



**Bharath**  
INSTITUTE OF HIGHER EDUCATION AND RESEARCH  
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**BHARATH INSTITUTE OF SCIENCE AND TECHNOLOGY**  
No.173, Agharam Road, Selaiyur, Chennai - 600 073.

## BEE048 – RENEWABLE ENERGY SOURCES

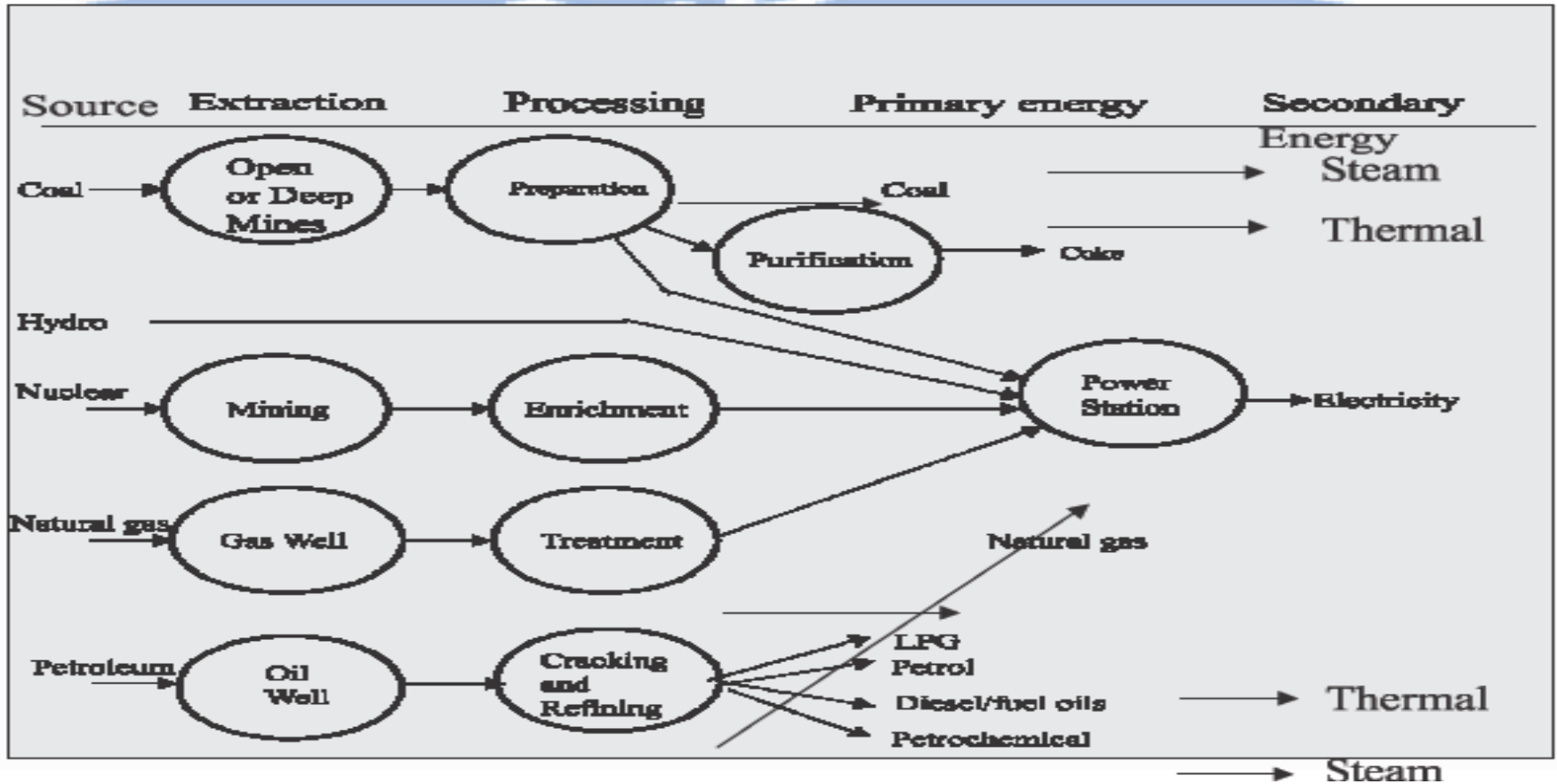


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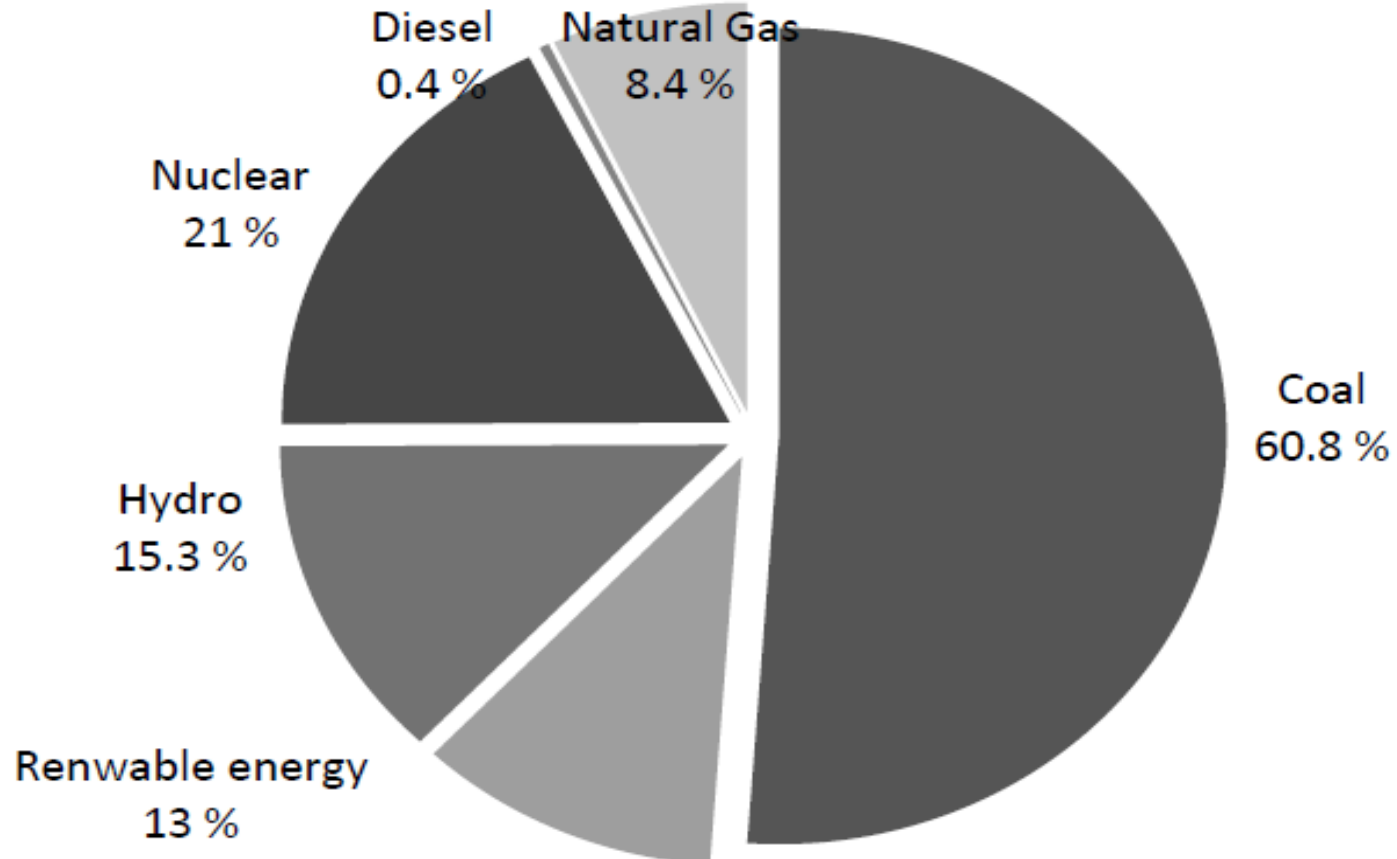
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BIHER .**

# Introduction Of Renewable Energy Sources

## Major primary and secondary sources



# *Global Energy use by Source*



# *Commercial Energy and Non-Commercial Energy*

## *Commercial Energy:*

- The energy sources that are available in the market for a definite price are known as commercial energy.
- By far the most important forms of commercial energy are electricity, coal and refined petroleum products.

