Main Criteria: U.S. Department of Energy - Energy Literacy Framework 5.0
Secondary Criteria: Alliance to Save Energy
Subject: Science
Grades: 9, 10, 11, 12
Correlation Options: Show Correlated

U.S. Department of Energy - Energy Literacy Framework 5.0
Science
Grade: **9** - Adopted: **2017**

Essential Principle		**Energy Literacy**
Fundamental Concept	**1**	**Energy is a physical quantity that follows precise natural laws.**
	1.1.	Energy is a quantity that is transferred from system to system. Energy is the ability of a system to do work. A system has done work if it has exerted a force on another system over some distance. When this happens, energy is transferred from one system to another. At least some of the energy is also transformed from one type to another during this process. One can keep track of how much energy transfers into or out of a system. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video
	1.2.	The energy of a system or object that results in its temperature is called thermal energy. When there is a net transfer of energy from one system to another, due to a difference in temperature, the energy transferred is called heat. Heat transfer happens in three ways: convection, conduction, and radiation. Like all energy transfer, heat transfer involves forces exerted over a distance at some level as systems interact. **Alliance to Save Energy** Amelia Airflow 9-12 Mr. BTU 9-12 Professor Frio
	1.4.	Energy available to do useful work decreases as it is transferred from system to system. During all transfers of energy between two systems, some energy is lost to the surroundings. In a practical sense, this lost energy has been “used up,” even though it is still around somewhere. A more efficient system will lose less energy, up to a theoretical limit. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video Mr. BAS
	1.5.	Energy comes in different forms and can be divided into categories. Forms of energy include light energy, elastic energy, chemical energy, and more. There are two categories that all energy falls into: kinetic and potential. Kinetic describes types of energy associated with motion. Potential describes energy possessed by an object or system due to its position relative to another object or system and forces between the two. Some forms of energy are part kinetic and part potential energy. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Mr. BTU 9-12 Professor Frio

	1.6.	Chemical and nuclear reactions involve the transfer and transformation of energy. The energy associated with nuclear reactions is much larger than that associated with chemical reactions for a given amount of mass. Nuclear reactions take place at the centers of stars, in nuclear bombs, and in both fission- and fusion[1]based nuclear reactors. Chemical reactions are pervasive in both living and non-living Earth systems. **Alliance to Save Energy** 9-12 Energy Basics Video
	1.7.	Many different units are used to quantify energy. As with other physical quantities, many different units are associated with energy. For example, joules, calories, ergs, kilowatt-hours, and BTUs are all units of energy. Given a quantity of energy in one set of units, one can always convert it to another (e.g., 1 calorie = 4.186 joules). **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video
	1.8.	Power is a measure of energy transfer rate. It is useful to talk about the rate at which energy is transferred from one system to another (energy per time). This rate is called power. One joule of energy transferred in one second is called a Watt (i.e., 1 joule/second = 1 Watt). **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video
Essential Principle		**Energy Literacy**
Fundamental Concept	**2**	**Physical processes on Earth are the result of energy flow through the earth system.**
	2.1.	Earth is constantly changing as energy flows through the system. Geologic, fossil, and ice records provide evidence of significant changes throughout Earth's history. These changes are always associated with changes in the flow of energy through the Earth system. Both living and non-living processes have contributed to this change. **Alliance to Save Energy** 9-12 Climate Video
	2.2.	Sunlight, gravitational potential, decay of radioactive isotopes, and rotation of the Earth are the major sources of energy driving physical processes on Earth. Sunlight is a source external to Earth, while radioactive isotopes and gravitational potential, with the exception of tidal energy, are internal. Radioactive isotopes and gravity work together to produce geothermal energy beneath Earth's surface. Earth's rotation influences global flow of air and water. **Alliance to Save Energy** 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video
	2.3.	Earth's weather and climate are mostly driven by energy from the Sun. For example, unequal warming of Earth's surface and atmosphere by the Sun drives convection within the atmosphere, producing winds and influencing ocean currents. **Alliance to Save Energy** 9-12 Climate Video

