

Exploring Energy



Unit Progression

Energy is an important part of our everyday lives. We use energy to cook, get around, and send emails. In this unit, we'll explore the issues associated with fossil fuels and how people are coming up with innovative sustainable energy alternatives for a brighter future.

[What's the Deal With Fossil Fuels?](#)

In this video, we'll focus on fossil fuels—what they are, and why they are a problem for the environment.



Activity [The Heat is On: Cause and Effect and Climate](#)

In this lesson, students will practice distinguishing between correlation and causation within the context of global climate change.

[Buses and Biofuels: Sustainable Transportation](#)

Transportation of people and all of our stuff accounts for almost one-third of all carbon emissions in the United States. In this video, we'll navigate through some sustainable transportation options.



Activity [Building Better Buses: Transportation Design Challenges](#)

This lesson is composed of three challenges, each addressing a different aspect of how to design an efficient public bus system by taking into account the benefits and drawbacks of various fuel options.

[Renewable Energy: Clean Tech Solutions](#)

In this video, we'll explore some of the clean and green technologies that exist for generating renewable energy.



Activity [Optimal and Sustainable: Renewable Energy Revamp](#)

What factors do we have to consider when designing a renewable energy plan for a community? In this lesson, students will be challenged with a renewable energy optimization problem.

[Renewable Energy: Powered by Poop](#)

Find out how a dairy farm is using a methane digester to turn cow poop into electricity.

[Nuclear Energy: Is Fission the Future?](#)

In this video, we'll weigh the benefits and drawbacks of nuclear energy.



Activity [Nuclear Energy: What's Your Reaction?](#)

Is nuclear fission a safe and carbon-free energy alternative to fossil fuels? In this lesson, students must decide if they support replacing coal with nuclear energy to generate electricity.

[Your Digital Footprint: Data and Energy Use](#)

Cell phones and laptops use energy to charge their batteries. But did you know that sending emails, texts, and Snapchats requires much more energy? In this video, we'll explore our digital energy footprints.

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Connections to Standards

Each video and lesson in this unit has been designed to support the Next Generation Science Standards; however, the NGSS connections are stronger when these resources are used together as a full unit. Below, we've outlined the NGSS Performance Expectations (PEs) this unit builds towards and the specific Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts that most directly support these PEs:

Performance Expectations (Grades 6-8)

- **MS-ESS3-3:** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- **MS-ESS3-4:** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- **MS-ESS3-5:** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
- **MS-ETS1-1:** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

Disciplinary Core Ideas (Grades 6-8)

- **MS-ESS3.C: Human Impacts on Earth Systems**
 - Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.
- **MS-ESS3.D: Global Climate Change**
 - Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.

Science and Engineering Practices (Grades 6-8)

- **Analyzing and Interpreting Data**
- **Using Mathematics and Computational Thinking**
- **Engaging in Argument from Evidence**
- **Designing Solutions**

Crosscutting Concepts (Grades 6-8)

- **Influence of Science, Engineering, and Technology on Society and the Natural World**
 - All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.

