

Finite and Renewable

What do the words mean?

Finite – will run out eventually

Renewable – we can replace them as we use them

Sustainable – meets the needs of the current generation without compromising the ability of future generations to meet their needs

What do we use the earth's resources for?

- warmth
- food
- shelter
- transport



We can use them as natural resources or process them

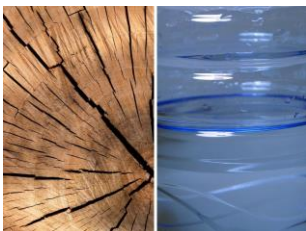
'Natural resources' + agriculture provide:

- food
- timber
- clothes

Finite resources are processed to get us

- energy
- materials

e.g. cotton is natural and we grow cotton plants
OR
We can use synthetic materials such as nylon



wood and plastic

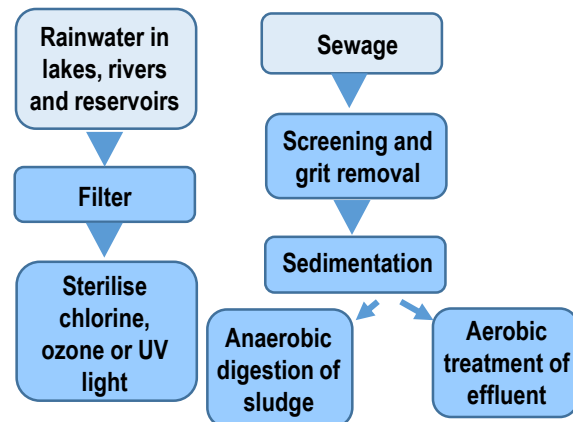
e.g. Coal, oil and gas are used for energy
AND
Metal ores are mined to get metals



coal, crude oil and natural gas

Treating Water

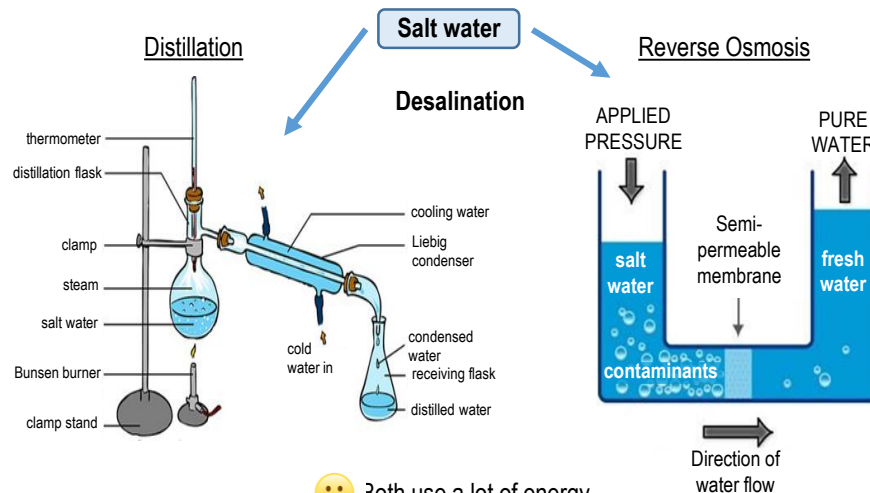
Potable water must have low levels of SALTS and MICROBES (it isn't PURE water)



Industrial and agricultural waste water – remove organic matter and harmful chemicals



WHY?
To kill microbes

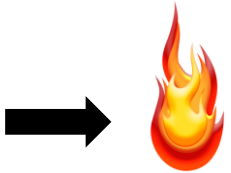
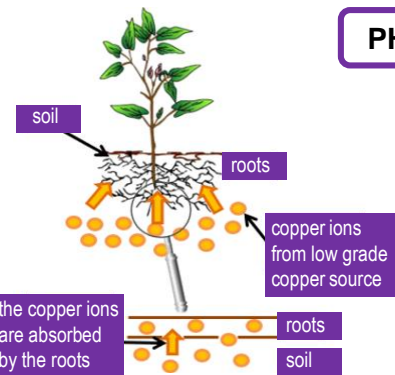


☹️ Both use a lot of energy

Alternative Metal Extraction

Why Bother? Running out of metal ores

PHYTOMINING



- BURN plants
- React ASH with sulphuric acid

Plants take in copper

BIOLEACHING



Bacteria feed on metal ore



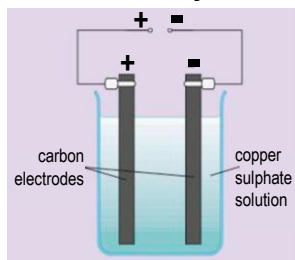
- 'leachate solution' contains copper compounds