	2.6.	Greenhouse gases affect energy flow through the Earth system. Greenhouse gases in the atmosphere, such as carbon dioxide and water vapor, are transparent to much of the incoming sunlight but not to the infrared light from the warmed surface of Earth. These gases play a major role in determining average global surface temperatures. When Earth emits the same amount of energy as it absorbs, its average temperature remains stable. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Video Carbon Footprint Calculator
	2.7.	The effects of changes in Earth's energy system are often not immediately apparent. Responses to changes in Earth's energy system, input versus output, are often only noticeable over the course of months, years, or even decades. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Video Carbon Footprint Calculator
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	3.6.	Humans are part of Earth's ecosystems and influence energy flow through these systems. Humans are modifying the energy balance of Earth's ecosystems at an increasing rate. Shifts occur, for example, as a result of changes in agricultural and food processing technology, consumer habits, and human population size. **Alliance to Save Energy** 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
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Fundamental Concept	**4**	**Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination.**
	4.1.	Humans transfer and transform energy from the environment into forms useful for human endeavors. The primary sources of energy in the environment include fuels like coal, oil, natural gas, uranium, and biomass. All primary source fuels except biomass are non-renewable. Primary sources also include renewable sources such as sunlight, wind, moving water, and geothermal energy. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

	4.2.	Human use of energy is subject to limits and constraints. Industry, transportation, urban development, agriculture, and most other human activities are closely tied to the amount and kind of energy available. The availability of energy resources is constrained by the distribution of natural resources, availability of affordable technologies, socioeconomic policies, and socioeconomic status. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.3.	Fossil fuels and biofuels are organic matter that contain energy captured from sunlight. The energy in fossil fuels such as oil, natural gas, and coal comes from energy that producers like plants, algae, and cyanobacteria captured from sunlight long ago. The energy in biofuels such as food, wood, and ethanol comes from energy that producers captured from sunlight very recently. Energy stored in these fuels is released during chemical reactions, such as combustion and respiration, which also release carbon dioxide into the atmosphere. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.4.	Humans transport energy from place to place. Fuels are often not used at their source but are transported, sometimes over long distances. Fuels are transported primarily by pipelines, trucks, ships, and trains. Electrical energy can be generated from a variety of energy resources and can be transformed into almost any other form of energy. Electric circuits are used to distribute energy to distant locations. Electricity is not a primary source of energy, but an energy carrier. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

	4.5.	Humans generate electricity in multiple ways. When a magnet moves or magnetic field changes relative to a coil of wire, electrons are induced to flow in the wire. Most human generation of electricity happens in this way. Electrons can also be induced to flow through direct interaction with light particles; this is the basis upon which a solar cell operates. Other means of generating electricity include electrochemical, piezoelectric, and thermoelectric. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video
	4.6.	Humans intentionally store energy for later use in a number of different ways. Examples include batteries, water reservoirs, compressed air, hydrogen, and thermal storage. Storage of energy involves many technological, environmental, and social challenges. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.7.	Different sources of energy and the different ways energy can be transformed, transported, and stored each have different benefits and drawbacks. A given energy system, from source to sink, will have an inherent level of energy efficiency, monetary cost, and environmental risk. Each system will also have national security, access, and equity implications. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
Essential Principle		**Energy Literacy**
Fundamental Concept	**5**	**Energy decisions are influenced by economic, political, environmental, and social factors.**

5.1. Decisions concerning the use of energy resources are made at many levels. Humans make individual, community, national, and international energy decisions. Each of these levels of decision making has some common and some unique aspects. Decisions made beyond the individual level often involve a formally established process of decision-making.

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5.2. Energy infrastructure has inertia. The decisions that governments, corporations, and individuals made in the past have created today's energy infrastructure. The large amount of money, time, and technology invested in these systems makes changing the infrastructure difficult, but not impossible. The decisions of one generation both provide and limit the range of possibilities open to future generations.

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5.3. Energy decisions can be made using a systems-based approach. As individuals and societies make energy decisions, they can consider the costs and benefits of each decision. Some costs and benefits are more obvious than others. Identifying all costs and benefits requires a careful and informed systems-based approach to decision making.

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	5.4.	Energy decisions are influenced by economic factors. Monetary costs of energy affect energy decision making at all levels. Energy exhibits characteristics of both a commodity and a differentiable product. Energy costs are often subject to market fluctuations, and energy choices made by individuals and societies affect these fluctuations. Cost differences also arise as a result of differences between energy sources and as a result of tax-based incentives and rebates. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation
	5.5.	Energy decisions are influenced by political factors. Political factors play a role in energy decision making at all levels. These factors include, but are not limited to, governmental structure and power balances, actions taken by politicians, and partisan-based or self-serving actions taken by individuals and groups. **Alliance to Save Energy** 9-12 Climate Video 9-12 Environmental Justice Video
	5.6.	Energy decisions are influenced by environmental factors. Environmental costs of energy decisions affect energy decision making at all levels. All energy decisions have environmental consequences. These consequences can be positive or negative. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation
	5.7.	Energy decisions are influenced by social factors. Questions of ethics, morality, and social norms affect energy decision making at all levels. Social factors often involve economic, political, and environmental factors. **Alliance to Save Energy** 9-12 Climate Video 9-12 Environmental Justice Video
Essential Principle		**Energy Literacy**
Fundamental Concept	**6**	**The amount of energy used by human society depends on many factors.**

6.1. Conservation of energy has two very different meanings. There is the physical law of conservation of energy. This law says that the total amount of energy in the universe is constant. Conserving energy is also commonly used to mean the decreased societal consumption of energy resources. When speaking of people conserving energy, this second meaning is always intended.

