



RENEWABLE ENERGY

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Report Outline

PART 1 Introduction

PART 2 ENVIRONMENTAL ISSUES

PART 3 ENERGY SOURCES

Introduction

Goals:

- Compare various types of energy
- Identify the problems associated with the energy production
- Identify how the CO₂ is linked to climate change
- Describe the mechanisms of the renewable energy sources



We are the first generation to feel the effect of climate change and the last generation who can do something about it.

-- Barack Obama

ENVIRONMENTAL ISSUES

Our environment is constantly changing. Human activity has already increased the earth's temperature from 1.1 to 1.3 °C over the past century, and as the planet continues to warm, the dangers intensify.

Climate change is happening now and there are and will be things that we will need to face, like:

- natural disasters
- warming and cooling periods
- different types of weather patterns
- biodiversity loss
- a warming, rising ocean
- health risks
- etc.

Main environmental problems by 2022

Climate crisis has many factors that play a role in the exacerbation of the environment, there are some that needs more attention than others.

1

POLLUTION

2

BIODIVERSITY LOSS

3

NATURAL DISASTERS

4

**GLOBAL WARMING
FROM FOSSIL FUELS**

1 Pollution

Pollution is the introduction of harmful materials into the environment. These harmful materials are called **pollutants**. Pollutants can be natural, such as volcanic ash. They can also be created by human activity, such as trash or runoff produced by factories. Pollutants damage the quality of air, water, and land.

There are 7 key types of pollution - air, water, soil, noise, radioactive, light and thermal.

Pollution of all kinds can have negative effects on the environment and wildlife and often impacts human health and well-being.



2

Biodiversity loss

Biodiversity is build out of three interwinde features: ecosystem diversity, species deversity and genetic diversity.

Biodiversity loss is caused by 5 primary drivers:

- habitat loss
- invasive species
- over exploitation (hunting/fishing)
- pollution
- climate change

EU Biodiversity Strategy for 2030: Bringing nature back into our lives

Goal: to ensure that by 2050 the world's ecosystems are restored, resilient and adequately protected. One of the thing is to make big changes in land and sea use



3 Natural disasters

Natural disasters are large-scale geological or meteorological events that have the potential to cause loss of life or property. These types of disasters include:

- wildfires
- drought
- floods
- extreme precipitation

Australian wildfires, 2020



Floods in Germany, 2022



Iraq dust storms, 2022



4 Generating power

The burning of fossil fuels refers to the burning of oil, natural gas, and coal to generate energy. **We use this energy to generate electricity, and to power transportation** (for example, cars and planes) **and industrial processes.** Ever since the invention of the first coal-fired steam engines of the 1700s, our burning of fossil fuels has steadily increased. Across the globe each year we now burn over 4,000 times the amount of fossil fuels burnt during 1776. The effects of the burning of fossil fuels, especially carbon dioxide, are having far-reaching effects on our climate and ecosystems.

The environmental problems directly related to energy production and consumption include **air pollution, climate change, water pollution, thermal pollution, and solid waste disposal.**



GAME TIME

Participants: 10

Observers: 4



Choose 10 players and 4 observers and go to the play field.
Players have to be silent until game manager allows talking.
Observer's takes best point where to stand for better listening and observing, after game gives summary.

People left out keeps silent and watches how players interact one by other.



Practically every environmental problem we have can be traced to our addiction to fossil fuels, primarily oil.

-- Dennis Weaver

There are three main categories of energy sources: fossil fuel, alternative, and renewable. Renewable is sometimes, but not always, included under alternative.

Fossil fuels

Formed over millions of years ago as dead plants and animals were subjected to extreme heat and pressure in the earth's crust. This natural process converted bones and other organic matter into carbon-rich substances that, when burned, generate energy.