Examples: Electricity, lignite, coal, oil, natural gas, etc..

## *Non-Commercial Energy:*

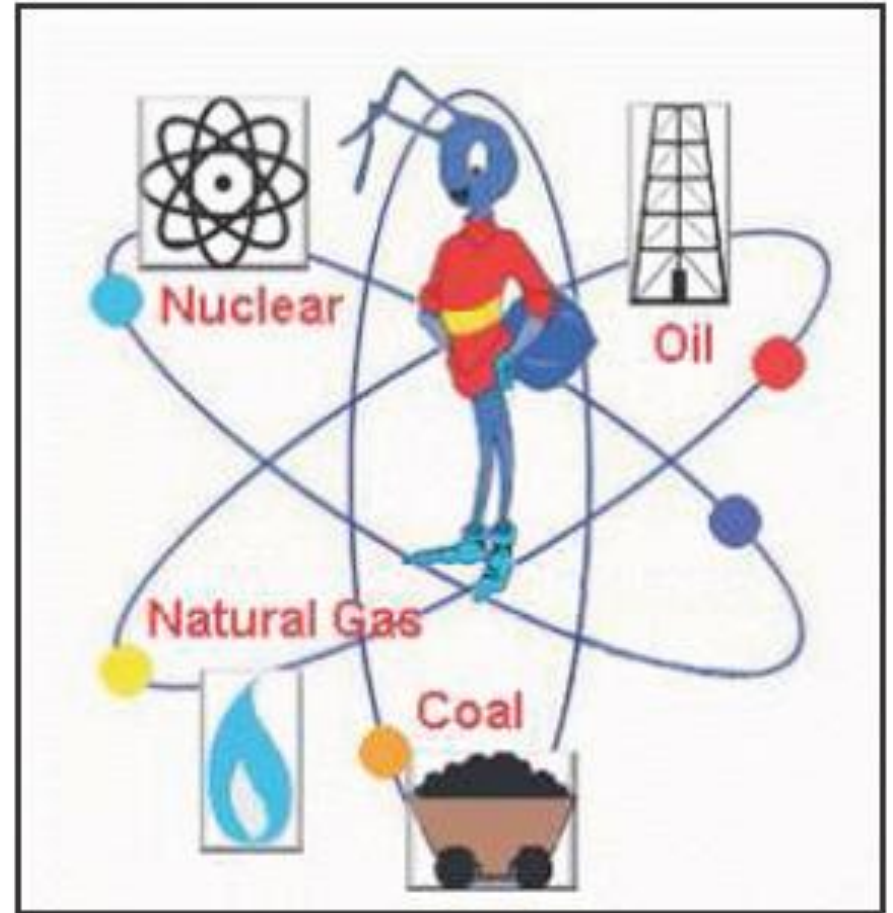
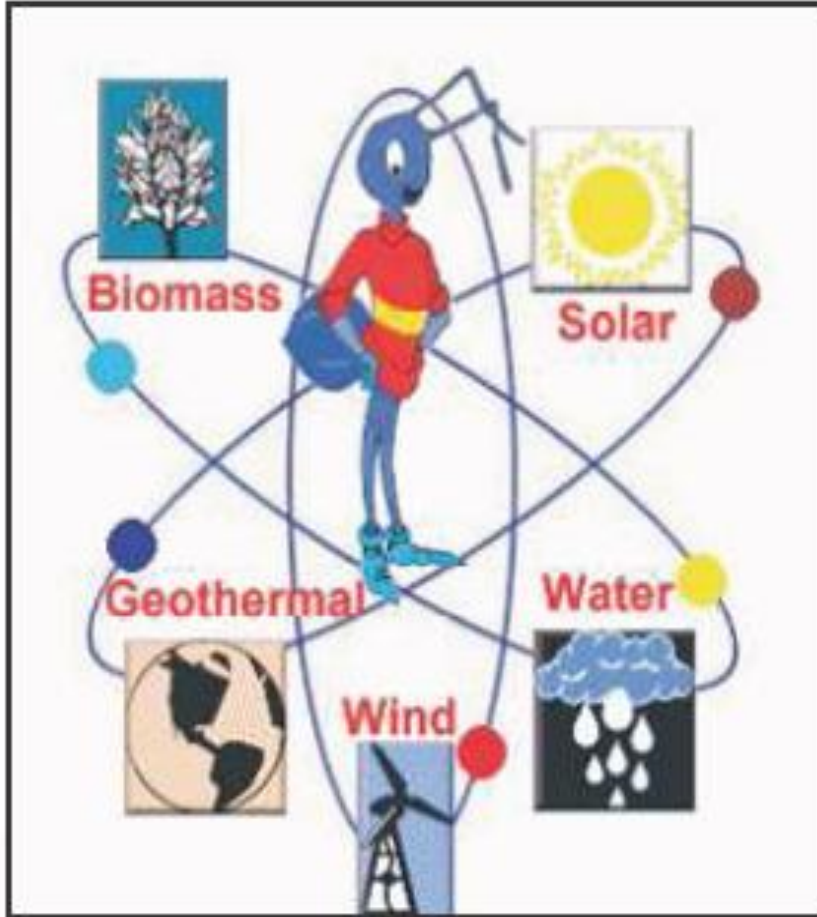
- The energy sources that are not available in the commercial market for a price are classified as non-commercial energy.
- Non-commercial energy sources include fuel such as firewood, cattle dung and agricultural waste.