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	6.2.	One way to manage energy resources is through conservation. Conservation includes reducing wasteful energy use, using energy for a given purpose more efficiently, making strategic choices as to sources of energy, and reducing energy use altogether. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation
	6.4.	Earth has limited energy resources. Increasing human energy consumption places stress on the natural processes that renew some energy resources, and it depletes those that cannot be renewed. **Alliance to Save Energy** 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video

6.5. Social and technological innovation affects the amount of energy used by human society. The amount of energy society uses per capita or in total can decrease. This can happen as a result of technological or social innovation and change. Decreased use of energy does not necessarily equate to decreased quality of life. In many cases it will be associated with improved quality of life in the form of increased economic and national security, reduced environmental risks, and monetary savings.

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	6.6.	Behavior and design affect the amount of energy used by human society. There are actions individuals and society can take to conserve energy. These actions might come in the form of changes in behavior or in changes to the design of technology and infrastructure. Some of these actions have more impact than others. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation

	6.8.	The amount of energy used can be calculated and monitored. An individual, organization, or government can monitor, measure, and control energy use in many ways. Understanding utility costs, knowing where consumer goods and food come from, and understanding energy efficiency as it relates to home, work, and transportation are essential to this process. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation

Essential Principle		**Energy Literacy**
Fundamental Concept	**7**	**The quality of life of individuals and societies is affected by energy choices.**
	7.1.	Economic security is impacted by energy choices. Individuals and society continually make energy choices that have economic consequences. These consequences come in the form of monetary cost in general and in the form of price fluctuation and instability specifically. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation

	7.2.	National security is impacted by energy choices. The security of a nation is dependent, in part, on the sources of that nation's energy supplies. For example, a nation that has diverse sources of energy that come mostly from within its borders is more secure than a nation largely dependent on foreign energy supplies. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	7.3.	Environmental quality is impacted by energy choices. Energy choices made by humans have environmental consequences. The quality of life of humans and other organisms on Earth can be significantly affected by those consequences. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	7.4.	Increasing demand for and limited supplies of fossil fuels affect quality of life. Fossil fuels provide the vast majority of the world's energy. Fossil fuel supplies are limited. If society has not transitioned to sources of energy that are renewable before depleting Earth's fossil fuel supplies, it will find itself in a situation where energy demand far exceeds energy supply. This situation will have many social and economic consequences. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

	7.5.	Access to energy resources affects quality of life. Access to energy resources, or lack thereof, affects human health, access to education, socioeconomic status, gender equality, global partnerships, and the environment. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	7.6.	Some populations are more vulnerable to impacts of energy choices than others. Energy decisions have economic, social, and environmental consequences. Poor, marginalized, or underdeveloped populations can most benefit from positive consequences and are the most susceptible to negative consequences. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

U.S. Department of Energy - Energy Literacy Framework 5.0

Science

Grade: **10** - Adopted: **2017**

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	4.3.	Fossil fuels and biofuels are organic matter that contain energy captured from sunlight. The energy in fossil fuels such as oil, natural gas, and coal comes from energy that producers like plants, algae, and cyanobacteria captured from sunlight long ago. The energy in biofuels such as food, wood, and ethanol comes from energy that producers captured from sunlight very recently. Energy stored in these fuels is released during chemical reactions, such as combustion and respiration, which also release carbon dioxide into the atmosphere. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.4.	Humans transport energy from place to place. Fuels are often not used at their source but are transported, sometimes over long distances. Fuels are transported primarily by pipelines, trucks, ships, and trains. Electrical energy can be generated from a variety of energy resources and can be transformed into almost any other form of energy. Electric circuits are used to distribute energy to distant locations. Electricity is not a primary source of energy, but an energy carrier. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.5.	Humans generate electricity in multiple ways. When a magnet moves or magnetic field changes relative to a coil of wire, electrons are induced to flow in the wire. Most human generation of electricity happens in this way. Electrons can also be induced to flow through direct interaction with light particles; this is the basis upon which a solar cell operates. Other means of generating electricity include electrochemical, piezoelectric, and thermoelectric. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video