How to get the copper from the compound

Displacement using scrap iron

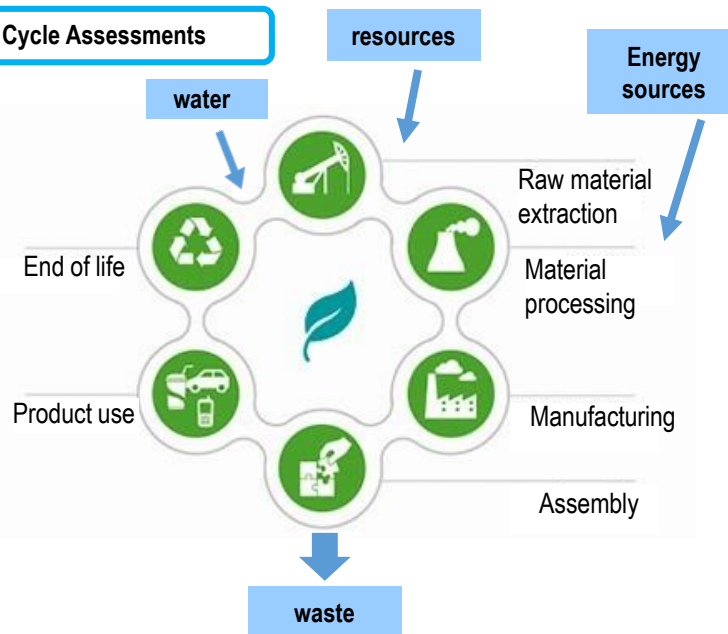


Electrolysis



Life Cycle Assessments

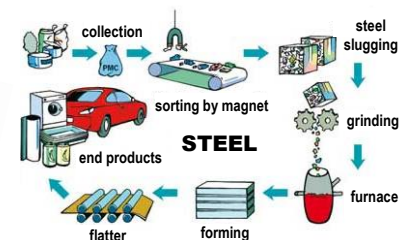
Life Cycle Assessments



Reducing the use of resources

Why bother?

Reduce ... use of limited resources



Why bother?

Reduce ... use of energy resources



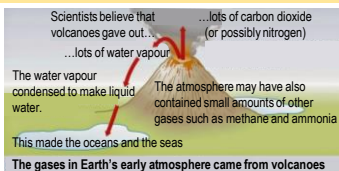
Why bother?

Reduce ... waste and environmental impacts



Early Atmosphere Evolving

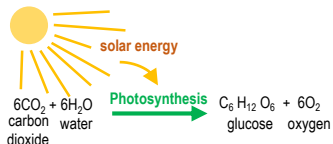
Volcanoes produced carbon dioxide, nitrogen (& a bit of methane & ammonia)



Oceans formed

From condensed water.
Carbon dioxide dissolved in the oceans
Carbonates precipitated (turned into solid bits) to form sediments

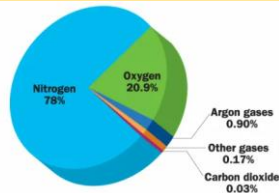
Green plants and algae



Took in CO₂ and released O₂ in photosynthesis

Sedimentary rocks and fossil fuels were formed:

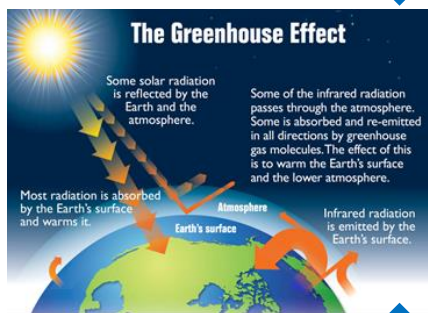
Decreased the CO₂ levels



Greenhouse Gases and Climate Change

Carbon Dioxide
Methane
Water Vapour

Short wavelength doesn't interact with the gases



Longer wavelength emitted does interact with the gases

Human activities increase the levels of CO₂ and CH₄

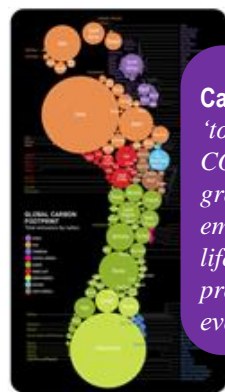
- CO₂**
- Burning fossil fuels
 - Deforestation
- Methane**
- Cows (and rice paddies)
 - Landfill

Effects of climate change:

- Rising sea levels
- Droughts
- Extreme weather events
- Changes in wildlife distribution

Why do some people deny humans cause climate change???

- Difficult to model
- Models are simplified
- Media can be biased
- MUST check the evidence is PEER REVIEWED



Carbon Footprint
'total amount of CO₂ and other greenhouse gases emitted over the full life cycle of a product, service or event'

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Atmospheric Pollutants

Gases released in combustion of fossil fuels and their effects:

Gases	Released when	Effects caused
Carbon dioxide	All fossil fuels burn	Global warming
Water vapour	All fossil fuels burn	None
Carbon monoxide	Incomplete combustion of fuels (not enough O ₂)	Poisonous gas
Solid particulates	Solid fuels burn incompletely	Global dimming Asthma
Sulphur dioxide	Coal burns (sulphur is an impurity in coal)	Acid rain Respiratory problems
Nitrous oxides	Nitrogen in air reacts with oxygen at high temperatures	Acid rain Respiratory problems

