Core Environmental Science-STEELS:
This course emphasizes the interrelationships between humans and their environment. Major units include human population problems, water resources and pollution, air resources and pollution, soil resources, wildlife habitats, energy and mineral resources, and relationships between society and the biosphere. Learning is accomplished through the use of reading text, lecture notes, frequent lab activities, individual worksheets, group work, videos, and case studies. The core level class will focus on the foundational concepts of topics and have slower pacing to focus on mastery, review, and practice of the content. To support students, assignments will have an emphasis on executive function through guided discovery while math and graphing will be integrated with a focus on trends and logical reasoning.

Units:

- Topic 1: Human Population
- Topic 2: Urbanization
- Topic 3: Soil and Agriculture
- Topic 4: Mineral Resources and Mining
- Topic 5: Water Resources
- Topic 6: The Atmosphere and Global Climate Change
- Topic 7: Nonrenewable Energy and Renewable Energy Alternatives

Book Resource: Withgott, Jay 2021 - Environmental Science: Your World, Your Turn. SAVVAS Learning Company

Digital Resource: SAAVAS Realize

Subject: CP Environmental Science		Grade: 9
Topic 1: Human Population		
Big Ideas (Phenomena): How does the human population affect the environment? Students will discover important trends in human population growth, predict population growth, and learn about people and their environments. Essential questions/models addressed in this unit: ● What social and environmental factors affect human population size? ● How do human population growth trends differ between developed nations and developing nations? ● How does a nation's wealth relate to its consumption of resources?		
Focus STEELS Standards Addressed in this Unit: 3.4.9-12.A Environmental Literacy & Sustainability Students who demonstrate understanding can analyze and interpret how issues, trends, technologies, and policies impact agricultural, food, and environmental systems and resources.		
Science and Engineering Practices (SEP)	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts (CC)**

Analyzing and Interpreting Data Analyzing and Interpreting Data Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. ● Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. **ESS3.A: Natural Resources** ● Resource availability has guided the development of human society. ESS3.C: Human Impacts on Earth Systems ● The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources **LS4.D: Biodiversity and Humans** ● Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation,	**Cause and Effect** ● Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system. ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

	habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational and inspirational value.	
Knowledge and Skills: ● Describe how technological advances have contributed to human population growth ● Explain recent trends in population growth ● Identify characteristics of human population that are studied by demographers ● Describe total fertility rates and replacement fertility ● Explain how the age structure and sex ratio of a population define its potential for growth ● Describe the demographic transition ● Discuss social factors that affect population growth ● Describe how humans impact their environments ● Discuss the negative and positive impacts of technology		**Vocabulary:** ● Industrial Revolution ● Infant mortality ● Life expectancy ● Growth rate ● Demography ● Total fertility rate ● Replacement fertility ● Demographic transition ● Wealth gap
Local Connection: Whitehall Census Data Blue Zones		**Additional Connections:** China's Changing Population Needs

Subject: Environmental Science		Grade: 9
Topic 2: Urbanization		
Big Ideas (Phenomena): How can we balance the ways we use land with the needs of the environment? Students will discover the impacts of land use and urbanization, sprawl, and sustainable cities. Essential questions/Model addressed in this unit: ● How do we use the land we live on? ● How can the effects of urbanization lead to sprawl? ● What are the characteristics of a sustainable city?		
Focus STEELS Standards Addressed in this Unit: 3.4.9-12.B and 3.4.9-12-H Students who demonstrate understanding can apply research and analytical skills to evaluate the conditions and motivations that lead to conflict, cooperation, and change among individuals, groups, and nations. Students who demonstrate understanding can design and evaluate solutions in which individuals and societies can promote stewardship in environmental quality and community well-being.		
Science and Engineering Practices (SEP)	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts (CC)**

Obtaining, Evaluating, and Communicating Information Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. ● Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.	**ESS3.A: Natural Resources** ● Resource availability has guided the development of human society. **ESS3.C: Human Impacts on Earth Systems** ● The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● Moreover, anthropogenic changes (induced by human activity) in the environment - including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change - can disrupt an ecosystem and threaten the survival of some species.	***Connections to Nature of Science*** **Science Addresses Questions About the Natural and Material World** ● Not all questions can be answered by science. ● Science knowledge indicates what can happen in natural systems-not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge. ● Many decisions are not made using science alone, but rely on social and cultural contexts to resolve issues.
Knowledge and Skills: ● Differentiate between land cover and land use, and describe how people affect both. ● Explain how and where urbanization occurs. ● Describe the environmental impacts of urbanization. ● Describe the contributors to sprawl and its patterns. ● Explain the impacts sprawl has on an area. ● Describe four different components of city planning. ● Explain the importance of mass transit options to a city and its residents. ● Explain the importance of open space to a livable city. ● Differentiate green buildings from conventional buildings. ● Discuss the progress toward sustainability some cities have made and its importance to the world.		**Vocabulary:** ● Land cover ● Land use ● Urban area ● Rural area ● Urbanization ● Infrastructure ● Heat island ● Sprawl ● City planning ● Geographic information system (GIS) ● Zoning ● Urban growth boundary (UGB) ● Smart growth ● Ecological restoration