	4.6.	Humans intentionally store energy for later use in a number of different ways. Examples include batteries, water reservoirs, compressed air, hydrogen, and thermal storage. Storage of energy involves many technological, environmental, and social challenges. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.7.	Different sources of energy and the different ways energy can be transformed, transported, and stored each have different benefits and drawbacks. A given energy system, from source to sink, will have an inherent level of energy efficiency, monetary cost, and environmental risk. Each system will also have national security, access, and equity implications. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
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5.2. Energy infrastructure has inertia. The decisions that governments, corporations, and individuals made in the past have created today's energy infrastructure. The large amount of money, time, and technology invested in these systems makes changing the infrastructure difficult, but not impossible. The decisions of one generation both provide and limit the range of possibilities open to future generations.

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5.3. Energy decisions can be made using a systems-based approach. As individuals and societies make energy decisions, they can consider the costs and benefits of each decision. Some costs and benefits are more obvious than others. Identifying all costs and benefits requires a careful and informed systems-based approach to decision making.

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	6.2.	One way to manage energy resources is through conservation. Conservation includes reducing wasteful energy use, using energy for a given purpose more efficiently, making strategic choices as to sources of energy, and reducing energy use altogether. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation
	6.4.	Earth has limited energy resources. Increasing human energy consumption places stress on the natural processes that renew some energy resources, and it depletes those that cannot be renewed. **Alliance to Save Energy** 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video

6.5. Social and technological innovation affects the amount of energy used by human society. The amount of energy society uses per capita or in total can decrease. This can happen as a result of technological or social innovation and change. Decreased use of energy does not necessarily equate to decreased quality of life. In many cases it will be associated with improved quality of life in the form of increased economic and national security, reduced environmental risks, and monetary savings.

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	6.6.	Behavior and design affect the amount of energy used by human society. There are actions individuals and society can take to conserve energy. These actions might come in the form of changes in behavior or in changes to the design of technology and infrastructure. Some of these actions have more impact than others. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation

	6.8.	The amount of energy used can be calculated and monitored. An individual, organization, or government can monitor, measure, and control energy use in many ways. Understanding utility costs, knowing where consumer goods and food come from, and understanding energy efficiency as it relates to home, work, and transportation are essential to this process. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation

Essential Principle		**Energy Literacy**
Fundamental Concept	**7**	**The quality of life of individuals and societies is affected by energy choices.**
	7.1.	Economic security is impacted by energy choices. Individuals and society continually make energy choices that have economic consequences. These consequences come in the form of monetary cost in general and in the form of price fluctuation and instability specifically. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation

7.2. National security is impacted by energy choices. The security of a nation is dependent, in part, on the sources of that nation's energy supplies. For example, a nation that has diverse sources of energy that come mostly from within its borders is more secure than a nation largely dependent on foreign energy supplies.

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7.3. Environmental quality is impacted by energy choices. Energy choices made by humans have environmental consequences. The quality of life of humans and other organisms on Earth can be significantly affected by those consequences.

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7.4. Increasing demand for and limited supplies of fossil fuels affect quality of life. Fossil fuels provide the vast majority of the world's energy. Fossil fuel supplies are limited. If society has not transitioned to sources of energy that are renewable before depleting Earth's fossil fuel supplies, it will find itself in a situation where energy demand far exceeds energy supply. This situation will have many social and economic consequences.

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	7.5.	Access to energy resources affects quality of life. Access to energy resources, or lack thereof, affects human health, access to education, socioeconomic status, gender equality, global partnerships, and the environment. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	7.6.	Some populations are more vulnerable to impacts of energy choices than others. Energy decisions have economic, social, and environmental consequences. Poor, marginalized, or underdeveloped populations can most benefit from positive consequences and are the most susceptible to negative consequences. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

U.S. Department of Energy - Energy Literacy Framework 5.0

Science

Grade: **11** - Adopted: **2017**

Essential Principle		**Energy Literacy**
Fundamental Concept	**1**	**Energy is a physical quantity that follows precise natural laws.**
	1.1.	Energy is a quantity that is transferred from system to system. Energy is the ability of a system to do work. A system has done work if it has exerted a force on another system over some distance. When this happens, energy is transferred from one system to another. At least some of the energy is also transformed from one type to another during this process. One can keep track of how much energy transfers into or out of a system. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video

