

4.0 Human Needs have led to technologies for obtaining and controlling heat

4.1 Looking At Different Sources of Heat

There are two types of natural resources in the environment: **renewable** and **non-renewable**. Renewable energy sources are those that can be replaced, while non-renewable energy sources are those that cannot be replaced – once they are used up, they are gone.

Focus On Fossil Fuels

An energy resource is anything that can provide energy in a useful form. Most energy supplies come from fossil fuels (in Alberta and throughout the world). Fossil Fuels are chemicals from plants and other organisms that died and decomposed millions of years ago and have been preserved underground. The widespread use of fossil fuels has created many problems. More than 60% of the world's energy needs were met by burning oil and natural gas, while another 30% was provided by coal. Despite the many disadvantages of using fossil fuels, we continue to use them. Coal is burned to generate electricity. Oil and natural gas are abundant in Alberta and we use it, maybe more than we should. Alternatives to using these non-renewable resources need to be utilized, so that future generations of Albertans can continue to thrive in our beautiful province.

Economic Impacts

price of gasoline,
drilling, processing, transporting,
exploration,
anti-pollution technology,

Environmental Impacts

global warming,
changing climate zones
around the world,
plant growth,
depleted water resources
thermal pollution

Societal Costs

pollution causes health problems,
rising health care costs,
treating polluted lakes,

Alternatives For Thermal Energy

Wind Energy Wind energy is the energy of moving air. As the sun heats up the air, the warm air rises and cools off. The cooler air falls, creating the convection currents called **thermals**. These convection currents, on a global basis, form the Earth's wind systems. The windmill is a turbine (a wheel with fan blades), which is connected to a generator. When the windmill spins the generator produces electricity.

Geothermal Energy Volcanoes, hot springs and geysers are sources of **geothermal** energy - energy from the interior of the earth. The thermal energy from these events can produce hot water or steam, which can be then piped to a power plant at the surface. This can be used to run turbines which produce electrical energy.

Nuclear Energy **Nuclear fission** is a process that uses small amounts of radioactive uranium to produce vast amounts of heat. The Canadian developed CANDU reactor provides nuclear energy in many parts of Canada and also sells this energy to other countries. A major problem is long-term storage of radioactive wastes.

Hydro-Electric Power Hydro-electric dams use the force of gravity which directs the water from the **reservoir**, through gates in the dam to turn **turbines**, which are attached to **generators**, which produce the electrical energy from the mechanical energy of the generators. This is very clean, renewable energy.

Comparing The Options

Each energy source has its advantages and disadvantages. When making choices about which type of system to utilize, take into account where, when and how the energy will be used.

4.2 Energy Consumption

Energy Consumption- Reduce Energy Waste

Home Energy efficient products to upgrade energy wasting products. There are many things we can do at home to stop wasting energy. Examples:

- turning off lights before leaving a room
- install low-flow shower heads to conserve water resources
- Recycling is another way to save energy.
- Stop your taps from dripping
- Save water and install more efficient taps and flush systems
- Insulate your roof and retrofit window to be double glazed
- Don't open doors and windows to cool down a room. Turn down your heat instead.
- Did you know that by turning down the thermostat by 1°C you can reduce your heating costs by up to 10% and helping the environment at the same time
- Get your heating system serviced regularly.
- Don't forget to turn off your computer and TV properly when not in use.
- Always check that lights and fittings are clean. Dirty lights can reduce lighting output by 20%. By cleaning regularly you can maintain lighting efficiency.
- Replace ordinary light bulbs with energy saving bulbs.
- Reduce, re-use and recycle your waste
- Try to make sure you separate your waste for recycling into: paper, glass, aluminum cans, and food waste for composting.

Transportation Cars and Trucks are big energy wasters and contribute greatly to the problems we have in the environment, including nitrogen oxides which cause breathing problems and contribute to smog. Take action to reduce use of cars – ride a bike, take public transit, use hybrid, or fuel cell vehicles, car pool, reduce speed to conserve on fuel consumption.

Industry Industry is the biggest energy user. Sometime, industry's use of energy can harm the environment, but it is also responsible to find ways to reduce the negative impacts and find better ways to utilize the available energy and find better – more efficient – alternative sources of energy. An **energy audit** is utilized to determine ways to reduce energy usage One of the products (**carbon dioxide**) that is released from the burning of fossil fuels is a greenhouse gas, which traps heat energy in our atmosphere and leads to global warming.

Sulfur-dioxide is released when coal and natural gas are burned. This gas is an irritant to the eyes, nose and throat.

Carbon monoxide is produced when a fire burns without enough oxygen. It is clear, odourless and very lethal. It hinders the brain's reasoning ability and can kill you.

Co-generation This alternative uses some of the two-thirds of the energy released by the burning of fossil fuels as thermal energy, to heat a building, or a fuel, to generate electrical energy.

Being A Responsible Citizen

Making responsible decisions means purchasing products and services that will have little negative impact on the environment and will promote a clean environment. Making your voice heard, by supporting government that conducts research into helping environmentally friendly technologies develop and advance our knowledge about energy consumption.

[101 Ways To Reduce Your Waste](http://www.wealden.gov.uk/Environment_and_Transport/Recycling/Ways_to_Reduce_Waste/index.aspx)

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