Name \_\_\_\_\_

Date \_\_\_\_\_

1. There are two MAJOR energy sources that affect our Earth Systems:

I\_\_\_\_\_ (energy from radioactive decay of elements in the Earth)

E\_\_\_\_\_ (energy from the sun)

2. Explain the difference between the two sources from #1.

renewable energy sources \_\_\_\_ be replenished and **3** examples are



non-renewable energy sources \_\_\_\_\_be replenished and **3** examples are

* F\_\_\_\_\_\_ f\_\_\_\_\_\_ (c\_\_\_\_, o\_\_\_\_, n\_\_\_\_\_\_\_\_ gas)
* manufactured items like plastic, vinyls
* n\_\_\_\_\_\_\_\_ power

What non-renewable energy sources are used the most? F\_\_\_\_\_ fuels

3. B\_\_\_\_\_ is \_\_\_\_\_material made from \_\_\_\_\_\_\_ and \_\_\_\_\_ (it contains stored energy from the \_\_\_\_\_). Biomass is a(n) \_\_\_\_\_ energy source because we can always grow more trees and crops, and waste will always exist. When burned, the \_\_\_\_\_ energy in biomass is released as \_\_\_\_\_\_\_. If you have a fireplace, the wood you burn in it is a \_\_\_\_\_\_\_\_ fuel. Wood waste or garbage can be burned to produce steam for making \_\_\_\_\_, or to provide heat to industries and homes.

4. H\_\_\_\_\_ is the \_\_\_\_\_ energy source that produces the most electricity in the United States. Hydropower Relies on the \_\_\_\_\_\_\_ Cycle (the amount of available energy in moving water is determined by its \_\_\_\_\_\_\_ or \_\_\_\_\_\_; the more flow/fall, the more electricity can be generated). The water flows through a pipe, or penstock, then pushes against and turns blades in a \_\_\_\_\_ to spin a \_\_\_\_\_ to produce \_\_\_\_\_.

5. Geo (\_\_\_\_\_\_) thermal (\_\_\_\_\_) energy is heat from within the Earth that mostly results from \_\_\_\_\_ decay of elements (elements “break down” and this process gives off heat).

D\_\_\_\_\_ use and district heating systems use \_\_\_\_\_ water from \_\_\_\_\_ or reservoirs near the surface (to heat water for use OR to heat homes).

\_\_\_\_\_ generation power plants require water or \_\_\_\_\_ at very high temperature to create electricity.

G\_\_\_\_\_ heat \_\_\_\_\_\_ use stable ground or water temperatures near the Earth's surface to control building temperatures above ground.

Is it a renewable energy source? \_\_\_\_\_\_

6. W\_\_\_\_\_ is simply air in \_\_\_\_\_\_\_\_ (it’s created by \_\_\_\_\_\_\_ heating of \_\_\_\_\_\_\_ and water). Today’s wind machines (also called wind \_\_\_\_\_) use blades to collect the wind’s kinetic (moving) energy. The blades turn and are connected to a drive shaft that turns an electric \_\_\_\_\_ to produce electricity.

7. S\_\_\_\_\_\_ energy is (renewable / non-renewable) can be converted to electricity in two ways:

a. \_\_\_\_\_\_ (PV devices) or “solar cells” change \_\_\_\_\_ directly into electricity. Individual PV cells are grouped into panels and arrays of panels that can be used in a wide range of applications ranging from single small cells that charge \_\_\_\_\_ and watch \_\_\_\_\_, to systems that power single homes, to large power plants covering many acres.

b. Concentrating Solar \_\_\_\_\_ Plants generate electricity by using the heat from solar thermal \_\_\_\_\_\_\_ to heat a fluid which produces \_\_\_\_\_ that is used to power the generator

8. Distinguish between passive and active solar energy

P\_\_\_\_\_ solar energy is used when radiant energy is collected and not mechanically converted. Example: positioning a home in the proper \_\_\_\_\_ to collect the maximum amount of \_\_\_\_\_ energy.