	• Greenway
Local Connection: Fahy Commons and Muhlenberg College - Allentown, PA Sustainable Energy Fund (SEF) Net Zero Building - Schnecksville, PA STEPS Building at Lehigh University - Bethlehem, PA	**Additional Connections:** Growing Pains in Portland, Oregon

Subject: Environmental Science		**Grade: 9**
Unit Title: 3. Soil and Agriculture		
Big Ideas (Phenomena): How can we balance our growing demand for food with our need to protect the environment? Students will discover the importance of soil, soil degradation and conservation, agriculture, and food production. Essential questions/Model addressed in this unit: • Why does it take so long for topsoil to form? • How can erosion be both helpful and harmful to soil formation? • What are the benefits and environmental consequences of industrial farming? • How can we increase food production sustainably?		
Focus STEELS Standards Addressed in this Unit: 3.4.9-12.F Students who demonstrate understanding can evaluate and communicate the effect of integrated pest management practices on indoor and outdoor environments.		
Science and Engineering Practices (SEP)	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts (CC)**

Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs. ● Communicate scientific and technical information (e.g., about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).	**ESS3.C: Human Impacts on Earth Systems** ● The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. **ETS1.B: Developing Possible Solutions** ● When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.	**Cause and Effect** ● Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.
Knowledge and Skills: ● Explain three processes by which soil forms. ● Describe the horizons that make up a soil profile. ● List the four characteristics used to classify soil. ● Describe some practices that can lead to soil erosion and some that can prevent it. ● Identify the causes and effects of desertification. ● Discuss the activities of U.S. and international agricultural organizations. ● Explain how irrigation and pesticide use can cause soil pollution. ● Discuss the beginnings of agriculture. ● Explain the importance of industrial agriculture and the green revolution. ● Identify different types of pest control. ● Explain the importance of pollinators to agriculture. ● Explain why the world needs to grow more food and to grow it sustainably. ● Discuss genetically modified food. ● Describe the advantages and disadvantages of industrial food production. ● Discuss sustainable agriculture.		**Vocabulary:** ● Soil ● Parent material ● Bedrock ● Weathering ● Soil horizon ● Soil profile ● Clay ● Silt ● Sand ● Loam ● Soil degradation ● Intercropping ● Crop rotation ● Cover crop ● Shelterbelt ● Tilling ● Terracing ● Contour farming ● Overgrazing

	• Desertification • Irrigation • Salinization • Pesticide • Traditional agriculture • Yield • Industrial agriculture • Green revolution • Biological pest control • Integrated pest management (IPM) • Pollinator • Arable land • Food security • Malnutrition • Genetic engineering • Genetically modified organism (GMO) • Biotechnology • Feedlot • Aquaculture • Seed bank • Sustainable agriculture • Organic agriculture
Local Connection: • Rodale • WHS Rain Garden • Flint Hill Farm Educational Center - Coopersburg, PA • Monocacy Farm Project - Bethlehem, PA	**Additional Connections:** Possible Transgenic Maize in Oaxaca, Mexico

Subject: Environmental Science		Grade: 9
Unit Title: 4. Mineral Resources and Mining		
Big Ideas (Phenomena): Can we make the benefits of mining outweigh the costs? Students will discover the importance of minerals and rocks, mining, and mining impacts and regulation. Essential questions/Model addressed in this unit: ● Where do minerals come from? ● How are mineral resources accessed? ● How can regulations and responsible mineral use reduce the negative impacts of mining?		
Focus STEELS Standards Addressed in this Unit: 3.4.9-12.D Students who demonstrate understanding can apply research and analytical skills to systematically investigate environmental issues ranging from local issues to those that are regional or global in scope.		
Science and Engineering Practices (SEP)	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts (CCC)**
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs. ● Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e. the ecosystem is resilient), as fluctuations in conditions or the size of any	**Cause and Effect** ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

	population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. **LS4.D: Biodiversity and Humans** ● Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). ● Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. **ESS3.C: Human Impacts on Earth Systems** ● The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.	
Knowledge and Skills: ● Explain what a mineral is.		**Competencies/Skills:** Critical thinking and problem solving,

• Describe how minerals form. • Identify types of rocks and the stages of the rock cycle. • Identify the types of resources that are mined. • Describe different methods used for mining. • Explain how metals are processed. • Describe the negative impacts of mining on the environment and society. • Explain how mining is regulated. • Describe ways that mineral use can become more responsible.	environmental literacy, global awareness and cultural sensitivity,ethical and responsible decision making, and sustainability management and planning
Local Connection: • National Museum of Industrial History (NMIH) - Bethlehem, PA • Eastern PA Coalition for Abandoned Mine Reclamation (EPCAMR) - Ashley, PA	**Additional Connections:** Mining for…Cell Phones?