	1.2.	The energy of a system or object that results in its temperature is called thermal energy. When there is a net transfer of energy from one system to another, due to a difference in temperature, the energy transferred is called heat. Heat transfer happens in three ways: convection, conduction, and radiation. Like all energy transfer, heat transfer involves forces exerted over a distance at some level as systems interact. **Alliance to Save Energy** Amelia Airflow 9-12 Mr. BTU 9-12 Professor Frio
	1.4.	Energy available to do useful work decreases as it is transferred from system to system. During all transfers of energy between two systems, some energy is lost to the surroundings. In a practical sense, this lost energy has been “used up,” even though it is still around somewhere. A more efficient system will lose less energy, up to a theoretical limit. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video Mr. BAS
	1.5.	Energy comes in different forms and can be divided into categories. Forms of energy include light energy, elastic energy, chemical energy, and more. There are two categories that all energy falls into: kinetic and potential. Kinetic describes types of energy associated with motion. Potential describes energy possessed by an object or system due to its position relative to another object or system and forces between the two. Some forms of energy are part kinetic and part potential energy. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Mr. BTU 9-12 Professor Frio
	1.6.	Chemical and nuclear reactions involve the transfer and transformation of energy. The energy associated with nuclear reactions is much larger than that associated with chemical reactions for a given amount of mass. Nuclear reactions take place at the centers of stars, in nuclear bombs, and in both fission- and fusion[1]based nuclear reactors. Chemical reactions are pervasive in both living and non-living Earth systems. **Alliance to Save Energy** 9-12 Energy Basics Video
	1.7.	Many different units are used to quantify energy. As with other physical quantities, many different units are associated with energy. For example, joules, calories, ergs, kilowatt-hours, and BTUs are all units of energy. Given a quantity of energy in one set of units, one can always convert it to another (e.g., 1 calorie = 4.186 joules). **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video
	1.8.	Power is a measure of energy transfer rate. It is useful to talk about the rate at which energy is transferred from one system to another (energy per time). This rate is called power. One joule of energy transferred in one second is called a Watt (i.e., 1 joule/second = 1 Watt). **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video

Essential Principle		Energy Literacy
Fundamental Concept	**2**	**Physical processes on Earth are the result of energy flow through the earth system.**
	2.1.	Earth is constantly changing as energy flows through the system. Geologic, fossil, and ice records provide evidence of significant changes throughout Earth's history. These changes are always associated with changes in the flow of energy through the Earth system. Both living and non-living processes have contributed to this change. **Alliance to Save Energy** 9-12 Climate Video
	2.2.	Sunlight, gravitational potential, decay of radioactive isotopes, and rotation of the Earth are the major sources of energy driving physical processes on Earth. Sunlight is a source external to Earth, while radioactive isotopes and gravitational potential, with the exception of tidal energy, are internal. Radioactive isotopes and gravity work together to produce geothermal energy beneath Earth's surface. Earth's rotation influences global flow of air and water. **Alliance to Save Energy** 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video
	2.3.	Earth's weather and climate are mostly driven by energy from the Sun. For example, unequal warming of Earth's surface and atmosphere by the Sun drives convection within the atmosphere, producing winds and influencing ocean currents. **Alliance to Save Energy** 9-12 Climate Video
	2.6.	Greenhouse gases affect energy flow through the Earth system. Greenhouse gases in the atmosphere, such as carbon dioxide and water vapor, are transparent to much of the incoming sunlight but not to the infrared light from the warmed surface of Earth. These gases play a major role in determining average global surface temperatures. When Earth emits the same amount of energy as it absorbs, its average temperature remains stable. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Video Carbon Footprint Calculator
	2.7.	The effects of changes in Earth's energy system are often not immediately apparent. Responses to changes in Earth's energy system, input versus output, are often only noticeable over the course of months, years, or even decades. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Video Carbon Footprint Calculator

Essential Principle		Energy Literacy
Fundamental Concept	**3**	**Biological processes depend on energy flow through the Earth system.**

	3.6.	Humans are part of Earth's ecosystems and influence energy flow through these systems. Humans are modifying the energy balance of Earth's ecosystems at an increasing rate. Shifts occur, for example, as a result of changes in agricultural and food processing technology, consumer habits, and human population size. **Alliance to Save Energy** 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