Examples: Firewood, agro waste in rural areas, solar energy for water heating, electricity generation, for drying grain, fish and fruits, etc...

# *Renewable energy and Non-renewable energy*

- Renewable energy is energy obtained from sources that are essentially inexhaustible. Examples of renewable resources include wind power, solar power, geothermal energy, tidal power and hydroelectric power. The most important features of renewable energy is that it can be harnessed without the release of harmful pollutants.
- Non-renewable energy is the conventional fossil fuels such as coal, oil and gas, which are likely to deplete with time.

# Renewable and Non-renewable energy



## *Sector wise Energy Consumption Pattern*

Sectors	International Level	National Level	State Level
Industry	51.7%	29%	25%
Transport	26.6%	30%	0.6%
Domestic	13.9%	27%	49%
Commercial	7.8%	9%	17%
Others	0	5%	8.4%

# Advantages And Disadvantages Of Energy Sources

Energy resource	Advantages	Disadvantages
<b>Fossil fuels</b>	<p>Provide a large amount of thermal energy per unit of mass</p> <p>Easy to get and easy to transport</p> <p>Can be used to generate electrical energy and make products, such as plastic</p>	<p>Nonrenewable</p> <p>Burning produces smog</p> <p>Burning coal releases substances that can cause acid precipitation</p> <p>Risk of oil spills</p>
<b>Nuclear</b>	<p>Very concentrated form of energy</p> <p>Power plants do not produce smog</p>	<p>Produces radioactive waste</p> <p>Radioactive elements are nonrenewable</p>
<b>Solar</b>	<p>Almost limitless source of energy</p> <p>Does not produce air pollution</p>	<p>Expensive to use for large-scale energy production</p> <p>Only practical in sunny areas</p>



