

Alternative Energy

Chapter 1: Introduction to Alternative Energy

by

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Chapter Description

- Expected Outcomes
 - Describe the definitions and the concept of alternative energy
 - List several types of alternative energy technologies
 - Explain the advantages and disadvantages of alternative energy

Alternative Energy



- **Alternative energy**
Any source of energy that is alternative to the fossil fuel.
- These alternatives energy are intended to address all issues about fossil fuels.



CRUDE OIL

FOSSIL FUEL



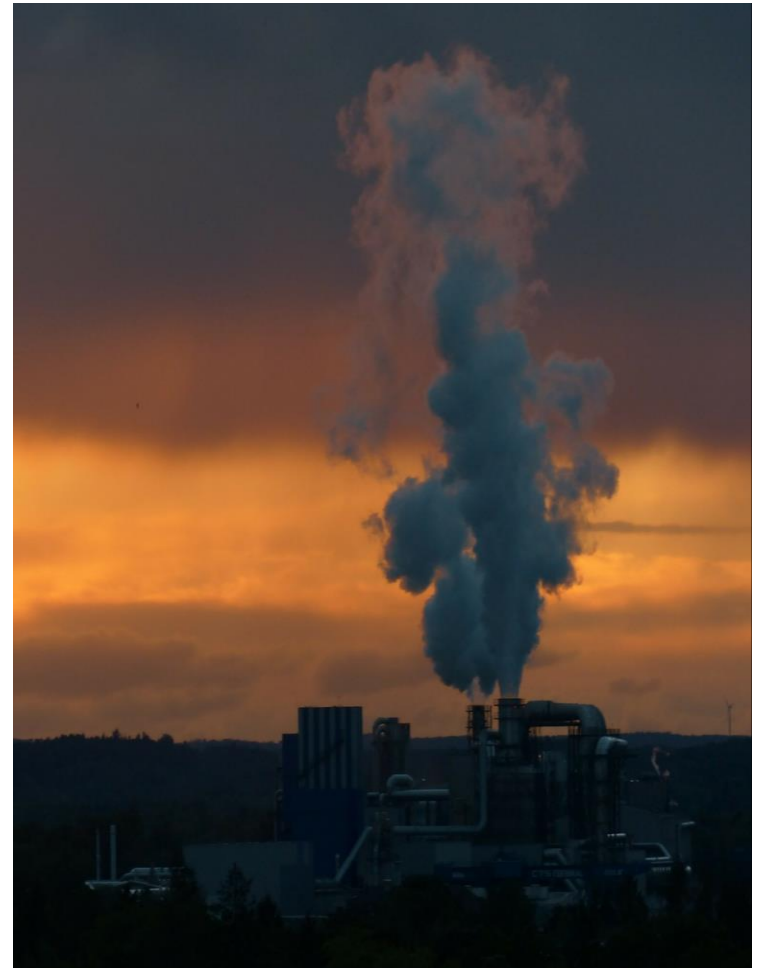
COAL



NATURAL GAS

10 Things About Fossil Fuel

1. Three main types: oil; coal; natural gas
2. Take millions of years to form
3. Cannot be replaced once used: non-renewable
4. Found under the ground
5. Can be difficult to get
6. Burnt to give off heat
7. Burnt in power stations to generate electricity
8. Give off carbon dioxide when burnt
9. They are the main cause of air pollution
10. One day they could run out



Types of Alternative Energy

SOLAR

HYDROGEN

BIOMASS

GEO THERMAL

WIND

WAVE

TIDAL

HYDRO

NUCLEAR

Types of Alternative Energy

ALTERNATIVE ENERGY

VS

RENEWABLE ENERGY

Renewable Energy (RE)

- **Definition:** Energy that comes from resources which are naturally replenished on a human timescale such as wind, sunlight, heat, rain, tides and waves.
- RE replaces the conventional fuels in four distinct areas: electricity generation, motor fuels, hot water/space heating and rural (off-grid) energy services.

