

## Unit 2 – Energy use and Conservation

### Essential Science Background

p. 54 Table 1 Forms of Energy – there are two main categories of forms of energy. \_\_\_\_\_ energy involved in the energy of motion and \_\_\_\_\_ energy, the energy related to position.

*Here are some forms of energy you should recognize.*

\_\_\_\_\_ energy or radiant energy is the energy of electromagnetic waves traveling through space

\_\_\_\_\_ energy is the vibrations of atoms

\_\_\_\_\_ energy or heat energy is the energy of random motion of atoms and particles

\_\_\_\_\_ Energy is the energy contained within bones of atoms.

\_\_\_\_\_ energy is the energy stored within a stretched were compressed object such as an elastic band or a car bumper.

\_\_\_\_\_ energy is the energy due to the position of an object affected by gravity.

\_\_\_\_\_ energy is the energy stored within the nucleus of an atom.

\_\_\_\_\_ energy is the energy stored by separation of positive and negative charges.

\_\_\_\_\_ energy is the sum of kinetic and potential energy of an entire system.

Energy can be converted from one form to another using an energy \_\_\_\_\_. Examine this on page 55.

### ***Chapter three - Energy Resources***

#### **Section 3.1**

And energy resource provides energy to bring about \_\_\_\_\_ or change. A sandwich and \_\_\_\_\_ are both energy resources. Gasoline has a higher concentration of energy rich molecules and so brings about much more movement or change.

A \_\_\_\_ - \_\_\_\_\_ energy resource is an energy resource that is not replaceable once consumed. \_\_\_\_\_ fuels like \_\_\_\_\_, natural gas, and \_\_\_\_\_ for nuclear energy use are two common examples of nonrenewable Energy Resources

A \_\_\_\_\_ energy resource is an energy resource that is available on a \_\_\_\_\_ basis. Examples of renewable Energy Resources would be \_\_\_\_\_, wind, \_\_\_\_\_, geothermal, \_\_\_\_\_, and wave and tidal energy. Read about these Energy Resources on page 58 and 59 of the textbook. Society's need for energy has increased many times over since the dawn of creation. Read and study the timeline on pages 60 and 61. Make any notes in the space below.

Notes:

## **Section 3.2**

Let's study further fossil fuels and other non-renewable Energy Resources

### **Coal**

Coal is thought to be formed over \_\_\_\_\_ periods of time under immense \_\_\_\_\_ and heat. Organic material starved of \_\_\_\_\_ under these conditions produce a dense carbon based fuel called Coal. Coal can be burned to produce large amounts of heat energy released within the \_\_\_\_\_ of the material. It is relatively easy to \_\_\_\_\_ an easy to move but is the largest contributor to excess greenhouse gas in the atmosphere and so its use has been declining.

### **Oil**

Crude oil (also known as \_\_\_\_\_) is created in a similar process as coal. Oil is mainly found underground in deposits of \_\_\_\_\_ rock called reservoirs. \_\_\_\_\_ down to these reservoirs and sucking out of the oil is how crude oil is extracted from the earth. Crude oil is then transformed into \_\_\_\_\_, plastics, \_\_\_\_\_, and other things that billions of people use every day.

Oil is transported from one place to another sometimes using boats, trucks, and \_\_\_\_\_ where pressure is applied to the oil in the pipe and the oil is moved over long distances. Oil pipelines are often \_\_\_\_\_ underground and when that is not possible they are placed above ground. Every effort is made to secure these pipelines but sometimes oil \_\_\_\_\_ will occur and interfere with local ecosystems.

### **Natural gas**

Natural gas is found thin layers of sediment \_\_\_\_\_ above oil reserves. Gas Wells are drilled down into these reserves and gas migrates up the well. "Fracking" (slang for \_\_\_\_\_ Fracturing) is a method of creating high pressure fluid pockets into the rock layers to create small \_\_\_\_\_ were more gas can bubble to the surface and be collected. The issue some people have with fracturing the rock in this way is that drinking \_\_\_\_\_ reservoirs can also be affected by increased \_\_\_\_\_ flow underground.

Read and discuss the advantages and disadvantages of using fossil fuels as an energy resource on page 67. Think about what your position would be? Record important notes and your thoughts below.

Notes:

### **Nuclear energy**

Inside a nuclear reactor, \_\_\_\_\_ -235 atoms are split. This process is called \_\_\_\_\_ and releases an enormous amount of \_\_\_\_\_ energy.

\*\*Read and study the diagram of the CANDU nuclear reactor on page 70 of your textbook.

Although nuclear reactors can provide an immense amount of energy with a small amount of material, the \_\_\_\_\_ material involved can be quite dangerous. And the waste that is generated in a nuclear reactor, called \_\_\_\_\_, but can be harmful due to the radioactive nature. Being radioactive means that some destructive energy is spontaneously radiated from the nucleus of an atom.

\*\*Read and discuss the advantages and disadvantages of nuclear energy on page 71 of the textbook and make any further notes below.

On page 72 and 73 \*\*read the case studies of nuclear accidents and public safety concerns of the last 50 years.

## **Section 3.3**

### Renewable Energy Resources

#### **Solar energy**

Solar energy is produced by the **sun**. **Passive** solar collection transforms solar energy into thermal energy without any special devices. A greenhouse, and a car with closed windows are common examples of passive solar heat collectors.

**Active** solar collection concentrates solar energy to generate electricity. **Photovoltaic** cells use solar energy to generate a **current** through a circuit. Common examples of these are solar calculators and **watches**. Large solar cells can produce enough electricity to service whole cities. \*\*Read and discuss the advantages and disadvantages on page 76

#### **Wind energy**

The energy of \_\_\_\_\_ air causes large fans to turn and generate electricity in the rotation or large \_\_\_\_\_.

#### **Hydro energy**

Hydro energy is the energy of running or \_\_\_\_\_ water. Water flows through hydroelectric dams causing turbines to spin which generates electrical energy. When large dams are built, a \_\_\_\_\_ stream or river is barricaded to create a large \_\_\_\_\_. The water then passes through \_\_\_\_\_ in the dam which is like a large wall separating the high water level reservoir from the water at a lower level on the other side.

There are advantages and disadvantages to building dams; discuss with a partner what you think those might be?

**Geothermal energy**

Geothermal energy is the energy that has captured from the earth's \_\_\_\_\_. The most common use of geothermal energy involves the surface water being injected deep underground where it becomes \_\_\_\_\_ before returning to the surface. This heat can then be used in different ways to heat homes or to generate electricity through steam engines turning turbines.

**Biomass energy**

Biomass energy is the \_\_\_\_\_ Energy contained in the bonds of non-fossil fuel organic materials such as \_\_\_\_\_ and vegetation, plant oils, and organic \_\_\_\_\_. These materials are burned, transforming chemical energy into the thermal energy. \_\_\_\_\_ such as ethanol are also used in vehicle fuel. Ethanol boosts the octane for lower grade fuels.

**Tidal energy**

Tidal and wave the energy is the energy of regular \_\_\_\_\_ of incoming and outgoing ocean tides. If the tide level is greater than \_\_\_\_\_ a turbine can be used to create electrical energy as water flows back and forth through the turbine. There are 40 places in the world where tidal power stations can be built but only seven exist. One is in the Bay of Fundy in Canada's maritime bordering Nova Scotia and Newfoundland.