A\_\_\_\_\_\_\_\_ solar energy uses the radiant energy from the sun along with some \_\_\_\_\_\_\_ equipment to utilize the radiant energy. Example: \_\_\_\_\_\_ Cells

9. N\_\_\_\_\_-renewable energy sources CANNOT be replaced once they have been used. There is a finite amount of these energy sources (once it’s gone, it’s gone).

10. F\_\_\_\_\_\_\_\_ fuels are (renewable / non-renewable) [fuels](http://en.wikipedia.org/wiki/Fuel) formed by natural processes such as [anaerobic \_\_\_\_\_](http://en.wikipedia.org/wiki/Anaerobic_decomposition)  of buried dead [organisms](http://en.wikipedia.org/wiki/Organism). Fossil fuels contain high percentages of \_\_\_\_\_ and include [c\_\_\_\_\_](http://en.wikipedia.org/wiki/Coal), p\_\_\_\_\_, and [n\_\_\_\_\_\_\_\_](http://en.wikipedia.org/wiki/Natural_gas) when decaying organic (formerly living) materials are subject to high p\_\_\_\_\_\_ and t\_\_\_\_\_\_\_.

11. Which world country uses almost twice the fossil fuels as any other country? \_\_\_\_\_\_\_

12. Fossil Fuel Oil was formed from the remains of animals and plants that lived millions of years ago in a marine (water) environment before the dinosaurs. H\_\_\_\_\_ and p\_\_\_\_\_ from these layers helped the remains turn into what we today call \_\_\_\_\_ *oil*.

Oil is most used for \_\_\_\_\_\_\_\_; in particular cars (\_\_\_\_\_).

13. C\_\_\_\_\_\_ is a(n) \_\_\_\_\_\_\_ energy source because it takes millions of years to create. Coal is \_\_\_\_\_\_\_\_ and then burned (at a power plant) to heat steam which spins a turbine which powers a generator which produces electricity. Coal is classified into four main types, or ranks, depending on the amounts and types of \_\_\_\_\_\_\_\_ it contains and on the amount of \_\_\_\_\_\_ energy.

* A\_\_\_\_\_ has 86-97% carbon and, therefore, the highest heating value
* B\_\_\_\_\_\_ has 45-86% carbon and the 2nd highest heating value
* S\_\_\_\_\_\_ has 35-45% carbon and the 3rd highest heating value
* L\_\_\_\_\_ has 25-35% carbon and the lowest heating value.

14. N\_\_\_\_\_ is a (renewable / non-renewable) energy source. Over time, sand and silt changed to rock, covered the organic material, and trapped it beneath the \_\_\_\_\_\_. Pressure and heat changed some of this organic material into coal, some into oil (petroleum), and some into natural gas — tiny bubbles of odorless \_\_\_\_\_\_.

Natural Gas is most used for generating \_\_\_\_\_ power and in \_\_\_\_\_.

15. N\_\_\_\_\_ energy is (renewable / non-renewable) energy from the \_\_\_\_\_ (core) of an atom. Electricity can be made from nuclear power at a nuclear power plant.

a. F\_\_\_\_\_ of Uranium occurs and this releases a large amount of heat.

b. This heat turns water into \_\_\_\_\_.

c. The steam spins a \_\_\_\_\_.

d. The spinning turbine powers a \_\_\_\_\_.

e. The generator generates \_\_\_\_\_.

16. Renewable and Non-Renewable resources are considered P\_\_\_\_\_\_\_ energy sources.

Most of these can be used to create electricity which is a S\_\_\_\_\_ source of energy. We can generate electricity from most renewable and nonrenewable energy sources

Which resource is most used to produce electricity in the U.S.? \_\_\_\_\_

17. The \_\_\_\_\_ of fossil fuels produces \_\_\_\_\_ and aerosols that have been linked to having a negative effect on human health and the health of our planet. Fossil fuels are the main source of energy for our e\_\_\_\_\_\_\_\_ and t\_\_\_\_\_\_\_ needs.