Essential Principle		**Energy Literacy**
Fundamental Concept	**4**	**Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination.**
	4.1.	Humans transfer and transform energy from the environment into forms useful for human endeavors. The primary sources of energy in the environment include fuels like coal, oil, natural gas, uranium, and biomass. All primary source fuels except biomass are non-renewable. Primary sources also include renewable sources such as sunlight, wind, moving water, and geothermal energy. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
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Lighting Audit
Mr. BAS
Mr. BTU 9-12
Poster Campaign
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	6.2.	One way to manage energy resources is through conservation. Conservation includes reducing wasteful energy use, using energy for a given purpose more efficiently, making strategic choices as to sources of energy, and reducing energy use altogether. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation
	6.4.	Earth has limited energy resources. Increasing human energy consumption places stress on the natural processes that renew some energy resources, and it depletes those that cannot be renewed. **Alliance to Save Energy** 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video

6.5. Social and technological innovation affects the amount of energy used by human society. The amount of energy society uses per capita or in total can decrease. This can happen as a result of technological or social innovation and change. Decreased use of energy does not necessarily equate to decreased quality of life. In many cases it will be associated with improved quality of life in the form of increased economic and national security, reduced environmental risks, and monetary savings.

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	6.6.	Behavior and design affect the amount of energy used by human society. There are actions individuals and society can take to conserve energy. These actions might come in the form of changes in behavior or in changes to the design of technology and infrastructure. Some of these actions have more impact than others. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation

	6.8.	The amount of energy used can be calculated and monitored. An individual, organization, or government can monitor, measure, and control energy use in many ways. Understanding utility costs, knowing where consumer goods and food come from, and understanding energy efficiency as it relates to home, work, and transportation are essential to this process. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation

Essential Principle		**Energy Literacy**
Fundamental Concept	**7**	**The quality of life of individuals and societies is affected by energy choices.**
	7.1.	Economic security is impacted by energy choices. Individuals and society continually make energy choices that have economic consequences. These consequences come in the form of monetary cost in general and in the form of price fluctuation and instability specifically. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation

	7.2.	National security is impacted by energy choices. The security of a nation is dependent, in part, on the sources of that nation's energy supplies. For example, a nation that has diverse sources of energy that come mostly from within its borders is more secure than a nation largely dependent on foreign energy supplies. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	7.3.	Environmental quality is impacted by energy choices. Energy choices made by humans have environmental consequences. The quality of life of humans and other organisms on Earth can be significantly affected by those consequences. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	7.4.	Increasing demand for and limited supplies of fossil fuels affect quality of life. Fossil fuels provide the vast majority of the world's energy. Fossil fuel supplies are limited. If society has not transitioned to sources of energy that are renewable before depleting Earth's fossil fuel supplies, it will find itself in a situation where energy demand far exceeds energy supply. This situation will have many social and economic consequences. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

	7.5.	Access to energy resources affects quality of life. Access to energy resources, or lack thereof, affects human health, access to education, socioeconomic status, gender equality, global partnerships, and the environment. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
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U.S. Department of Energy - Energy Literacy Framework 5.0

Science

Grade: **12** - Adopted: **2017**

Essential Principle		**Energy Literacy**
Fundamental Concept	**1**	**Energy is a physical quantity that follows precise natural laws.**
	1.1.	Energy is a quantity that is transferred from system to system. Energy is the ability of a system to do work. A system has done work if it has exerted a force on another system over some distance. When this happens, energy is transferred from one system to another. At least some of the energy is also transformed from one type to another during this process. One can keep track of how much energy transfers into or out of a system. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video

	1.2.	The energy of a system or object that results in its temperature is called thermal energy. When there is a net transfer of energy from one system to another, due to a difference in temperature, the energy transferred is called heat. Heat transfer happens in three ways: convection, conduction, and radiation. Like all energy transfer, heat transfer involves forces exerted over a distance at some level as systems interact. **Alliance to Save Energy** Amelia Airflow 9-12 Mr. BTU 9-12 Professor Frio
	1.4.	Energy available to do useful work decreases as it is transferred from system to system. During all transfers of energy between two systems, some energy is lost to the surroundings. In a practical sense, this lost energy has been “used up,” even though it is still around somewhere. A more efficient system will lose less energy, up to a theoretical limit. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video Mr. BAS
	1.5.	Energy comes in different forms and can be divided into categories. Forms of energy include light energy, elastic energy, chemical energy, and more. There are two categories that all energy falls into: kinetic and potential. Kinetic describes types of energy associated with motion. Potential describes energy possessed by an object or system due to its position relative to another object or system and forces between the two. Some forms of energy are part kinetic and part potential energy. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Mr. BTU 9-12 Professor Frio
	1.6.	Chemical and nuclear reactions involve the transfer and transformation of energy. The energy associated with nuclear reactions is much larger than that associated with chemical reactions for a given amount of mass. Nuclear reactions take place at the centers of stars, in nuclear bombs, and in both fission- and fusion[1]based nuclear reactors. Chemical reactions are pervasive in both living and non-living Earth systems. **Alliance to Save Energy** 9-12 Energy Basics Video
	1.7.	Many different units are used to quantify energy. As with other physical quantities, many different units are associated with energy. For example, joules, calories, ergs, kilowatt-hours, and BTUs are all units of energy. Given a quantity of energy in one set of units, one can always convert it to another (e.g., 1 calorie = 4.186 joules). **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video
	1.8.	Power is a measure of energy transfer rate. It is useful to talk about the rate at which energy is transferred from one system to another (energy per time). This rate is called power. One joule of energy transferred in one second is called a Watt (i.e., 1 joule/second = 1 Watt). **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video