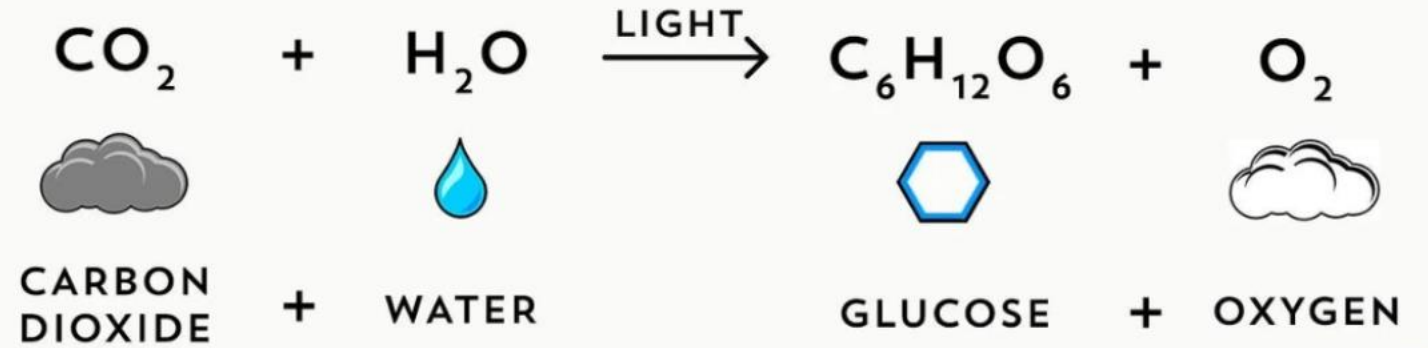
PETROLEUM	COAL	NATURAL GAS
created by the decomposition of organic matter	black or brownish-black sedimentary rock	a mixture of gases trapped underneath the earth's surface
extracted with giant drilling machines	extracted through surface mining	extracted in similar ways as oil
used as fuel to power vehicles, heating units, and machines, and can be converted into plastics	used as fuel to generate electric power	used for electricity generation, heating, and cooking and as a fuel for certain vehicles

Carbon dioxide

It is one of the most important greenhouse gases linked to global warming, but it is a minor component of Earth's atmosphere.

Carbon dioxide is used as a refrigerant, in fire extinguishers, for inflating life rafts and life jackets, blasting coal, foaming rubber and plastics, promoting the growth of plants in greenhouses, immobilizing animals before slaughter, and in carbonated beverages.

Environment naturally balances CO2 out, but when there is more CO2 released, environment can't balance it out!



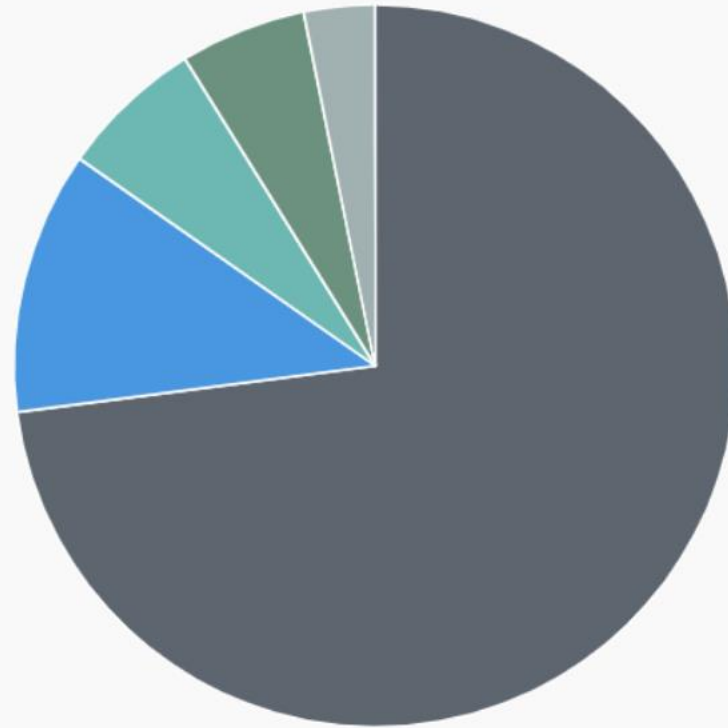
Companies are turning CO2 into materials that goes into: medicine, socks, sneakers, car seats, phone cases etc.



Who Releases the Most Greenhouse Gases?



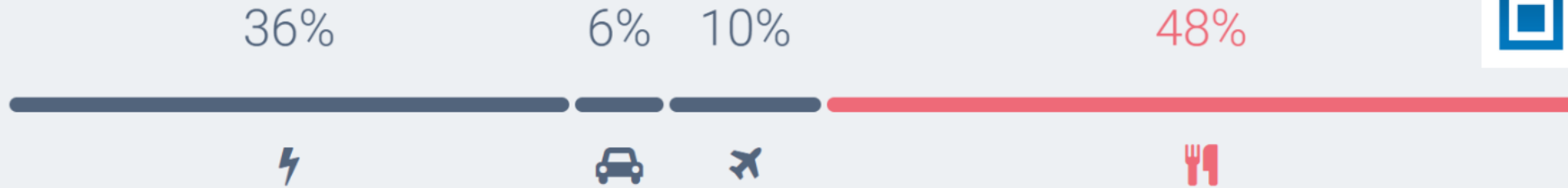
World Greenhouse Gas Emissions by Economic Sector



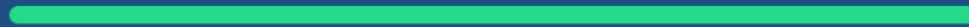
● Energy ● Agriculture ● Land-Use Change and Forestry ● Industrial Processes ● Waste

(Reference: World 101, Global Era Issues)

Let's calculate our footprint!



