

Applications of Hydrogen energy

- * Hydrogen is a reagent, used in many industries including chemicals, textile fiber manufacturing, glass, electronics & metallurgy.
- * It is also used as a fuel for rocket launchers.
- * In electronics, hydrogen is used as a carrier gas, for the manufacture of electronic components.
- * Hydrogen is used in industries for many applications.
- * Hydrogen is used in metallurgy for heat treatment process to produce mechanical parts or to alter their properties.
- * Hydrogen is used during fuel refining to remove this sulphur via a process of desulphurization.
- * Atomic hydrogen welding (AHW) is a type of arc welding which utilizes a hydrogen environment.
- * A mixture of hydrogen & nitrogen is used to prevent oxidation in flat glass production.
- * As an efficient reducing & etching agent, hydrogen is used to create semiconductors, LEDs displays.
- * Hydrogen gas is used as a therapeutic gas for a number of different diseases.
- * Hydrogen fuel cell:
Hydrogen fuel cell uses hydrogen as a fuel in an electrochemical process that combines H_2 & O_2 to produce electrical energy with water & heat as the only by-product.

a) Stationary power sources.

- These are used to power office build, data centres, grocery stores and off-grid telecommunication towers.

- It is used as a part of Uninterruptible power Supply (UPS) System, where Continuous uptime is Critical.

b) Hydrogen fuel cell vehicles (FCVs)

- * The heat produced by the hydrogen fuel cell can be used for space and water heating (or) industrial process.

- * Hydrogen fuel cells power clean trucks, fork lifts etc.

- * Hydrogen power is being considered for transportation applications including hydrogen fuel cell buses.

- * Hydrogen fuel cell trains have now appeared.

- * Hydrogen fuel cells have found a number of marine applications.

Advantages:

- Hydrogen is readily available.
- It does not produce harmful emissions.
- It is environmentally friendly.
- It can be used as a fuel in rocket.
- It is renewable.
- It reduces carbon foot prints.
- It is energy efficient and more powerful than fossil fuels.
- charging time is fast.
- It does not make noise → visual pollution
- It can be used for long time.

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Disadvantages:

- it is expensive
- it is difficult to store
- it is highly inflammable
- infra-structure
- Regulatory issues.

Applications of ocean energy resources:

Tidal energy is a form of ocean energy that is harnessed by converting tide energy into useful forms of power.

Tidal energy is obtained from the rise and fall of tides.

Ocean waves:

Potential energy associated with ocean waves can be harnessed using modular technologies.

Temperature gradients:

Difference in thermal energy between sea surface and deep water can be harnessed by Ocean Thermal Energy Conversion process.

Salinity gradient:

At the mouth of rivers, where fresh water mixes with salt water, energy associated with the salinity gradient can be harnessed using pressure retarded reverse osmosis process and associated conversion technologies.

Ocean wave energy Convertors:

These are the technology used to trap the mechanical energy of the wave to convert it to electrical power.

Oscillating bodies

Oscillating waves uses hydraulic motors (or) electrical generators as a power take off system

Overlapping wave energy converters

The overlapping wave energy converters using the low head hydraulic turbines, converts the potential energy formed by the height of accumulated water ~~on~~ over the wave surface to electrical power

Ocean Thermal Energy (OTE)

The temperature difference, between the surface level & deeper level of the tropical oceans can be utilized to generate electricity

Advantages

- Ocean energy is cheaper & efficient
- It is environment-friendly.
- The source of ocean energy is inexhaustible
- Operational & maintenance costs are low.
- Tidal energy sources can last for decades.
- It protects coastal floodings due to the

Stability of rock armor.

Disadvantages:

- * Storage capacity is required
- * Construction of tidal power plant is expensive & requires high capital investment.
- * Maintenance & equipment repairing is a challenge
- * Negative influence on marine life forms.
- * Environmental problems like habitat change arises.

Applications of Tidal Energy Conversion

- * Electricity can be generated from the tidal energy.
- * Tidal energy is used in grinding mills for the mechanical crushing of grains.
- * Tidal energy is used to rotate a turbine.
- * Tidal energy is used to store energy in a hydro-electric dam, acting as large energy storage.
- * Tidal barrages and reservoirs can be modified to store energy.
- * Tidal barrages are capable of preventing damages to the coast during high storms.
- * Tidal barrages also help to create easy transport between the two arms of an estuary.

Advantages:

- ✓ It is environment friendly.
- ✓ It is cheaper & efficient.
- ✓ Low operating and maintenance costs.
- ✓ The source of energy is inexhaustible.
- ✓ protects coastal flooding.
- ✓ Tidal energy sources can last for decades.
- ✓ power output is highly predictable.

Disadvantages:

- * Location limited.
- * Negative influence on marine life forms.
- * Storage capacity is required.
- * Environment problems, like habitat change, arises.
- * Equipment repairing and maintenance is difficult.
- * Construction of tidal power plants is expensive and requires high capital investment.