About 3 pounds of \_\_\_\_\_\_\_\_ are produced from creating 1 KWh of electricity. Also, a by-product of coal combustion is \_\_\_\_\_ (tiny particles which stay in the atmosphere).

What is attributed to most of the Carbon Dioxide emissions on our planet? \_\_\_\_\_\_\_

What two sectors contribute to more than half of the Carbon emissions? \_\_\_\_\_

As a result of using fossil fuels as our primary source of fuel for electricity and transportation, we have generated damaging gases which cause health problems, \_\_\_\_\_\_ rain, ground level \_\_\_\_\_ and possibly and change in \_\_\_\_\_ temperature.

18. Where do we use the most energy? In what areas can energy be most conserved in? H\_\_\_\_\_ & C\_\_\_\_\_

19. Energy Conservation Tips include:

Use high \_\_\_\_\_ furnaces and air conditioning units.

Use less \_\_\_\_\_ water for showers, dishes, clothes

I\_\_\_\_\_ any holes (fireplace) and windows (thermal pane)

Adjust \_\_\_\_\_ at night and during day when not at home.

Use occupancy / \_\_\_\_\_ sensors for lights.

Use compact \_\_\_\_\_ lighting.

Turn \_\_\_\_\_\_ appliances when not in use, and/or \_\_\_\_\_ appliances so they don’t continue to draw electricity.

ANSWERS

1. There are two MAJOR energy sources that affect our Earth Systems:

Internal (energy from radioactive decay of elements in the Earth)

External (energy from the sun)

2. Explain the difference between the two sources from #1.

renewable energy sources CAN be replenished and **3** examples are

* water
* sunlight
* minerals, oxygen, nitrogen

non-renewable energy sources CANNOT be replenished and **3** examples are

* fossil fuels (coal, oil, natural gas)
* manufactured items like plastic, vinyls
* nuclear power

What non-renewable energy sources are used the most? Fossil fuels

3. Biomass is organic material made from plants and animals (it contains stored energy from the sun). Biomass is a renewable energy source because we can always grow more trees and crops, and waste will always exist. When burned, the chemical energy in biomass is released as heat. If you have a fireplace, the wood you burn in it is a biomass fuel. Wood waste or garbage can be burned to produce steam for making electricity, or to provide heat to industries and homes.

4. Hydropower is the renewable energy source that produces the most electricity in the United States. Hydropower Relies on the Water Cycle (the amount of available energy in moving water is determined by its flow or fall; the more flow/fall, the more electricity can be generated). The water flows through a pipe, or penstock, then pushes against and turns blades in a turbine to spin a generator to produce electricity.

5. Geo (Earth) thermal (heat) energy is heat from within the Earth that mostly results from radioactive decay of elements (elements “break down” and this process gives off heat).

Direct use and district heating systems use hot water from springs or reservoirs near the surface (to heat water for use OR to heat homes).

Electricity generation power plants require water or steam at very high temperature to create electricity.

Geothermal heat pumps use stable ground or water temperatures near the Earth's surface to control building temperatures above ground.

Is it a renewable energy source? Yes

6. Wind is a (renewable / non-renewable) resource, which is simply air in motion. It is created by uneven heating of land and water or by pressure differences in the atmosphere. Today’s wind machines (also called wind turbines) use blades to collect the wind’s kinetic (moving) energy. The blades turn and are connected to a drive shaft that turns an electric generator to produce electricity.

7. Solar energy is (renewable / non-renewable) can be converted to electricity in two ways:

a. Photovoltaic (PV devices) or “solar cells” change sunlight directly into electricity. Individual PV cells are grouped into panels and arrays of panels that can be used in a wide range of applications ranging from single small cells that charge calculator and watch batteries, to systems that power single homes, to large power plants covering many acres.

b. Concentrating Solar Power Plants generate electricity by using the heat from solar thermal collectors to heat a fluid which produces steam that is used to power the generator

8. Distinguish between passive and active solar energy

Passive solar energy is used when radiant energy is collected and not mechanically converted. Example: positioning a home in the proper location to collect the maximum amount of radiant energy.

