

## ENERGY UNIT STUDY GUIDE

Concept or Term	√	Definition or Explanation
Energy		Energy is defined as the ability to do work or cause change
<u>Kinetic Energy</u>		Energy of a moving object
Mechanical		Energy of an object due to its movement and position
Electrical		Energy of electrons moving in one direction in a wire
Sound		Energy of sound waves moving through a substance like air
Radiant		Electromagnetic radiation (like light waves, microwaves, radio waves, x-rays, etc.) that move in wave forms
Thermal		Internal energy caused by its atoms and molecules moving and vibrating within the substance
<u>Potential Energy</u>		Stored energy in an object, often due to its position
Stored mechanical		Energy stored in an object from a push or a pull (like pressing in a spring or stretching a rubber band)
Gravitational		The energy an object or substance has because of its vertical position (or height)
Nuclear		Energy stored in the nucleus of an atom which is released if the atom is broken apart
Chemical		Energy stored in the bonds between atoms which are released if the bonds are broken by a chemical reaction
Conduction		Movement of heat from one SOLID to another, from warmer to colder
Convection		Transfer of heat from one place to another in LIQUIDS or GASES, from warmer areas to colder areas
Radiation		Heat transfer from fire or the sun in the form of wave energy being emitted from the source (either fire or the sun)
<u>Renewable energy</u>		Renewable energy sources come from nature and can be replenished (made again) in one hundred years or less.
Solar		Solar energy converts the sun's light into electricity with the use of solar panels and the photovoltaic effect.
Wind		Wind energy is mainly used to either generate electricity through wind turbines, or to pump water with a windmill.
Biomass		Biomass is organic material that can be burned to create heat or converted to be burned as fuels (example: trees).
Hydroelectric power		Hydroelectric power is produced from moving water from either a flowing river or from water in reservoirs. The water flows through a turbine to spin a generator, which produces electricity through the electromagnetic effect.
Geothermal		Heat within the earth that can be used as steam or hot water to heat items or to spin a generator.
<u>Nonrenewable energy</u>		Nonrenewable energy sources come out of the ground as liquids, gases and solids. These sources cannot be replenished and are usually used up completely.
Coal		Coal is a combustible black or brownish-black sedimentary rock with a high amount of carbon and hydrocarbons.
Oil		Liquid form made from prehistoric plants and animals and are found in tiny spaces within sedimentary rocks.
Natural gas		Natural gas occurs deep beneath the earth's surface and is in gas form.

Nuclear	Nuclear energy can be released when those bonds are broken in a process called nuclear fission. This energy can be used to produce electricity by heating water and spinning a turbine which produces a current.
Electromagnetic effect	The effect that occurs in copper wire when wrapped in spinning magnets, which produces an electric current by loosening the electrons to flow in the wire.
Turbine generator	A device with blades, which is turned by a force e.g. that of wind, water, or high pressure steam. The mechanical energy of the spinning turbine is converted into electricity by a generator through the electromagnetic effect.
Photovoltaic effect	The process by which radiant (light) energy is changed into electrical energy by exciting electrons out of the material they are in to become a current.
Pros and cons of traditional power plants	<p>Benefits (pros) of traditional power plants include, infrastructure (the buildings and such) already exists, burning coal is an efficient source of energy, and most are inexpensive compared to new alternatives.</p> <p>Drawbacks (cons) of traditional power plants are that they cause harm to the environment. Mining fossil fuels scars land and emits harmful chemicals into the environment. Fossil fuels are non-renewable sources of energy.</p>

### Review Questions

1. What is the difference between conduction, convection, and radiation? Give an example.
2. Give a definition and an example of kinetic energy.
3. Give a definition and an example of potential energy.
4. Describe how chemical energy can be transformed into mechanical energy.
5. Describe how electrical energy can be transformed into sound energy.
6. List all of the energy sources and list ones are renewable and which are nonrenewable.
7. Explain two differences between renewable and nonrenewable energy.
8. Explain how the electromagnetic effect produces electricity from a turbine generator.
9. Explain how the photovoltaic effect produces electricity.
10. How can fossil fuels like coal be used to create electricity?
11. How can water be used to create electricity?
12. Explain two advantages and two environmental problems from using fossil fuels.
13. How are uranium and coal similar? How are they different? Provide at least two ideas for each question.
14. Describe what a current is and give an example of how it is created.
15. List and describe four **forms** of energy.