**Water**

Renewable

Does not produce air pollution

Dams disrupt a river's ecosystem available only in areas that have rivers

**Wind**

Renewable

Relatively inexpensive to generate

Does not produce air pollution

Only practical in windy areas

**Geothermal**

Almost limitless source of energy

Power plant require little land

Only practical areas near hot spots

Waste water can damage soil

**Biomass**

Renewable

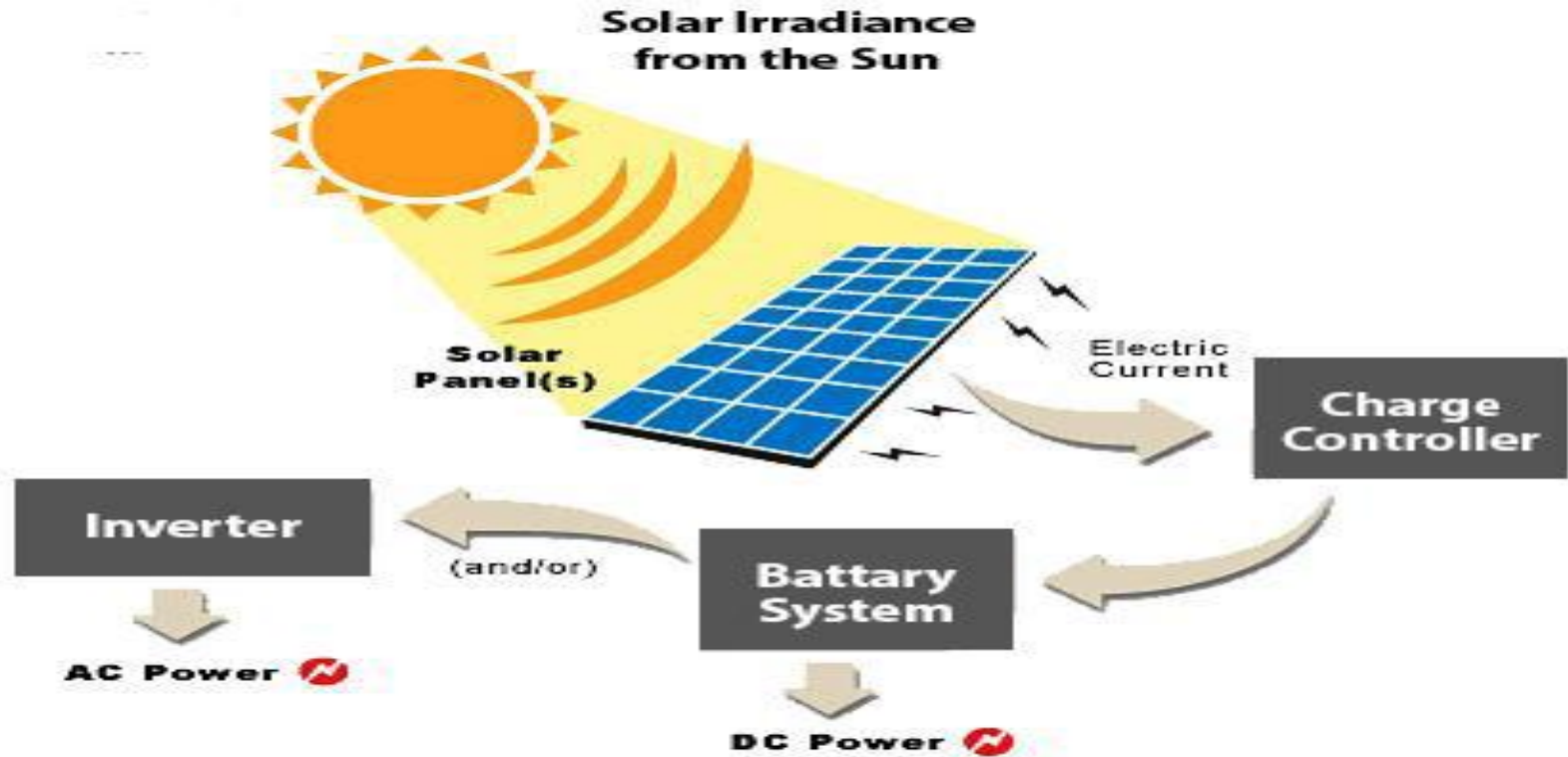
Requires large area of farmland

Produces smoke

# *Solar Energy Source*

- Modern residential solar power systems use photovoltaic (PV) to collect the sun's energy. “Photo” means “produced by light,” and “voltaic” is “electricity produced by a chemical reaction.”
- Commercial residential PV modules range in power output from 10 watts to 300 watts, in a direct current. A PV module must have an inverter to change the DC electricity into alternating current energy in order to be usable by electrical devices and compatible with the electric grid.

# Solar Energy Source



# *Solar energy Applications*

1. Heating and cooling of residential building.
2. Solar water heating.
3. Solar drying of agricultural and animal products.
4. Salt production by evaporation of seawater.
5. Solar cookers.
6. Solar engines for water pumping.
7. Solar Refrigeration.
8. Solar electric power generation.
9. Solar photo voltaic cells, which can be used for electricity.
10. Solar furnaces.