Essential Principle		Energy Literacy
Fundamental Concept	**2**	**Physical processes on Earth are the result of energy flow through the earth system.**
	2.1.	Earth is constantly changing as energy flows through the system. Geologic, fossil, and ice records provide evidence of significant changes throughout Earth's history. These changes are always associated with changes in the flow of energy through the Earth system. Both living and non-living processes have contributed to this change. **Alliance to Save Energy** 9-12 Climate Video
	2.2.	Sunlight, gravitational potential, decay of radioactive isotopes, and rotation of the Earth are the major sources of energy driving physical processes on Earth. Sunlight is a source external to Earth, while radioactive isotopes and gravitational potential, with the exception of tidal energy, are internal. Radioactive isotopes and gravity work together to produce geothermal energy beneath Earth's surface. Earth's rotation influences global flow of air and water. **Alliance to Save Energy** 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video
	2.3.	Earth's weather and climate are mostly driven by energy from the Sun. For example, unequal warming of Earth's surface and atmosphere by the Sun drives convection within the atmosphere, producing winds and influencing ocean currents. **Alliance to Save Energy** 9-12 Climate Video
	2.6.	Greenhouse gases affect energy flow through the Earth system. Greenhouse gases in the atmosphere, such as carbon dioxide and water vapor, are transparent to much of the incoming sunlight but not to the infrared light from the warmed surface of Earth. These gases play a major role in determining average global surface temperatures. When Earth emits the same amount of energy as it absorbs, its average temperature remains stable. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Video Carbon Footprint Calculator
	2.7.	The effects of changes in Earth's energy system are often not immediately apparent. Responses to changes in Earth's energy system, input versus output, are often only noticeable over the course of months, years, or even decades. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Video Carbon Footprint Calculator

Essential Principle		Energy Literacy
Fundamental Concept	**3**	**Biological processes depend on energy flow through the Earth system.**

	3.6.	Humans are part of Earth's ecosystems and influence energy flow through these systems. Humans are modifying the energy balance of Earth's ecosystems at an increasing rate. Shifts occur, for example, as a result of changes in agricultural and food processing technology, consumer habits, and human population size. **Alliance to Save Energy** 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

Essential Principle		**Energy Literacy**
Fundamental Concept	**4**	**Various sources of energy can be used to power human activities, and often this energy must be transferred from source to destination.**
	4.1.	Humans transfer and transform energy from the environment into forms useful for human endeavors. The primary sources of energy in the environment include fuels like coal, oil, natural gas, uranium, and biomass. All primary source fuels except biomass are non-renewable. Primary sources also include renewable sources such as sunlight, wind, moving water, and geothermal energy. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.2.	Human use of energy is subject to limits and constraints. Industry, transportation, urban development, agriculture, and most other human activities are closely tied to the amount and kind of energy available. The availability of energy resources is constrained by the distribution of natural resources, availability of affordable technologies, socioeconomic policies, and socioeconomic status. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation

	4.3.	Fossil fuels and biofuels are organic matter that contain energy captured from sunlight. The energy in fossil fuels such as oil, natural gas, and coal comes from energy that producers like plants, algae, and cyanobacteria captured from sunlight long ago. The energy in biofuels such as food, wood, and ethanol comes from energy that producers captured from sunlight very recently. Energy stored in these fuels is released during chemical reactions, such as combustion and respiration, which also release carbon dioxide into the atmosphere. **Alliance to Save Energy** 9-12 Climate Video 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.4.	Humans transport energy from place to place. Fuels are often not used at their source but are transported, sometimes over long distances. Fuels are transported primarily by pipelines, trucks, ships, and trains. Electrical energy can be generated from a variety of energy resources and can be transformed into almost any other form of energy. Electric circuits are used to distribute energy to distant locations. Electricity is not a primary source of energy, but an energy carrier. **Alliance to Save Energy** 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.5.	Humans generate electricity in multiple ways. When a magnet moves or magnetic field changes relative to a coil of wire, electrons are induced to flow in the wire. Most human generation of electricity happens in this way. Electrons can also be induced to flow through direct interaction with light particles; this is the basis upon which a solar cell operates. Other means of generating electricity include electrochemical, piezoelectric, and thermoelectric. **Alliance to Save Energy** 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video