Your total annual emissions



8.34 tonnes of CO₂

Latvia Country average



7 tonnes of CO₂

World average



9.34 tonnes of CO₂

Renewable energy

Renewable and alternative energy sources are often categorized as clean energy because they produce significantly less carbon emissions compared to fossil fuels. But they are not without environmental footprint.

1 WIND POWER

2 SOLAR POWER

3 HYDROPOWER

4 GEOTHERMAL ENERGY

5 OCEAN ENERGY

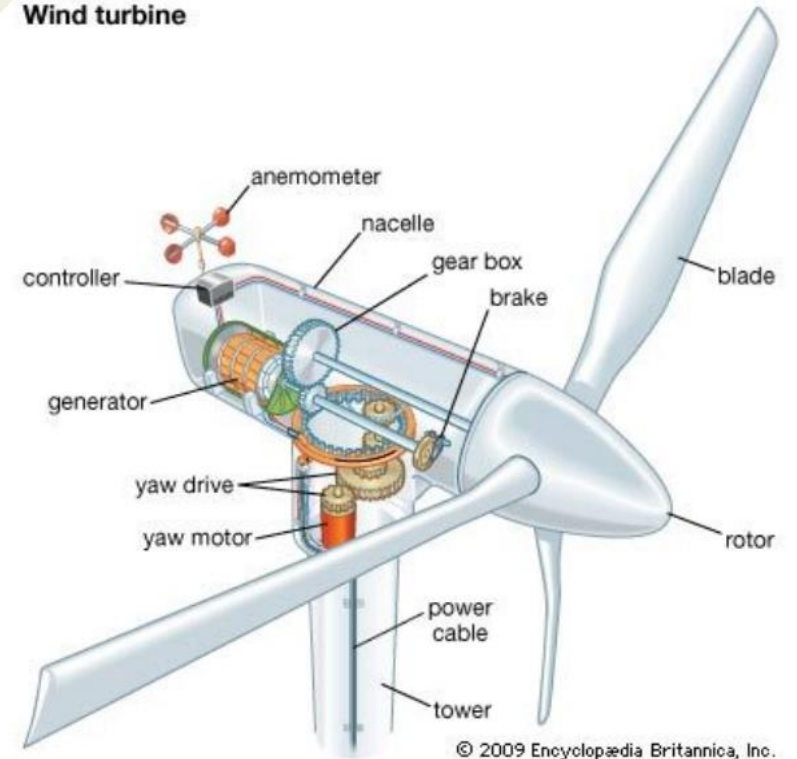
Let's look deeper!



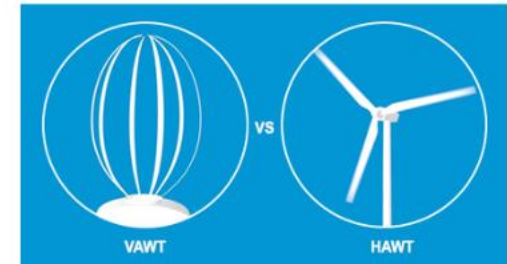
Created using a wind turbine, a device that channels the power of the wind to generate electricity.

Created using a wind turbine, a device that channels the power of the wind to generate electricity.

Wind turbine



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The largest offshore wind farm in the world is called the Walney Extension. The wind farm is located in the Irish Sea approximately 19 km west of the northwest coast of England. The Walney Extension covers a massive area of 149 square kilometers.

They have the potential to generate 659 megawatts of power, which is enough to supply 600,000 homes in the UK with electricity.

