- We experience energy in different ways. We can say…
    - Energy is light.
    - Energy is heat.
    - Energy makes things grow.
    - Energy makes things move.
    - Energy runs machines.
    - Energy does not disappear.
        - The Law of Conservation of Energy says that energy cannot be created or destroyed; it only changes forms. This is a topic for older grades, but the concept is important when discussing the forms of energy (heat, electrical energy, light sound) found in 3rd grade.
- The United States uses a lot of energy. The average American consumes five times the world average per capita consumption of energy. This has a great impact on our economics, environment, politics and foreign relations.

Introduction/Engage:

- 10 Sources of Energy Pre-poll
- Summarize background information for students
- Define energy vs. matter discussing examples of each using the Energy vs. Matter Student Worksheet
    - Examples of Energy from student worksheet: music, electricity, light, motion, heat, wind
    - Examples of Matter from student worksheet: tree, water, rock, paper, apple, air
- Energy Scavenger Hunt Student Worksheet: Energy is all around us. Start in your classroom and try to list or draw an example for each type of energy. Discuss as a class. Take a walk around the school or playground. Add at least one more example for each box. Return to your classroom and discuss again.

Part 2: 10 Sources of Energy

Background Information:

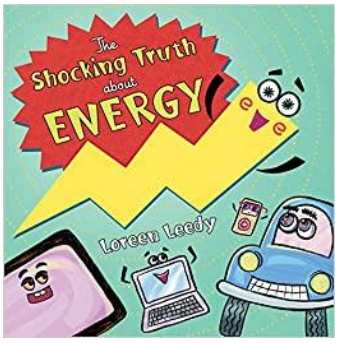
- We use many different sources of energy to do work for us. They are classified into two groups:
  - Non-Renewable-Our supplies are limited and once they are used, they cannot be replaced or restored in a short period of time.
    - Coal, Natural Gas, Nuclear, Petroleum, Propane
  - Renewable-Our supplies are unlimited or can be restored within a short period of time.
    - Biomass, Geothermal, Hydropower, Solar, Wind

- There is no one perfect source of energy. Both groups have advantages and disadvantages.
  - Non-renewable Advantages
    - They are relatively inexpensive.
    - They are very energy dense or they produce large amounts of energy.
    - They provide our base load power, so we have access to energy 24/7/365.
    - They are highly reliable.
    - Our current infrastructure is set up for ease of use. (Example: There is a gas station on every corner.)
  - Renewable Advantages
    - They produce energy with little air pollution or other environmental impacts. There are still some environmental impacts with the production of materials (solar panels, wind turbines, etc.), transportation or land use.
    - The source of energy is generally free (sun, wind, water).
    - They can provide energy where current infrastructure (electric grid or gas lines) is not available.
  - Non-Renewable Disadvantages
    - The fossil fuels produce greenhouse gases and air pollution contributing to climate change.
    - There are other environmental impacts from burning fossil fuels and storing spent nuclear fuel.
    - As the world's largest countries (China and India) develop more of a middle class, the world's need for energy will dramatically rise. Most of the energy development in these countries is through non-renewable sources causing faster use of these resources and impacting health through increased pollution.
    - The increasing need for limited non-renewable resources impacts relationships between countries with and without these resources.
  - Renewable Disadvantages
    - While the energy source is usually free, the technology to transform the energy sources into electricity can be expensive. New technologies and government policy are decreasing costs.
    - They are not reliable. The sun isn't always shining, and the wind isn't always blowing. Since electricity cannot be stored, this is a challenge. Batteries are an option many companies are developing.

        - They are not energy dense. Example: One wind turbine produces roughly 4 megawatts of electricity. A medium sized coal burning power plant produces 1,600 megawatts of electricity.

- Electricity is called a secondary source of energy. One of the ten sources must be used to generate electricity. Electricity is an energy carrier because it is an efficient and safe way to move energy from one place to another.