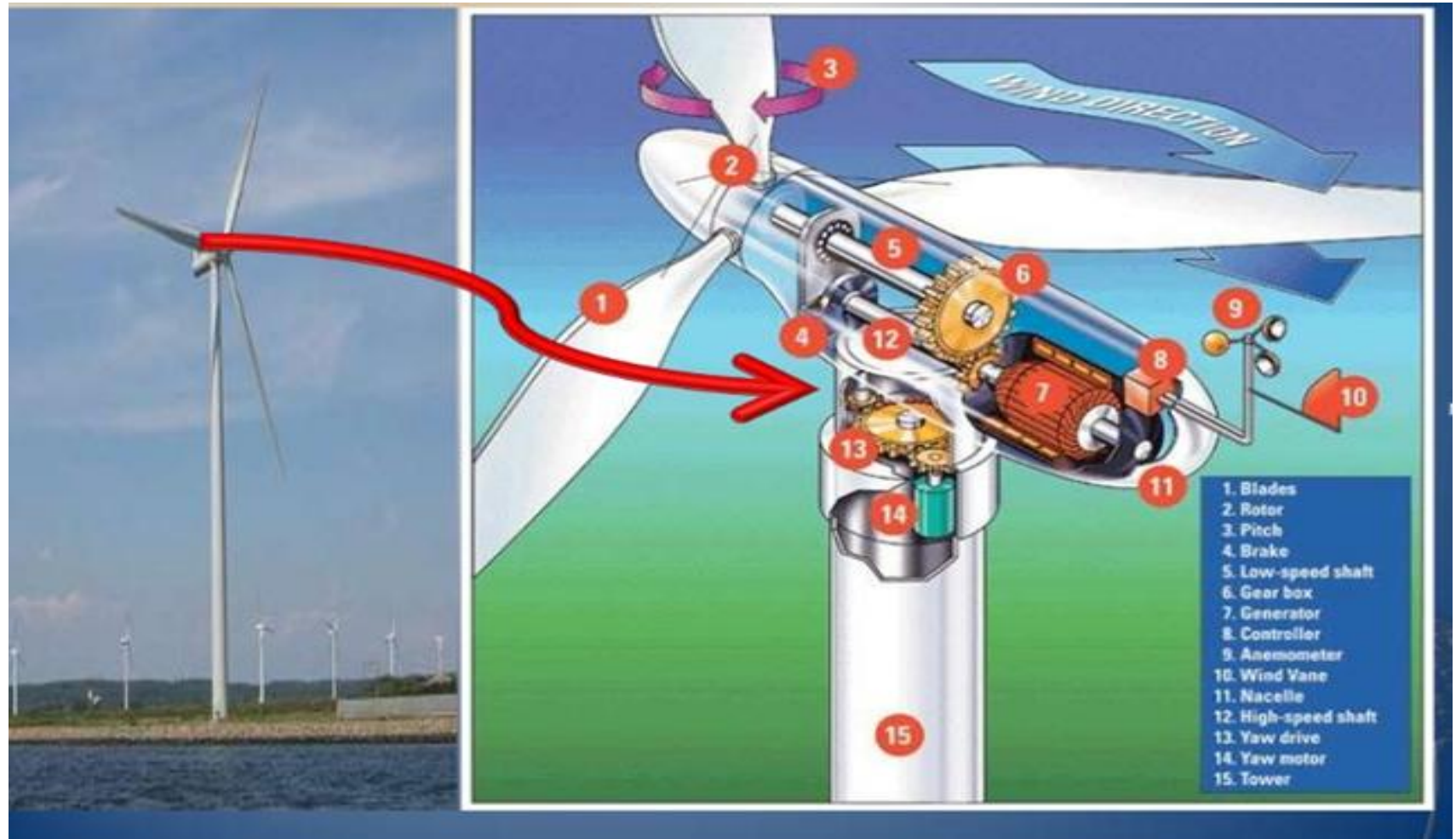
# Wind energy source



## *Wind energy source*

- Wind energy is a free, renewable resource, so no matter how much is used today, there will still be the same supply in the future. Wind energy is also a source of clean, non-polluting, electricity. Unlike conventional power plants, wind plants emit no air pollutants or green house.
- It's a clean fuel source. Wind energy doesn't pollute the air like power plants that rely on combustion of fossil fuels, such as coal or natural gas, which emit particulate matter, nitrogen oxides, and sulfur dioxide—causing human health problems and economic damages' gases.