Offshore



WIND SPEEDS



LOCATIONS



SIZE



COMMUNITY IMPACT



Onshore



WIND SPEEDS



LOCATIONS



SIZE



COMMUNITY IMPACT



Pros and cons of wind energy



Clean and sustainable

Cost-effective

Price continues to drop

Cost-Turbines are an efficient use of land



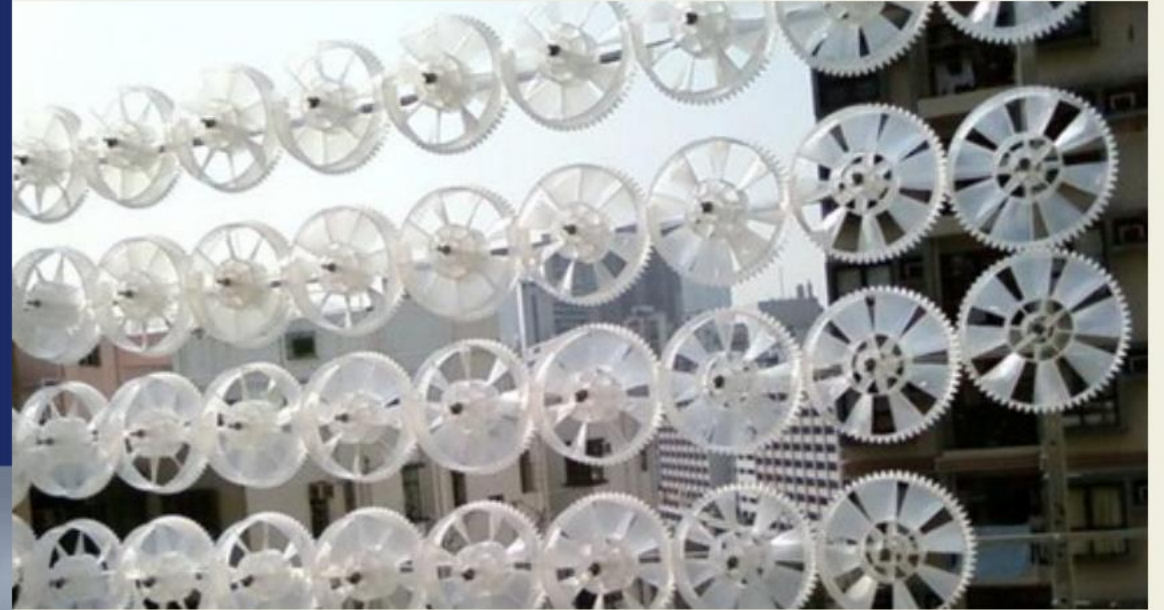
Variable energy source

Tourbines can be loud

Construction can cause local disturbances

Can negatively impact wildlife

The wind
causes the pole
to vibrate



A new technique
how to generate
electricity on
rooftops



There are two main types of solar energy technologies - photovoltaics (PV) and solar thermal (CST)

When the sun shines onto a solar panel, energy from the sunlight is absorbed by the PV cells in the panel. This energy creates electrical charges that move in response to an internal electrical field in the cell, causing electricity to flow.



A solar thermal system uses the energy from the sun to heat up water to use in the home. The way a solar thermal panel works is quite simple: it absorbs the heat from the sun with panels that are called solar collectors.

solar panels can produce power without direct sunlight



Bhadla Solar Park, India

- **The project commenced in 2015 with an investment of 1400 million dollars**
- **The temperature in Bhadla ranges from 46 to 48 degrees**
- **10 million solar panels**
- **The solar farm has a capacity of 2.25 GW**

Pros and cons of solar energy



Diverse application

Low maintenance costs

Technology development

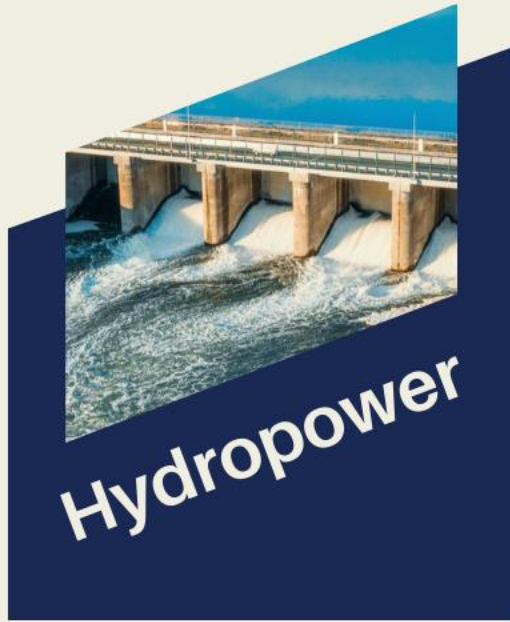
Energy independence



Weather dependent

Uses a lot of space

Impossible to transport

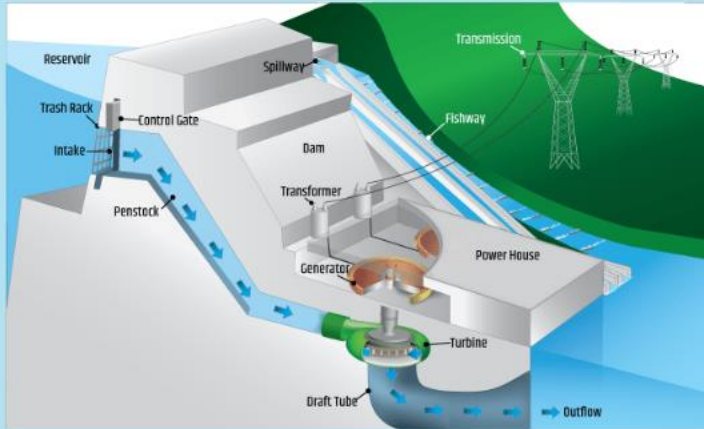


Hydroplants range in size from "micro-hydros" that power only a few homes to large hydropower stations that provide electricity for millions of people