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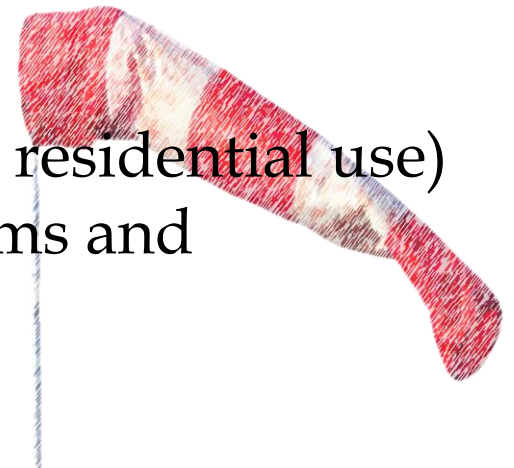
Non-
renewable

Solar Energy

- ✓ Direct conversion of sunlight into electricity
- ✓ Simple in design and require very little maintenance.
- ✓ Can be constructed as standalone systems to give outputs from microwatts to grid-connected system of megawatts scale.
- ✓ Application:
 - ✓ Off-grid (stand-alone system) for remote area
 - ✓ Central power plants
 - ✓ Grid connected residential or commercial buildings
 - ✓ Remote communication systems

Wind Energy

- ✓ The conversion of wind energy into electricity using wind turbines.
- ✓ The power is extracted by allowing it to blow past moving blades.
- ✓ Amount of power is dependent on:
 - ✓ rotor size
 - ✓ wind speed.
- ✓ Range from small four hundred watt (for residential use) to several megawatt machines (wind farms and offshore).



Tidal / Wave Energy

- ✓ Produced by the surge of ocean waters during the rise and fall of tides.
- ✓ Potential source of RE because tides are steady and predictable
- ✓ Hydropower that converts the energy obtained from tides into useful forms of power, mainly electricity.
- ✓ High cost and limited availability of sites



Geothermal Energy

- ✓ The thermal energy that is generated and stored in the earth
- ✓ The source is sustainable
- ✓ Heat energy is derived from the earth from hot springs, hydrothermal circulation or magma conduits
- ✓ Spin the turbines to generate electricity
- ✓ Disadvantage - this energy is diffuse and available in certain location



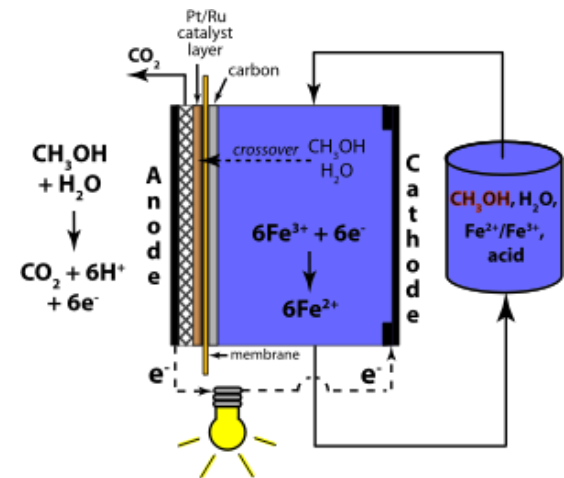
Biomass Energy



- ✓ The most widely used form of RE sources
- ✓ Use of organic materials and convert it into other forms of energy
- ✓ Source of heating for electric power generation.
- ✓ Biomass materials: such as wood, agricultural residues and animal and human waste.

Hydrogen Fuel Cell

- ✓ The electricity is generated through an electrochemical process
- ✓ No moving parts: quiet and highly efficient power generation
- ✓ Chemical energy comes from hydrogen contained in various types of fuels:
 - ✓ Pure hydrogen
 - ✓ Hydrocarbon fuels (eg: biogas, natural gas, ethanol, methanol, etc.)



Advantages of Alternative Energy

1. Renewable Sources
2. Less maintenance
3. Low operation cost, free energy
4. No waste product and pollution
5. Economic benefits, tourism

Disadvantages of Renewable Energy

- Require more energy facilities or land use
- May not be available when we need it:
 - Daily and seasonal variation
 - To smooth out supply need energy storage systems
 - Not equally available in all locations
- High installation cost



Thank
You