



Energy and the Environment

Lesson 1: Investigating Energy | 14 days

Activity 1.1: Energy Comes in Many Forms

Activity 1.2: Energy Crossroads

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

Technology and Engineering

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.G Analyze how an invention or innovation was influenced by the context and circumstances in which it is developed.

3.5.6-8.W (ETS) 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.

3.5.6-8.CC Consider historical factors that have contributed to the development of technologies and human progress.

Activity 1.2.a: The Next Frontier

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

Technology and Engineering

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.G Analyze how an invention or innovation was influenced by the context and circumstances in which it is developed.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.W (ETS) 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.

3.5.6-8.Z Analyze how different technological systems often interact with economic, environmental, and social systems.

Activity 1.3: Using Energy Efficiently

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

Technology and Engineering

3.5.6-8.D Analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges.

3.5.6-8.E Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation.

3.5.6-8.W (ETS) 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.



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Activity 1.4.a: Wind Energy

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.G Analyze how an invention or innovation was influenced by the context and circumstances in which it is developed.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.W (ETS) 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.

Project 1.4: Measuring Energy

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

3.4.6-8.H Design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment.

Technology and Engineering

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.R Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.

3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.

3.5.6-8.V Refine design solutions to address criteria and constraints.

3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.

3.5.6-8.HH Create a closed-loop system that has a feedback path and requires no human intervention.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.

Lesson 2: Sustainable Energy | 15 days

Activity 2.1: Why Are We Concerned?

Earth and Space Science

3.3.6-8.O Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

3.3.6-8.N Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems



Energy and the Environment

Activity 2.1: Why Are We Concerned? cont.

Environmental Literacy and Sustainability

3.4.6-8.B Analyze and interpret data about how different societies (economic and social systems) and cultures use and manage natural resources differently.

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

3.5.6-8.E Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation.

Technology and Engineering

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.Z Analyze how different technological systems often interact with economic, environmental, and social systems.

3.5.6-8.CC Consider historical factors that have contributed to the development of technologies and human progress.

Project 2.2: Energy Expo

Earth and Space Science

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Environmental Literacy and Sustainability

3.4.6-8.H Design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment.

Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.F Analyze examples of technologies that have changed the way people think, interact, live, and communicate.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.R Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.

3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.

3.5.6-8.V Refine design solutions to address criteria and constraints.

3.5.6-8.W (ETS) 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.

3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.DD Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.



Energy and the Environment

Project 2.3: Energy for Our Future

Earth and Space Science

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

3.3.6-8.N Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Environmental Literacy and Sustainability

3.4.6-8.H Design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment.

Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.W (ETS) 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.

3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.Z Analyze how different technological systems often interact with economic, environmental, and social systems.

3.5.6-8.DD Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.

Lesson 3: Making an Impact | 16 days

Activity 3.1: Water Audit

Earth and Space Science

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Technology and Engineering

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.D Analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges.

3.5.6-8.I Examine the ways that technology can have both positive and negative effects at the same time.

3.5.6-8.L Design methods to gather data about technological systems.

3.5.6-8.W (ETS) 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.

3.5.6-8.Z Analyze how different technological systems often interact with economic, environmental, and social systems.

3.5.6-8.BB Demonstrate how knowledge gained from other content areas affects the development of technological products and systems.



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Activity 3.2: Product Life Cycle

Physical Science

3.2.6-8.C Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Earth and Space Science

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

Technology and Engineering

3.5.6-8.A Research information from various sources to use and maintain technological products or systems.

3.5.6-8.D Analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges.

3.5.6-8.E Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation.

3.5.6-8.W (ETS) 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.

Activity 3.3: I Made a Difference

Earth and Space Science

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.

Technology and Engineering

3.5.6-8.D Analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges.

3.5.6-8.E Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation.

3.5.6-8.W (ETS) 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.

3.5.6-8.AA Adapt and apply an existing product, system, or process to solve a problem in a different setting.

Activity 3.4: Recycle City

Earth and Space Science

3.3.6-8.M Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

3.3.6-8.N Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Environmental Literacy and Sustainability

3.4.6-8.G Obtain and communicate information to describe how best resource management practices and environmental laws are designed to achieve environmental sustainability.



Energy and the Environment

Activity 3.4: Recycle City cont.

Technology and Engineering

3.5.6-8.D Analyze how the creation and use of technologies consumes renewable, nonrenewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges.

3.5.6-8.E Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation.

3.5.6-8.W (ETS) 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.

Activity 3.5: Heat Transfer Pre-Assessment

Activity 3.6: Heat Transfer

Physical Science

3.2.6-8.B Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Technology and Engineering

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.N (ETS) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Project 3.7: Penguin Dwellings

Physical Science

3.2.6-8.B Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

3.2.6-8.M Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

3.2.6-8.N Plan an investigation to determine the relationship among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Earth and Space Science

3.3.6-8.O Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Environmental Literacy and Sustainability

3.4.6-8.H Design a solution to an environmental issue in which individuals and societies can engage as stewards of the environment.



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Energy and the Environment

Project 3.7: Penguin Dwellings cont.

Technology and Engineering

3.5.6-8.B Use instruments to gather data on the performance of everyday products.

3.5.6-8.M (ETS) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

3.5.6-8.P (ETS) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

3.5.6-8.Q Apply a technology and engineering design thinking process.

3.5.6-8.U Evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.

3.5.6-8.V Refine design solutions to address criteria and constraints.

3.5.6-8.X Defend decisions related to a design problem.

3.5.6-8.JJ Apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.

Activity 3.8: Heat Transfer Post-Assessment

Physical Science

3.2.6-8.B Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