Hydropower stations create the energy of water moving from higher to lower elevations. It can be generated from reservoirs and rivers.

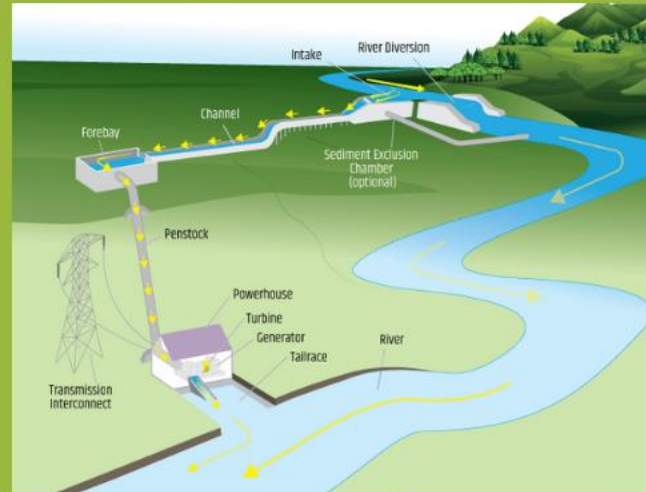
The water turbine changes the kinetic energy of the falling water into mechanical energy at the turbine shaft.





IMPOUNDMENT

Uses a dam to store river water in a reservoir. Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity.



DIVERSION

Channels a portion of a river through a canal and/or a penstock to utilize the natural decline of the river bed elevation to produce energy.



PUMPED STORAGE

Stores energy by pumping water from the lower reservoir to an upper reservoir. During periods of high electrical demand, the water is released back to the lower reservoir and turns a turbine, generating electricity.



Three Gorges Dam, China

- Built in 17 years by over 40,000 workers
- Intended to provide protection from floods
- length 2335 m, maximum height 185 m
- Generates up to 22,5 GW of electricity