The Shocking Truth about Energy by Loreen Leedy



Key Vocabulary:

- *Energy*-The ability to do work or cause a change. We experience energy as light, heat, growth, motion or sound.
- *Fossil Fuel*-Fuels from prehistoric plants and animals. Examples are coal, natural gas and petroleum (oil).
- *Nuclear Energy*-The energy of atoms. Nuclear power plants run on the Uranium atom.
- *Thermal*-Heat energy.
- *Electricity*-The energy you get when electrons (a really small part of an atom) flow. Lightning and static electricity are examples of electricity in nature. Electricity we use at home and school needs to be generated from one of the 10 sources of energy. It can be generated from both renewable and nonrenewable energy sources. We use electricity to cook food, stay warm/cool and watch TV.

Introduce/Engage:

- Energy Sources Pictures & Definitions
    - Post the definitions of the 10 energy sources. Consider making two columns, one renewable and one non-renewable.
    - Distribute the pictures of the energy sources to students
    - Read the definition. The student with the corresponding picture matches the picture with the definition.
    - Discuss the advantages and disadvantages of renewable and nonrenewable resources.

Book Talk:

Have you ever thought about catching energy? Or how the sun may be involved in the lunch you eat? People are always wanting more and more energy to power their cars, light their homes and cook their food. We use energy every single day for many of the things we need and enjoy. There are 10 sources of energy and different ways we use them. There are also many advantages and disadvantages to each energy source. Let's read *The Shocking Truth About Energy* by Loreen Leedy to answer all of our questions about energy!

Read *The Shocking Truth About Energy*:

- Before reading the book, pass out discussion questions to students. Have students pre-read the questions to get an idea of what they should be listening for while you read.

- While reading book, students answer discussion questions
- Give time to complete questions after reading.
- Discuss answers to questions.
- Additional Ideas for Discussion Questions:
    - If the entire page of questions is too much for your students, consider breaking up the questions, assigning each student 1-2 questions to answer while you read.
    - When you are done reading have students find someone with the SAME question and meet to discuss their answers, looking for similarities and differences in their thinking
    - Likewise, you may choose to have students find someone with a DIFFERENT question and meet to share their answers.

Reinforcement/Assessment:

- Energy Chants-Reinforce the 10 Sources of Energy by introducing the chants and motions. See a video of the 10 Energy Chants at: https://www.youtube.com/watch?v=g4UPNhDbz3w
- Energy Relay Instructions
    - Separate the cards by color (energy source).
    - Divide group into equal teams, up to 6 teams or less.
    - Choose one energy source to start the game and distribute that card to each team by placing it face down in front of the team.
    - When you give the signal, the teams turn over their card and determine which energy source is being described.
    - When a team thinks they have the correct answer, one team member brings the card to you and quietly tells you the answer.
    - If the answer is correct, the student gives you the card and receives the next card and returns to the team. If the answer is incorrect, they must return to the team with the card to try again.
    - The first team to get all 10 cards correct and sit down wins the game.
    - Helpful Tips:
        - Keep the 10 Sources pictures/definitions visible so students can check their answer.
        - Alternate the student bringing the answer to you. Make adaptations for special mobility needs.
        - Reading out loud can be done by the person getting the card or a designated helper.
        - The gym, cafeteria or empty hallway are good spaces to run the relay if available.
        - If you want to do the relay on the playground, consider the wind and cards blowing away.

Part 3: Sources of Energy Research Project

You Become the Expert-Energy Research Project:

- Place students in groups of 2 or 3 and assign the group an energy source.
- Students use the Energy Research Project Student Worksheet to research specific information about their energy source. Additional resources can include:
    - *The Shocking Truth about Energy*

    - *Energy at a Glance* handouts from NEED: https://shop.need.org/collections/elementary-guides/products/energy-at-a-glance-free-download
    - *Energy Infobooks* from NEED: https://shop.need.org/collections/elementary-guides/products/energy-infobooks
    - See digital online resources
- Students will put their information in a format in which they can share their energy with the class. Format styles could include poster, Google Slide or PowerPoint.
- During each presentation, groups can take notes on the Presentation Notes student worksheet.

Assessments:

- 10 Sources of Energy Post-poll
- Energy Research Project Rubric

Additional Resources for 10 Sources of Energy:

See OEP's website for additional activities for the classroom and resources for students' 10 Sources of Energy Research project.