

Energy

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Slide 2: *What is Energy?*

- Energy can be defined as the capacity to do work.
- Energy is all around us.
- We can see light energy from the sun.
- Energy cannot be created or destroyed; it can only be transformed from one form to another.
- Heat energy from the sun keeps us warm.
- We can see the kinetic energy of the wind cause a door to slam.
- The chemical energy stored in food sustains life.
- Energy is needed to make cars move.
- Without energy, the world would be cold and dark.

Slide 3: *Renewable vs Non-renewable: Renewable Energy Sources*

- We use energy from both renewable and non-renewable sources every day.
- The sun is the main source of energy. There are two sources of renewable energy that are not dependent on the sun: Geothermal and Tidal energy.
- Renewable energy comes from natural energy sources that replenish themselves continually.
- Most of the following renewable energy sources have limited environmental impact:

Sun
Wind
Water
Biomass
Geothermal sources
Ocean

Slide 4: *Renewable vs Non-renewable: World's Energy Sources*

- Energy drives modern society.

- Currently most of the world's energy is derived from non-renewable sources.
- There is a global need to increase the use of renewable energy sources and decrease the use of non-renewable energy sources, thus reducing environmental pollution.

Slide 5: Renewable vs Non-renewable: Non-renewable Energy Sources

- Fossil fuels are hydrocarbon compounds in the crust of the earth that have developed from decomposed plant and animal matter over millions of years.
- Fossil fuels are called non-renewable energy sources because they cannot be replenished.
- Fossil fuels contain chemical potential energy which is released through combustion.
- Combustion is the most common way of converting the chemical potential energy in fossil fuels into kinetic energy (work).
- Oil, coal and gas are fossil fuels and are non-renewable.
- Burning fossil fuels releases greenhouse gases.
- An increase in greenhouse gases has significant environmental impacts.

Slide 6: Renewable vs Non-renewable: The Hot Issue

- Modern society is totally dependent upon energy in the form of electricity derived from burning fossil fuels and in the form of combustion engines burning fossil fuels.
- Combustion engines are used by cars, trucks, planes, generators, etc.
- Burning fossil fuels releases a gas called CO₂ (carbon dioxide) which increases the greenhouse effect.
- Carbon is the basic building block of all fossil fuels. When fossil fuels are used, the carbon reacts with the oxygen in the atmosphere to form carbon dioxide, which is then released into the atmosphere.
- This depletes the oxygen levels in the atmosphere.

Slide 7: Greenhouse Effect

- The **greenhouse effect** is a warming of Earth's surface and the air above it (Atmosphere).
- Without the natural greenhouse effect the earth's temperature would be on average -18°C instead of the 15°C it is now.
- It is caused by **gases** in the air that trap energy from the Sun.
- These heat-trapping **gases** are called **greenhouse gases**.
- The most common **greenhouse gases** are water vapour (H₂O_g), carbon dioxide (CO_{2g}), and methane (CH_{4g}).
- Burning fossil fuels has increased the amount of CO₂ in the atmosphere, trapping more heat and making the earth warmer than it should be.

Slide 8: The Environmental Impact: Outcomes of Global warming.

There are a number of negative effects caused by the Global warming:

- Because of fossil fuels we have increased the levels of CO₂ and other greenhouse gases, thus trapping more of the sun's heat and raising global temperatures.
- This is known as global warming.
- Global warming is thus a rise in the average temperature of the earth's atmosphere which is causing climate changes.
- Rising sea and air temperatures are slowly melting the ice in the Arctic and Antarctic.
- The ice melting in the arctic regions has very big effect on the rising sea levels.
- As the earth's average temperature rises because of global warming, the temperature of the sea also rises. When the temperature of water rises, there is an increase in volume, which in turn causes sea levels to rise.
- In the long term, the effects of global warming cause climate change.
- Climate change can be experienced through increased droughts, heavier snow storms and an increase in floods.
- This will have far-reaching effects on us, our food supply and the whole natural world.
- Using renewable energy would mean that less CO₂ would be released, thus reduce the impact of global warming.

Slide 9: South African Total Energy Resource 2018

The South African total energy resource in 2018 was:

Coal:	72%
Nuclear:	3%
Gas/Diesel:	7%
Pumped Storage:	5%
Hydro:	4%
PV:	3%
Wind:	4%
CSP:	1%
Other (Biomass/Landfill):	1%

REF: <http://www.energy.gov.za/IRP/irp-update-draft-report2018/IRP-Update-2018-Draft-for-Comments.pdf>