Pros and cons of hydropower



Flexible

Cost-competitive energy source

Other uses

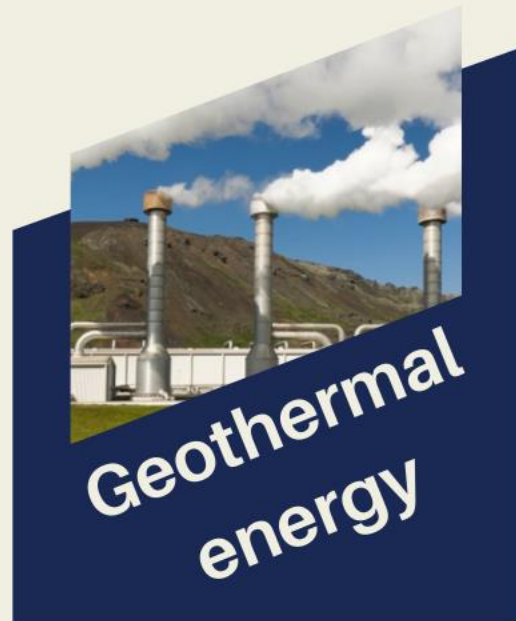


High upfront capital costs

Ecosystem damage

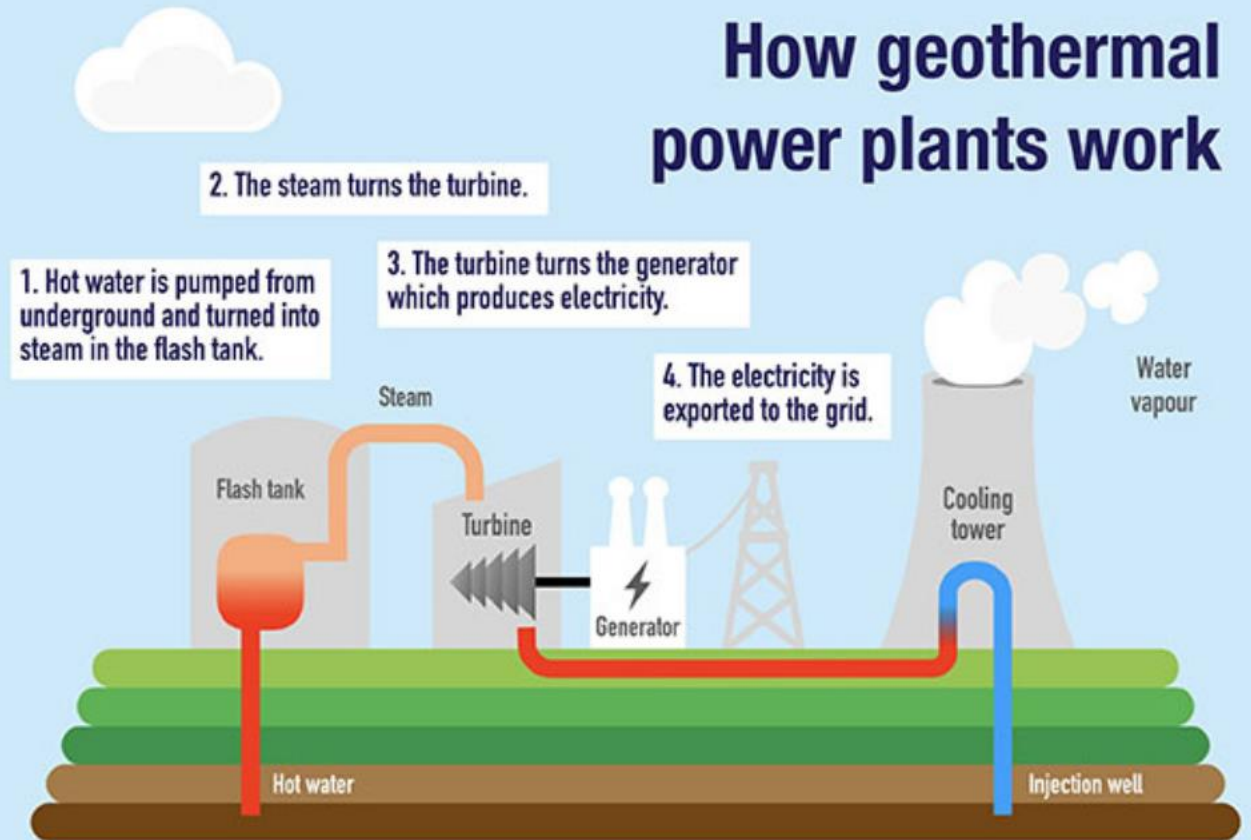
May lead to droughts

Relocation due to risk of floods



Geothermal energy utilizes the accessible thermal energy from the Earth's interior. Heat is extracted from geothermal reservoirs using wells or other means.