# Wind Energy Electricity Generation



# *Geothermal energy Source*

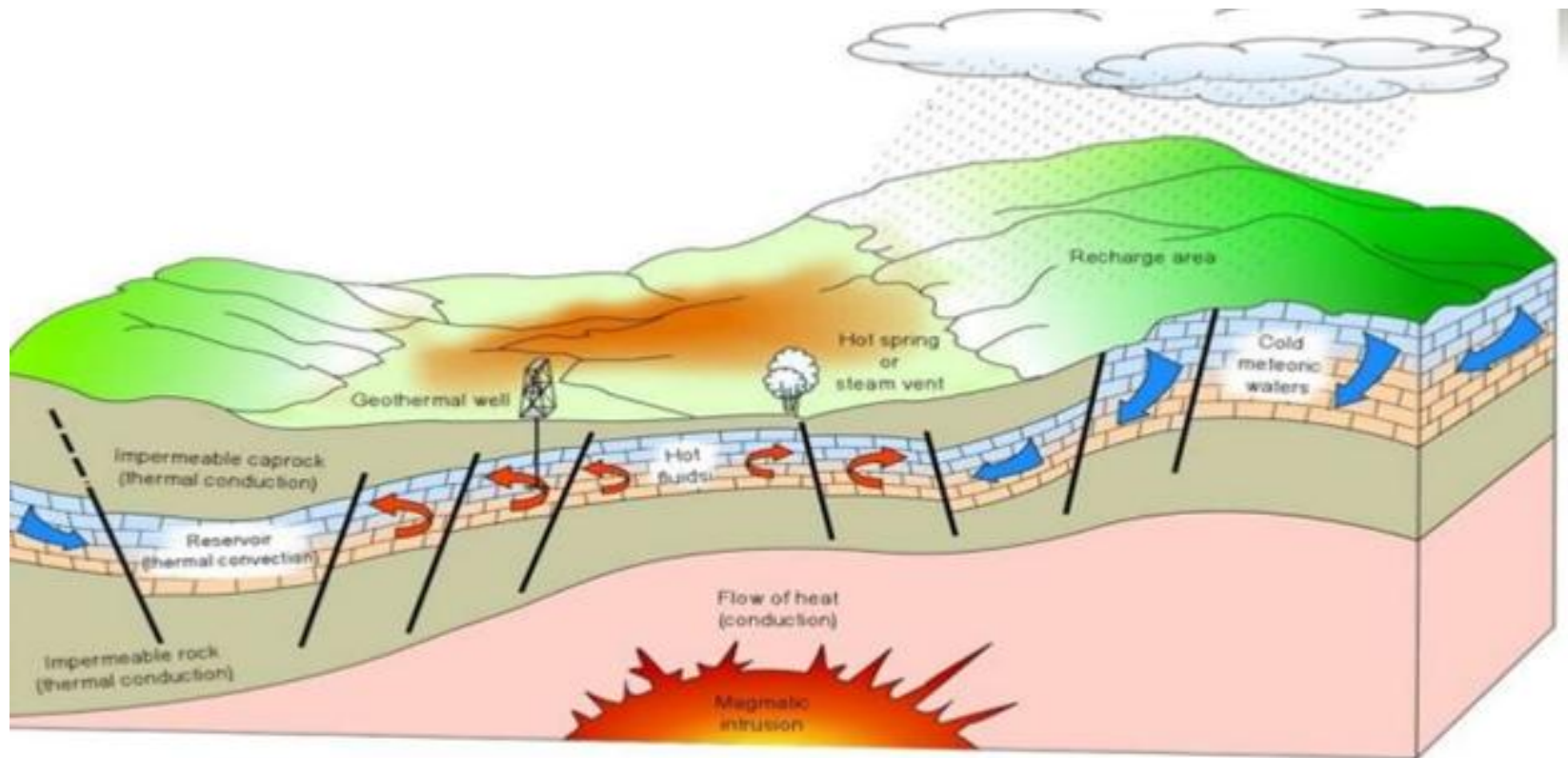
- Geothermal energy is heat from within the Earth.
- We can recover this heat as steam or hot water and use it to heat buildings or generate electricity.
- It is a natural part of the energy flow within the Earth's depths.
- Most of the commercial-grade production geothermal energy is harvested along localized “geothermal systems”, where the heat flow is near enough to the surface that hot water or steam is able to rise either to the surface, or to depths that we can reach by drilling.