Active solar energy uses the radiant energy from the sun along with some mechanical equipment to utilize the radiant energy. Example: PV Cells

9. Non-renewable energy sources CANNOT be replaced once they have been used. There is a finite amount of these energy sources (once it’s gone, it’s gone).

10. Fossil fuels are (renewable / non-renewable) [fuels](http://en.wikipedia.org/wiki/Fuel) formed by natural processes such as [anaerobic decomposition](http://en.wikipedia.org/wiki/Anaerobic_decomposition) of buried dead [organisms](http://en.wikipedia.org/wiki/Organism). Fossil fuels contain high percentages of [carbon](http://en.wikipedia.org/wiki/Carbon) and include [coal](http://en.wikipedia.org/wiki/Coal), [petroleum](http://en.wikipedia.org/wiki/Petroleum), and [natural gas](http://en.wikipedia.org/wiki/Natural_gas) when decaying organic (formerly living) materials are subject to high pressure and temperature.

11. Which world country uses almost twice the fossil fuels as any other country? U.S.

12. Fossil Fuel Oil was formed from the remains of animals and plants that lived millions of years ago in a marine (water) environment before the dinosaurs. Heat and pressure from these layers helped the remains turn into what we today call *crude oil*.

Oil is most used for transportation; in particular cars (gasoline).

13. Coal is a nonrenewable energy source because it takes millions of years to create. Coal is mined and then burned (at a power plant) to heat steam which spins a turbine which powers a generator which produces electricity. Coal is classified into four main types, or ranks, depending on the amounts and types of carbon it contains and on the amount of heat energy.

* Anthracite has 86-97% carbon and, therefore, the highest heating value
* Bituminous has 45-86% carbon and the 2nd highest heating value
* Subbituminous has 35-45% carbon and the 3rd highest heating value
* Lignite has 25-35% carbon and the lowest heating value.

14. Natural Gas is a (renewable / non-renewable) energy source. Over time, sand and silt changed to rock, covered the organic material, and trapped it beneath the rock. Pressure and heat changed some of this organic material into coal, some into oil (petroleum), and some into natural gas — tiny bubbles of odorless gas.

Natural Gas is most used for generating electric power and in industry.

15. Nuclear energy is (renewable / non-renewable) energy from the nucleus (core) of an atom. Electricity can be made from nuclear power at a nuclear power plant.

a. Fission of Uranium occurs and this releases a large amount of heat.

b. This heat turns water into steam.

c. The steam spins a turbine.

d. The spinning turbine powers a generator.

e. The generator generates electricity.

16. Renewable and Non-Renewable resources are considered PRIMARY energy sources.

Most of these can be used to create electricity which is a SECONDARY source of energy. We can generate electricity from most renewable and nonrenewable energy sources

Which resource is most used to produce electricity in the U.S.? coal

17. The burning of fossil fuels produces gases and aerosols that have been linked to having a negative effect on human health and the health of our planet. Fossil fuels are the main source of energy for our electricity and transportation needs.

About 3 pounds of CO2 are produced from creating 1 KWh of electricity. Also, a by-product of coal combustion are aerosols (tiny particles which stay in the atmosphere).

What is attributed to most of the Carbon Dioxide emissions on our planet? Climate Change

What two sectors contribute to more than half of the Carbon emissions? Heat & Electricity

As a result of using fossil fuels as our primary source of fuel for electricity and transportation, we have generated damaging gases which cause health problems, acid rain, ground level ozone and possibly and change in global temperature.

18. Where do we use the most energy? In what areas can energy be most conserved in? Heating & Cooling

19. Energy Conservation Tips include:

Use high efficiency furnaces and air conditioning units.

Use less hot water for showers, dishes, clothes

Insulate any holes (fireplace) and windows (thermal pane)

Adjust thermostat at night and during day when not at home.

Use occupancy / motion sensors for lights.

Use compact fluorescent lighting.

Turn off appliances when not in use, and/or unplug appliances so they don’t continue to draw electricity.