	4.6.	Humans intentionally store energy for later use in a number of different ways. Examples include batteries, water reservoirs, compressed air, hydrogen, and thermal storage. Storage of energy involves many technological, environmental, and social challenges. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
	4.7.	Different sources of energy and the different ways energy can be transformed, transported, and stored each have different benefits and drawbacks. A given energy system, from source to sink, will have an inherent level of energy efficiency, monetary cost, and environmental risk. Each system will also have national security, access, and equity implications. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Energy Poster Project 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Carbon Footprint Calculator Family Presentation Staff Presentation
Essential Principle		**Energy Literacy**
Fundamental Concept	**5**	**Energy decisions are influenced by economic, political, environmental, and social factors.**

	5.1.	Decisions concerning the use of energy resources are made at many levels. Humans make individual, community, national, and international energy decisions. Each of these levels of decision making has some common and some unique aspects. Decisions made beyond the individual level often involve a formally established process of decision-making. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Carbon Rank Competition 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Green Your Career Video 9-12 Understanding Energy Demand Video Amelia Airflow 9-12 Appliance Audit Assembly Announcement Capstone Project Carbon Footprint Calculator Carbon Footprint Journal Energy Patrol Contest Family Presentation Green Future Design HVAC Audit Home Energy Audit Home Energy Demand Pledge Lighting Audit Mr. BAS Mr. BTU 9-12 Poster Campaign School Audit Shutdown Reminders Staff Presentation
	5.2.	Energy infrastructure has inertia. The decisions that governments, corporations, and individuals made in the past have created today's energy infrastructure. The large amount of money, time, and technology invested in these systems makes changing the infrastructure difficult, but not impossible. The decisions of one generation both provide and limit the range of possibilities open to future generations. **Alliance to Save Energy** 9-12 Climate Video 9-12 Environmental Justice Video
	5.3.	Energy decisions can be made using a systems-based approach. As individuals and societies make energy decisions, they can consider the costs and benefits of each decision. Some costs and benefits are more obvious than others. Identifying all costs and benefits requires a careful and informed systems-based approach to decision making. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation

	5.4.	Energy decisions are influenced by economic factors. Monetary costs of energy affect energy decision making at all levels. Energy exhibits characteristics of both a commodity and a differentiable product. Energy costs are often subject to market fluctuations, and energy choices made by individuals and societies affect these fluctuations. Cost differences also arise as a result of differences between energy sources and as a result of tax-based incentives and rebates. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation
	5.5.	Energy decisions are influenced by political factors. Political factors play a role in energy decision making at all levels. These factors include, but are not limited to, governmental structure and power balances, actions taken by politicians, and partisan-based or self-serving actions taken by individuals and groups. **Alliance to Save Energy** 9-12 Climate Video 9-12 Environmental Justice Video
	5.6.	Energy decisions are influenced by environmental factors. Environmental costs of energy decisions affect energy decision making at all levels. All energy decisions have environmental consequences. These consequences can be positive or negative. **Alliance to Save Energy** 6-12 Final Presentation & Peer Performance 9-12 Climate Video 9-12 Custodial Presentation & Pledge 9-12 Energy Audit Video 9-12 Energy Basics Video 9-12 Environmental Justice Video 9-12 Explore Renewables Video 9-12 Understanding Energy Demand Video Assembly Announcement Family Presentation Staff Presentation
	5.7.	Energy decisions are influenced by social factors. Questions of ethics, morality, and social norms affect energy decision making at all levels. Social factors often involve economic, political, and environmental factors. **Alliance to Save Energy** 9-12 Climate Video 9-12 Environmental Justice Video
Essential Principle		**Energy Literacy**
Fundamental Concept	**6**	**The amount of energy used by human society depends on many factors.**

6.1. Conservation of energy has two very different meanings. There is the physical law of conservation of energy. This law says that the total amount of energy in the universe is constant. Conserving energy is also commonly used to mean the decreased societal consumption of energy resources. When speaking of people conserving energy, this second meaning is always intended.

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