



## Ocean Energy as Renewable Energy

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The **Ministry of New and Renewable Energy** has declared Ocean Energy as renewable energy.

It has clarified to all the stakeholders that energy produced using various forms of ocean energy such as tidal, wave, ocean thermal energy conversion among others shall be considered as renewable energy and shall be eligible for meeting the non-solar **Renewable Purchase Obligations (RPO)**.

### Renewable Purchase Obligation

- This is a mechanism by which the State Electricity Regulatory Commissions are obliged to purchase a certain percentage of power from renewable energy sources.
- RPO is being implemented throughout the country to create demand for renewable energy.

### Potential

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- According to MNRE, the total identified potential of tidal energy is about 12,455 MW, with potential locations identified at **Khambhat & Kutch regions (Gujrat)** and large backwaters, where barrage technology could be used.
- The total theoretical potential of wave energy in India along the country's coast is estimated to be about 40,000 MW.
- **Ocean Thermal Energy Conversion (OTEC)** has a theoretical potential of 180,000 MW in India subject to suitable technological evolution.
- The sector has the potential to grow, fuelling economic growth, reduction of carbon footprint and creating jobs not only along the coasts but also inland along its supply chains.

### Ocean Energy

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- Oceans cover 70% of the earth's surface and represent an enormous amount of energy in the form of wave, tidal, marine current and thermal gradient. India has a long coastline with the estuaries and gulfs.
- Ocean energy is used in the form of Tidal, Wave, Current Energy and Ocean Thermal Energy.
  - **Tidal Energy:** The tidal cycle occurs every 12 hours due to the gravitational force of the moon. The difference in water height from low tide and high tide is stored in the form of potential energy. Similar to traditional hydropower generated from dams, tidal water can be captured in a barrage across an estuary during high tide and forced through a hydro-turbine during low tide.
    - The capital cost for tidal energy power plants is very high due to the high construction cost and high power purchase tariff.
    - To capture sufficient power from the tidal energy potential, the height of high tide must be at least five meters (16 feet) greater than low tide.
    - The Gulf of Cambay and the Gulf of Kutch in Gujarat on the west coast have few ideal locations in the country where potential exists.
  - **Wave Energy:** Wave energy is generated by the movement of a device either floating on the surface of the ocean or anchored to the ocean floor.
    - Wave conversion devices that float on the surface have joints hinged together that bend with the waves. This kinetic energy pumps fluid through turbines and creates electricity.
    - Stationary wave energy conversion devices use pressure fluctuations produced in long tubes from the waves swelling up and down.
  - **Current Energy:** Marine current is ocean water moving in one direction. Few examples being the Gulf Stream, North Atlantic Drift, etc. Tides also create currents that flow in two directions.
    - Kinetic energy can be captured from the Gulf Stream and other tidal currents with submerged turbines.
  - **Ocean Thermal Energy Conversion (OTEC) :** Ocean Thermal Energy Conversion uses ocean temperature differences from the surface to depths lower than 1,000 meters, to extract energy. A temperature difference of only 20°C can yield usable energy.

**Source: THBL**