# *Hot Water Springs Form Due To Geothermal Energy Of The Earth*



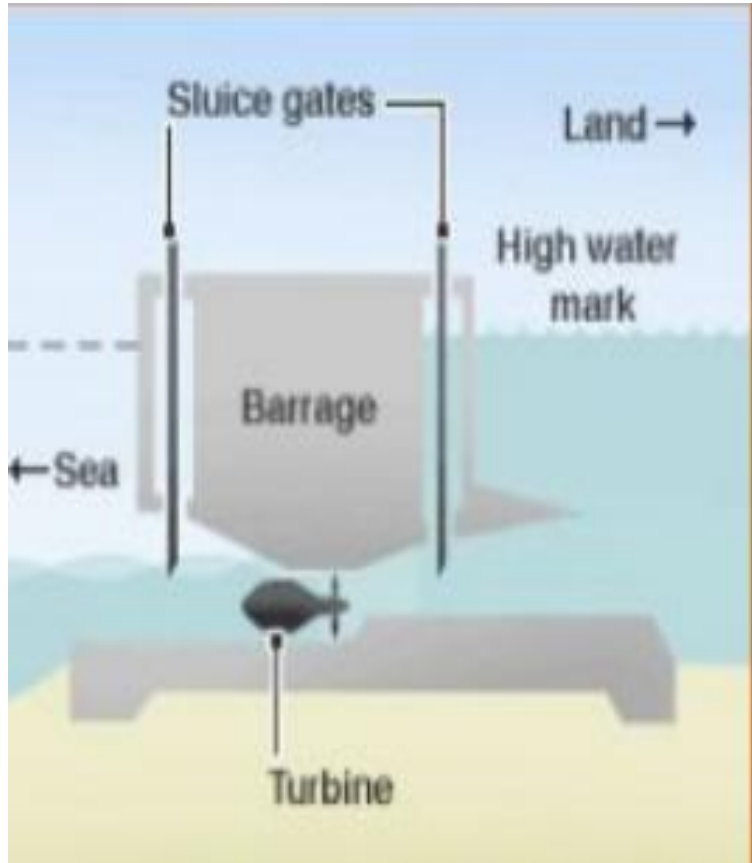
# Schematic Representation Of An Ideal Geothermal System



# *Tidal power*

- Tidal power or tidal energy is a form of hydropower that converts the energy obtained from tides into useful forms of power, mainly electricity.
- Tides are more predictable than the wind and the sun.
- Among sources of renewable energy, tidal energy has traditionally suffered from relatively high cost and limited availability of sites with sufficiently high tidal ranges or flow velocities, thus constricting its total availability.

# *Tidal power*



# *Biomass Energy*

- Biomass is organic material that comes from plants and animals, and it is a renewable source of energy.
- Biomass contains stored energy from the sun. Plants absorb the sun's energy in a process called photosynthesis. When biomass is burned, the chemical energy in biomass is released as heat

# *Types of biomass*



Wood fuel



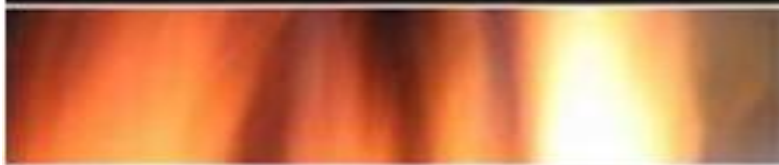
Rubbish



Alcohol fuels



Crops



Landfill gas

# Schematic Diagram For Biomass Energy



**THANK YOU**