Subject: Environmental Science	Grade: 9

Unit Title: 5. Water Resources

Big Ideas (Phenomena): Why is the level of water in the Colorado River so low?

Students will discover the importance of our planet's water sources, uses of freshwater, and water pollution.

Essential questions/Model addressed in this unit:

- How can water be both a renewable resource and be scarce in some places?
- How can we reduce our own daily water use?
- Why do excess nutrients have a negative effect on water health?

Focus STEELS Standards Addressed in this Unit: 3.4.9-12.C
Students who demonstrate understanding can analyze and interpret how issues, trends, technologies, and policies impact watersheds and water resources.

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Analyzing and Interpreting Data Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. ● Analyze data using tools, technologies, and/or models (e.g. computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e. the ecosystem is resilient), as fluctuations in conditions or the size of any population, however, can challenge	**Cause and Effect** ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. **Stability and Change** ● Feedback (negative or positive) can stabilize or destabilize a system.

	the functioning of ecosystems in terms of resources and habitat availability. **LS4.D: Biodiversity and Humans** ● Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). ● Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. **ESS3.A: Natural Resources** ● Resource availability has guided the development of human society.	
Knowledge and Skills: ● Discuss how fresh water can be both renewable and limited. ● Explain the significance of a watershed. ● Explain how most groundwater is accessed. ● List the three primary categories of freshwater use. ● Relate the causes of surface water depletion to their effects.		**Competencies/Skills:** ● Fresh water ● Surface water ● Runoff ● River system ● Watershed

• Explain the major causes and effects of groundwater depletion. • Describe the strategies for addressing water depletion.	• Groundwater • Permeable • Impermeable • Aquifer • Water table • Recharge zone • Well • Water diversion • Dam • Reservoir • Salinization • Desalination • Xeriscaping • Point-source pollution • Nonpoint-source pollution • Cultural eutrophication • Wastewater • Algal bloom • Pathogen • Red tide • Septic system
Local Connection: • Jacobsburg State Park • Lehigh River	**Additional Connections:** Looking for Water…in the Desert

Subject: Environmental Science	Grade: 9

Unit Title: 6. The Atmosphere and Global Climate Change

Big Ideas (Phenomena):
Does congestion charging work to reduce air pollution?
How does climate change impact low-lying areas?

Students will discover the importance of Earth's atmosphere, pollution of the atmosphere, controlling air pollution, our dynamic climate, climate change, effects of climate change, and responding to climate change.

Essential questions/Model addressed in this unit:

- How can we describe Earth's atmosphere?
- What are sources of air pollution?
- What measures can limit and prevent pollution of the atmosphere?
- Why is the greenhouse effect important for Earth's climate?
- How can we determine what the atmosphere greenhouse gas levels were in the distant past?
- How is climate change affecting food availability for both marine and terrestrial organisms?
- What can we personally do to respond to climate change?

Focus STEELS Standards Addressed in this Unit: 3.4.9-12.E
Students who demonstrate understanding can plan and conduct an investigation utilizing environmental data about a local environmental issue.

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Planning and Carrying Out Investigations Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. ● Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● Moreover, anthropogenic changes (included by human activity) in the environment-including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change-can disrupt an ecosystem and threaten the survival of some species. **LS4.D: Biodiversity and Humans** ● Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). ● Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. **ESS3.C: Human Impacts on Earth Systems**	***Connections to Nature of Science*** **Science Is a Way of Knowing** ● Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise, and extend this knowledge.

	• The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.	
Knowledge and Skills: • Describe the properties of the atmosphere. • Identify four main layers of the atmosphere. • Explain how both natural processes and human activities can cause air pollution. • Describe how air pollutants affect human health. • Explain what causes smog and how temperature inversions affect it and other forms of air pollution. • Explain how acid deposition occurs and describe its effects. • Explain how the provisions of the Clean Air Act have reduced air pollution in the United States. • Describe international efforts to reduce the ozone hole. • Describe the factors that affect how the sun warms Earth. • Explain how the oceans affect climate. • Identify evidence of global warming. • Explain three methods used to study climate change. • State the probable cause of global climate change. • State ways in which the warming atmosphere affects ecosystems and organisms. • Explain how climate change is affecting people now. • Predict future effects of climate change on people. • List ways to reduce greenhouse gases related to the use and generation of electricity. • Describe some ways of reducing greenhouse gases related to transportation. • Describe other strategies for reducing greenhouse gases. • Explain how nations are working together to try to address climate change.		**Competencies/Skills:** • Atmosphere • Trophosphere, stratosphere, ozone layer, mesosphere, thermosphere • Air pollution • Emission • Fossil fuel • Primary air pollutant • Secondary air pollutant • Smog • Acid deposition • Clean Air Act • Catalytic converter • Scrubber • Ozone hole • Chloroflurocarbon (CFC) • Montreal Protocol • Greenhouse effect • Greenhouse gas • Global climate change • Global warming • Climate model • Fossil fuel • Coral bleaching • Carbon footprint • Carbon tax • Carbon offset • Carbon sequestration • Kyoto Protocol

