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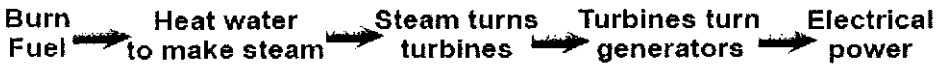
Energy Sources

Fossil Fuels

- Coal, Oil and Natural Gas
- Come from remains of ancient plants and animals
- provides 66% of the world's electrical power
- 95% of the world's total energy demands

How Fossil Fuels Work

- Coal is crushed to a fine dust and burnt. Oil and gas can be burnt directly.



Coal provides around 28% of our energy, and oil provides 40%.

- Crude oil (called "petroleum") is easier to get out of the ground than coal, as it can flow along pipes. This also makes it cheaper to transport.

Advantages to Using Fossil Fuels

- Transporting oil and gas to the power stations is easy.
- Gas-fired power stations are very efficient.
- A fossil-fuelled power station can be built almost anywhere

Disadvantages of Using Fossil Fuels

- Pollution- produces carbon dioxide, which contributes to the "greenhouse effect", warming the Earth.
- Mining coal can be difficult, dangerous and ugly.
- Coal-fired power stations need **huge amounts of fuel**
- Oil spills are a serious problem

Is it Renewable?

Fossil fuels are NOT a renewable energy resource

Nuclear Power

- Nuclear power is generated when a reactor splits the nucleus of uranium atoms to release energy in the form of heat. This is called **nuclear fission**.
- Uranium, which is a metal that is mined in various parts of the world.
- Nuclear power produces around 11% of the world's energy needs.

How Nuclear Power Works

- Nuclear fission makes heat--heated water makes steam---steam turns the turbines--- turbines turn generators---electrical power is sent around the country

Advantages to Using Nuclear Power

- Does not produce smoke or carbon dioxide, so it does not contribute to the greenhouse effect.
- Produces huge amounts of energy from small amounts of fuel.
- Nuclear power is reliable.

Disadvantages of Nuclear Power

- Produces very hazardous waste that must be sealed up and buried for many years to allow the radioactivity to die away
- Power plant accidents are extremely harmful to the environment

Is it Renewable?

- Nuclear energy from Uranium is NOT renewable.
- Once we've dug up all the Earth's uranium and used it, there isn't any more.

Solar Power

- **Solar Cells** really called photovoltaic or "photoelectric" cells) convert light directly into electricity.
- In a sunny climate, you can get enough power to run a 100W light bulb from just one square meter of solar panel.

Solar Water Heating

- Heat from the Sun is used to heat water in glass panels on your roof.

Solar Furnaces

- Use a huge array of mirrors to concentrate the Sun's energy into a small space and produce very high temperatures.

Advantages to solar power

- Solar energy is free - it needs no fuel and produces no waste or pollution.
- In sunny countries, solar power can be used where there is no easy way to get electricity to a remote place.
- Handy for low-power uses such as solar powered garden lights and battery chargers

Disadvantages to Solar Power

- Doesn't work at night.
- Very expensive to build solar power stations.
- Solar cells cost a lot
- Can be unreliable unless you're in a very sunny climate.

Is Solar Power Renewable?

- Solar power is renewable.
- The Sun will keep on shining anyway, so it makes sense to use it.

Wind Power

- Energy in the wind is used by building a tall tower, with a large propeller to turn a turbine or a pump

Advantages to Wind power

- Free-uses no fuel.
- No waste or greenhouse gases.
- The land beneath can usually still be used for farming.
- Wind farms can be tourist attractions.
- A good method of supplying energy to remote areas.

Disadvantages of Wind Power

- Wind is not always predictable
- Some people think towers are ugly
- Can kill birds
- Noisy- constant, low, "swooshing" noise day and night.

Is Wind Power Renewable?

- Wind power is renewable.
- Winds will keep on blowing, it makes sense to use them.

Hydroelectricity

- Moving water turns a turbine that turns a generator that makes electricity.
- Can be from a natural waterfall or a dam is built
- Hydro-electricity provides 20% of the world's power

Advantages of Hydroelectricity

- After initial cost of building a dam and power stations energy is free.
- No waste or pollution produced.
- Reliable

Disadvantages to Hydro-electricity

- The dams are very expensive to build.
- Dams disrupt habitats
- Water quality and quantity downstream can be affected, which can have an impact on plant life.

Is it Renewable?

- Hydro-electric power is renewable.
- The Sun provides the water by evaporation from the sea, and will keep on doing so

How Biomass Works

- Plant and animal waste is used to produce fuels such as methanol, natural gas, and oil.
- Garbage, animal manure, sludge, woodchips, seaweed, corn stalks and other wastes.
- Burn fuel--heat water to make steam--team turns turbine----turbine turns generator---makes electrical power

Advantages to Biomass

- Gets rid of waste wisely
- Fuel is cheap.
- Less demand on the Earth's resources.

Disadvantages to Using Biomass

- Collecting the waste in sufficient quantities can be difficult.
- Burning fuel creates pollution and greenhouse gases.
- Some waste materials are not available all year round.

Is It Renewable?

- Biomass is renewable
- We will always make waste products.
- We can always plant & grow more sugar cane and more trees, so those are renewable too.

Geothermal Power

- Hot rocks underground heats water to produce steam.
- Water is pumped where hot rock is located, steam comes up, turns turbines, which turn electric generators.

Advantages to Geothermal Power

- Does not produce any pollution, and does not contribute to the greenhouse effect.
- Power stations do not take up a lot of space
- No fuel is needed.
- Energy is *almost* free.
  It may need a little energy to run a pump, but this can be taken from the energy being generated.

Disadvantages to Geothermal Power

- There are not many places to build geothermal power stations.
- Stations may "run out of steam"
- Hazardous gases and minerals may come up from underground, and can be difficult to safely dispose of.
- Expensive to build

Is it Renewable?

- Geothermal energy is renewable.
- The energy keeps on coming, as long as we don't pump too much cold water down and cool the rocks too much.

Hydrogen Fuel Cell

- Separates hydrogen into protons and electrons
- Electrons form an electric current that powers a motor
- Protons combine with oxygen and make water

Advantages and Disadvantages to Hydrogen Fuel Cell

- **Advantage**-No pollution –only water and heat are byproducts

- **Disadvantage**-Very expensive to produce in large numbers
- Limited number of fuel stations

Is it Renewable? Yes

Tidal Power

- A huge dam (called a "barrage") is built across a river estuary.
- When the tide goes in and out, the water flows through tunnels in the dam
- The moving water turns a turbine
- Or it can push air through a pipe, which then turns a turbine.
- Only around 20 tidal power stations in the world

Advantages to Tidal Power

- Once you've built it, tidal power is free.
- It produces no greenhouse gases or other waste.
- It needs no fuel.
- It produces electricity reliably.
- Not expensive to maintain.
- Tides are totally predictable.

Disadvantages to Tidal Power

- A barrage is very expensive to build
- Affects the environment for many miles upstream and downstream
- Many birds rely on the tide to uncover the mud s so that they can feed.
- There are few suitable sites for tidal barrages.
- Only provides power for around 10 hours each day, when the tide is actually moving in or out.

Is it Renewable?

- Tidal energy is renewable.
- The tides will continue to ebb and flow, and the energy is there for the taking.

Energy sources	How it works	Advantages	Disadvantages	Renewable (yes or no)
Fossil fuels				
Nuclear power				
Solar power				
Wind power				
Hydroelectric power				
Tidal power				
Wave power				
Geothermal power				
Biomass				