BrishLab

ES15A Energy, Conversion and Conservation

Name: _____

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Did you know?

1 Energy is the ability to do work or cause change. We get most of our energy in one form or another from our sun (see Fig 1).

2 There are really only two different forms of energy: kinetic energy (energy of motion) and potential energy (stored energy). Energy can be converted from stored to motion and back again.

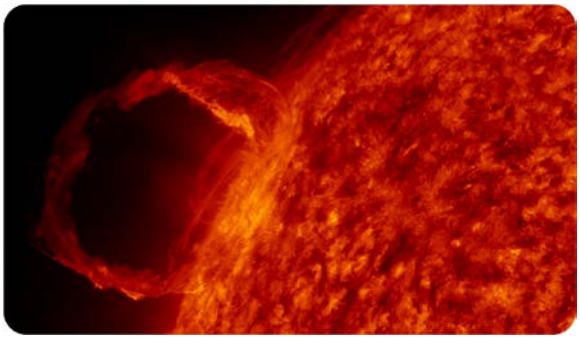

Figure 1 – Most of Earth's energy comes from our sun.

So, why is it important to me?

3 Energy use and energy resources are one of the most important topics for us in our energy rich environment. We want our homes heated and cooled and we want our transportation. Conserving our resources and developing new ones will help meet our energy needs.

What are the big ideas I need to know?

4 Energy is either renewable (replaced in our lifetime) or nonrenewable (taking millions of years) to replace. Plants make renewable food energy from sunlight. Nonrenewable fossil fuels are made of the remains of plants and animals that stored the Sun's energy millions of years ago. Nonrenewable energy sources take a long time to make (see Fig 2).

Figure 2 – Nonrenewable stored energy in coal.

5 Potential energy is energy that is stored. Potential energy has the potential to do work or the potential to be converted into other forms of energy. An example of potential energy might be a stretched rubber band. It has energy stored in the stretched rubber.

6 Kinetic energy is the energy of anything in motion. The rubber band snaps back when you let it go, releasing the stored energy. A bow stores potential energy when pulled back. This potential energy is converted into kinetic energy when the arrow is released. A slight bit of energy is always converted into heat (see Fig 3).

Figure 3 – Kicking a ball is a conversion of energy from you to the ball.

7 Energy forms fit into several groups: mechanical (the motion or stored energy in an object), chemical (energy in atoms or chemical bonds), electrical and electromagnetic (electricity, light and magnetism), thermal (heat in an object), and nuclear (the splitting or combining of atoms).

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8 Most of the time when something happens, energy is changing forms. Even though energy can change form from chemical energy in a battery to electrical energy, it must still follow the fundamental law that energy cannot be created or destroyed; it can only be changed from one form to another. This is known as the law of conservation of energy.

9 Renewable energy resources include solar, water, wind, biomass, and geothermal power. These resources can usually be replaced at the same rate that we use them. Some examples of biomass energy are burning something like wood or changing corn into biofuels. We can plant new trees or crops to replace the ones we use. Geothermal energy uses water in the rocks that has been heated by magma. The magma will heat more water in the rocks as we take hot water out (see Fig 4).

Figure 4 – Renewable water power, wind turbines and solar collectors.

10 Nonrenewable resources are fossil fuels, which include coal, oil, natural gas and nuclear material. Millions of years ago, plants used energy from the sun to form sugars and other energy-rich carbon compounds that were later transformed into coal, oil, or natural gas. The solar energy stored in these fuels is a rich source of energy, but while fossil fuels took millions of years to form, we are using them up in a matter of decades and will soon run out. Nuclear material used in nuclear power plants was formed millions of years ago and decays over time (see Fig 5).

Figure 5 – Nonrenewable coal, oil, natural gas and nuclear energy resources

What about?

11 Power describes the rate you can do some amount of work. It takes more power to do the same amount of work in less time. The tradeoff is that it takes more energy to get more power.

12 We can conserve energy by buying more efficient air conditioners, motors and vehicles – things that use less energy to do the same work. We can also turn off devices when not in use, and insulate our buildings to keep the heat we have.