Local Connection: ● Nurture Nature Center - Easton, PA	**Additional Connections:** Charging Toward Cleaner Air in London Rising Seas May Flood the Maldive Islands

Subject: Environmental Science		Grade: 9
Unit Title: 7. Nonrenewable Energy and Renewable Energy Alternatives		
Big Ideas (Phenomena): **What effect do nonrenewable energy resources have on the environment?** **Do the benefits of renewable energy outweigh the costs?** Students will discover the importance of energy, fossil fuels, consequences of fossil fuels, nuclear power, biomass and geothermal energy, hydropower and ocean energy, solar and wind energy, and energy from hydrogen. Essential questions/Model addressed in this unit: ● What is energy and how is it used? ● How did fossil fuels form, and how are they obtained and used? ● What problems are associated with fossil fuel use? ● What are the advantages and disadvantages of nuclear energy? ● How can we use the heat from the Earth to both warm and cool our homes? ● How can the movement of water be used to generate electricity? ● How does both solar and wind energy depend on radiation from the sun? ● How can a reaction that produces water also generate electricity?		
Focus STEELS Standards Addressed in this Unit: 3.4.9-12.G and e.4.9-12.I Students who demonstrate understanding can analyze and evaluate how best resource management practices and environmental laws achieve sustainability of natural resources. Students who demonstrate understanding can analyze and interpret data on a regional environmental condition and its implications on environmental justice and social equity.		
Science and Engineering Practices (SEP)	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts (CCC)**

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Engaging in Argument from Evidence

Engaging in argument from evidence in 9-12 builds on K-8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about natural and designed worlds. Arguments may also come from current scientific or historical episodes in science.

- Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g., economic, societal, environmental, ethical considerations)
- Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

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ESS3.C: Human Impacts on Earth Systems

- The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

ETS1.B Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e. the ecosystem is resilient), as fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.

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Stability and Change

- Feedback (negative or positive) can stabilize or destabilize a system.

Cause and Effect

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.
- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Science knowledge indicates what can happen in natural systems - not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge.

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Knowledge and Skills:

- Identify different forms of energy.
- Describe how human society uses energy resources.
- Explain how fossil fuels formed.

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Competencies/Skills:

- Energy
- Energy efficiency
- Renewable energy

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• Describe the uses of coal and how it is removed from the ground. • Describe the uses of oil and how it is extracted. • Explain the characteristics and uses of natural gas. • Predict the future of fossil fuels. • Explain how pollutants released by fossil fuels damage health and the environment. • Describe the environmental and health effects of mining and drilling. • Explain the implications of dependence on foreign nations for fossil fuels. • Explain why energy conservation is important. • Describe how a nuclear power plant generates electricity. • Identify the advantages and disadvantages of nuclear power. • Explain the benefits and current status of renewable energy resources. • Define biomass energy and explain how it is used. • Describe how geothermal energy is harnessed and used. • Explain how river water can be used to generate electricity. • Identify benefits and costs of hydropower. • Describe how energy from the ocean can generate electricity. • Describe techniques for using solar energy to heat buildings and generate electricity. • Analyze the benefits and costs of solar energy. • Explain how wind energy can be used to produce electricity. • Analyze the benefits and costs of wind energy. • Describe how hydrogen fuel can be produced. • Explain the way fuel cells work and how they are used.	• Nonrenewable energy • Electricity • Strip mining • Subsurface mining • Petroleum • Petrochemical • Acid drainage • Energy conservation • Nuclear energy • Nuclear reactor • Meltdown • Nuclear waste • Biomass energy • Biofuel • Biopower • Geothermal energy • Hydropower • Tidal energy • Passive solar heating • Active solar heating • Wind turbine • Wind farm • Electrolysis • Fuel cell
Local Connection: • Lehigh University Energy Research Center - Bethlehem, PA • Nature Nurture Center - Easton, PA • Penn State Extension	**Additional Connections:** Oil or Wilderness on Alaska's North Slope? Germany's Big Bet on Renewable Energy