How geothermal power plants work

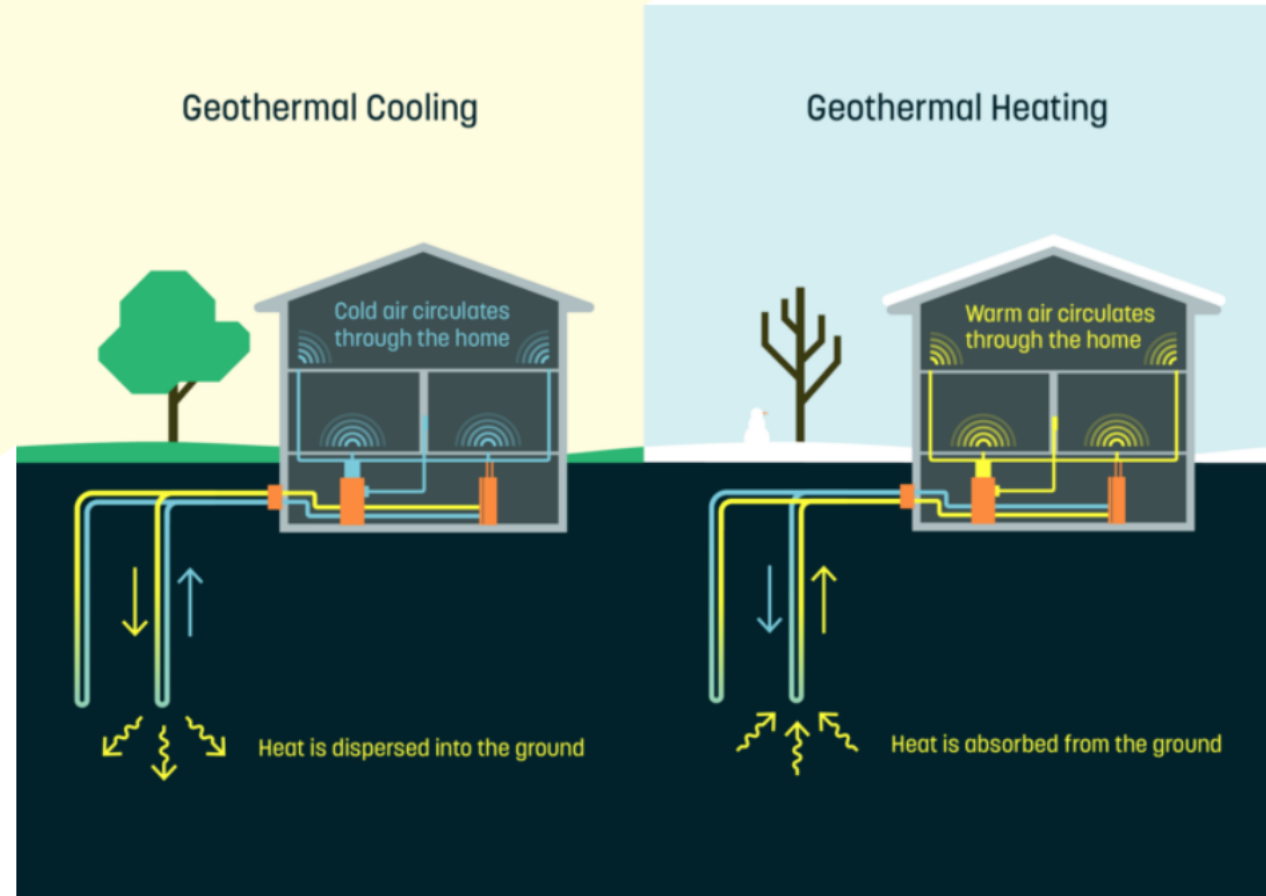


Geothermal Energy For Homes

The temperature of the earth remains constant around 35 to 50 degrees.

The earth is a huge solar "battery", the ultimate reliable and renewable resource.

The pipes can be buried under the ground horizontally or vertically, depending on the characteristics of the site.



Pros and cons of geothermal energy



Small land footprint

Usable for large and small-scale installations

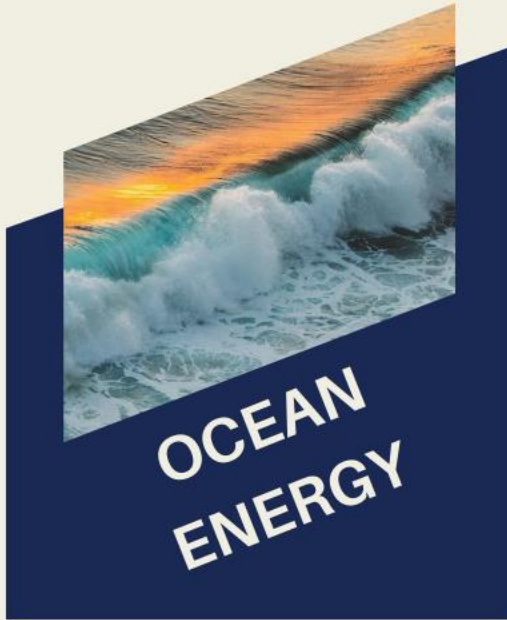
Geothermal infrastructure has longevity



Location dependent

High initial costs

Can lead to surface instability



The oceans contain a huge amount of energy. Ocean energy refers to all forms of renewable energy derived from the sea.

- Wave energy could meet all the world's electricity needs.
- But technologies to harness wave energy are still developing (*Many countries - including Australia, China, Denmark, Italy, Korea, Portugal, Spain, the United Kingdom and the US - are currently developing wave energy.*)
- The theoretical resource potential of ocean energy ranges from 20,000 TWh to 80,000 TWh of electricity generation per year, representing 100% to 400% of the current global demand for electricity.



