

Activity 1A: What is Energy?

Before you begin: Read **the background information** on energy use

01

Think about the question: Where does energy come from? Write down some ideas!

02

Use the following slides to find out how energy is generated from:

- **Wind**
- **Solar**
- **Oil**
- **Coal**

03

While learning about these different sources of energy, think about how they might be impacting the environment:

- Immediately?
- Long-term?

Wind Energy



Wind can be used to create electricity, using wind turbines. As wind blows the blades on the turbine, they spin. The blades are connected to a drive shaft, which turns an electric generator to produce electricity.

Wind turbines do not pollute the air or water. They are a very clean, environmentally friendly source of energy.

Solar Energy



Solar energy comes from the sun's rays that reach the earth.

Energy from the sun can be used to heat water or heat houses.

Or, solar energy can be turned directly into electricity to power our appliances and electronics, using solar panels.

Solar panels are made up of things called photovoltaic cells, which capture the sun's energy and makes positive and negative terminals on each surface (like on a battery). When the two surfaces are connected through an external load (like an appliance) electricity flows.

Using solar energy does not make air or water pollution, and does not contribute to global warming. Therefore the environmental impact of using solar energy is very low.

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Oil Energy



Oil (or petroleum) is a smelly yellow to black liquid that is usually found underground. Oil was formed from the remains of plants and animals that lived millions of years ago in a marine environment before the dinosaurs. When these plant and animal remains were covered with layers of dirt and silt, the heat and pressure caused them to turn into oil. The word petroleum actually means "rock oil" or "oil from the earth".

To get oil, scientists and engineers drill holes deep into the earth. Above the hole, a structure called a "derrick" is built to house the tools and pipes going into the well. When finished, the drilled well will bring a steady flow of oil to the surface. After the oil comes out of the ground, it is separated (refined). The oil that comes from the ground can be separated to make gasoline, diesel, propane, and other petroleum products. Many people across North America use propane or natural gas to heat their homes.

Although oil products make our lives easier, finding, producing, moving and using them can harm the environment through air and water pollution. When they are burned as fuel, harmful gases are released into the air (carbon dioxide, carbon monoxide, sulphur dioxide, etc.) These gases cause climate change, acid rain, etc. and can be very bad for human health. If oil is spilled into rivers or oceans, it can hurt or kill wildlife.

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Coal Energy



Coal is a black or brownish black rock that is burned to make energy. It takes millions of years to make coal. The energy in coal comes from energy stored in plants that lived hundreds of millions of years ago, when the earth was partly covered in swampy forests. At that time, plants would die and get covered by layers of water and dirt, trapping the energy. The heat and pressure from the top layers of dirt and water helped the plant remains turn into coal.

Coal miners use giant machines to remove coal from the ground. After the coal comes out of the ground it is moved to a place where it is cleaned and processed (unwanted dirt, rocks, ash, etc. are removed). Then it is shipped (usually on a train) to a power plant where they burn it to make steam. The steam turns turbines that generate electricity.

Coal hurts the environment for a few reasons. When digging for coal, habitat is lost and water is polluted. In some cases coal companies will use explosives to blow away entire mountain tops in search of coal. In 2014, Ontario became the first jurisdiction in North America to be almost entirely coal-free! (99% of energy will be from non-coal sources).

Activity 1B: Ranking Appliances

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01

Ask students to brainstorm a list of the electrical appliances used around their home and school.

02

Narrow in on the following five appliances:

- Fridge
- Clothes Dryer
- Washing machine
- Television
- Dishwasher



03

Rank these appliances according to how much energy you think each uses in one hour.



Activity 1B: Ranking Appliances

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04

Reveal the actual rankings as follows:

Rank	Appliance	Watts per hour
1	Clothes dryer	1800-5000
2	Dishwasher	1200-2400
3	Fridge	170-750
4	Washing machine	350-500
5	TV	65-170

Some other appliances for your interest:

Appliance	Watts per hour
Clothes iron	1000-1800
Computer monitor	150 awake (30 asleep)
Laptop	50
Hair dryer	1200-1875
Toaster	800-1400

Activity 1C: Wasted without knowing

Note: this activity will require additional supplies: 1 incandescent light bulb & 1 compact fluorescent (CFL) bulb and a lamp or light socket (and possibly adult supervision)

01

Think about how it is easy to waste energy without knowing! For example: when we turn on a light it creates energy that we want (**light**), but also energy we don't want (**heat**), and that heat becomes wasted energy.

Hands on:

Show students: 1 incandescent light bulb (a very old invention) and 1 fluorescent light bulb (a newer invention)

Screw the bulbs in one by one and turn them on. Measure the length of time it takes each bulb to get hot.

02

Ask students to note the difference in time, and heat between the two bulbs.

Observations & Conclusions:

- The CFL bulb takes much longer to get hot and only really gets warm vs. incandescent happens quickly and gets very hot
- CFL bulbs last a lot longer than incandescent bulbs.
- How can choices about lighting impact the environment?
- What other energy efficient choices can we make for our household?