Tidal and curenents

Energy from height changes in sea level or movement of ocean water volumes



Thermal energy

Solar energy that is absorbed by the oceans



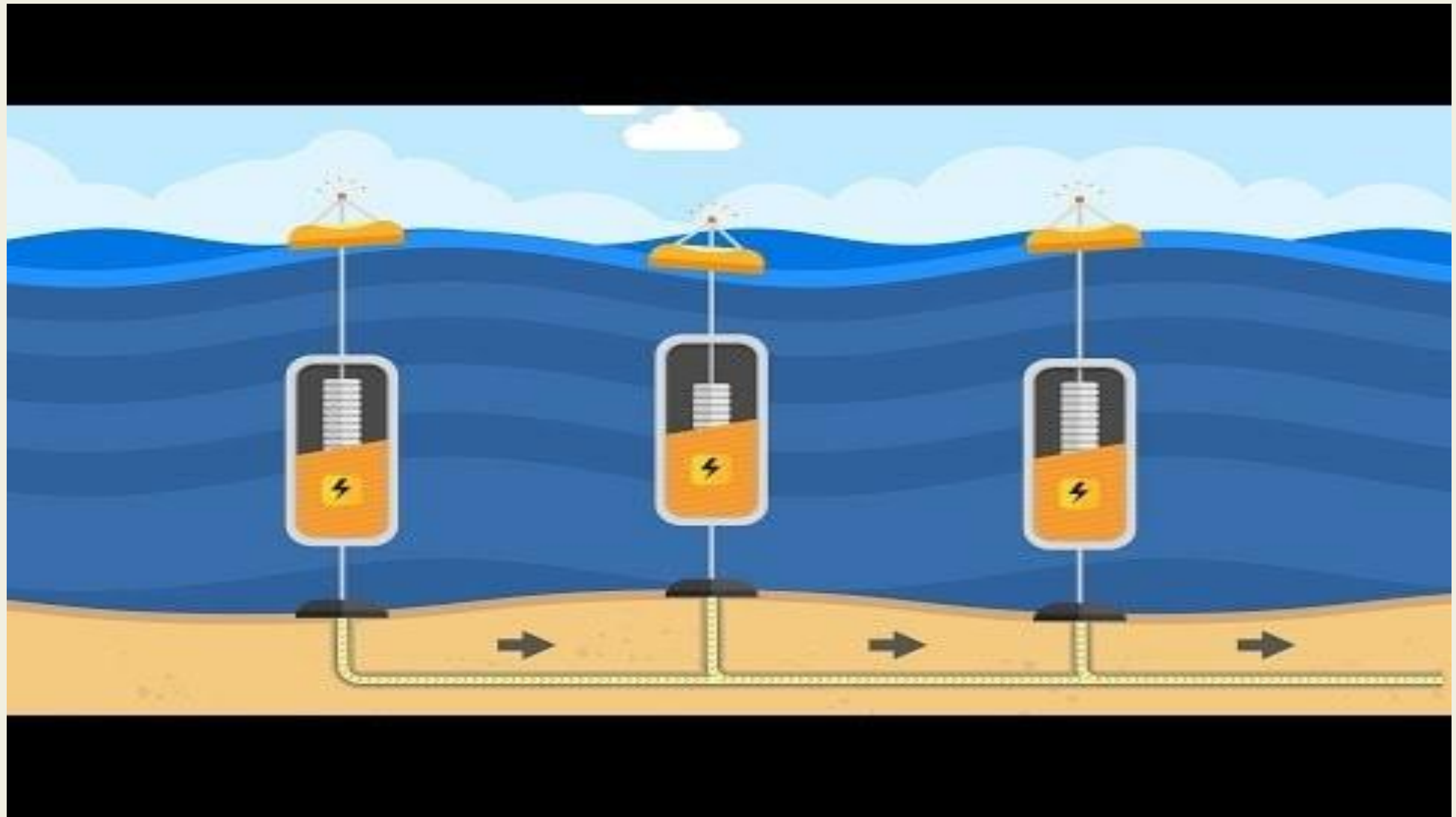
Salinity gradient

Energy that is released when freshwater and seawater mixes



Waves

Kinetic and potential energy associated with ocean waves



Pros and cons of ocean energy



Widely Available

Variety of Ways To Harness

Easily Predictable



Suitable to Certain Locations

Effect on Marine Ecosystem

Weak Performance in Rough Weather

Energy comparison

SOURCE OF ENERGY	FOSSIL FUEL	ALTERNATIVE	RENEWABLE	EMISSIONS	LAND USE
Biomass	✗	✓	✓		
Coal	✓	✗	✗		
Hydro	✗	✓	✓*		
Natural gas	✓	✗	✗		
Nuclear	✗	✓	✗		
Petroleum	✓	✗	✗		
Solar	✗	✓	✓		
Wind	✗	✓	✓		

(Reference: World 101, Global Era Issues)

Conclusion

- Compare various types of energy
- Identify problems associated with energy production
- Identify how CO₂ is linked to climate change
- Describe the mechanisms of renewable energy sources



PART 1

INTRODUCTION



PART 2

ENVIRONMENTAL
PROBLEMS



PART 3

RENEWABLE ENERGY

*Thank
You*

References

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