GEC1010
AY22/23 Sem 2
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05. Hydro power

Ocean vs River

River

1. Hydroelectricity

Ocean

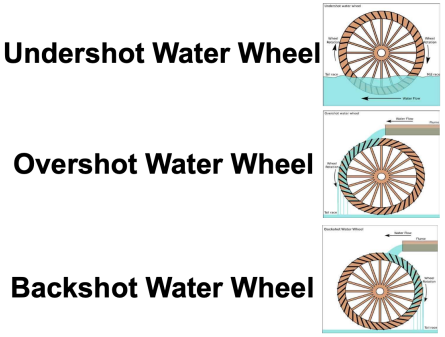
1. Tidal power
2. Wave power
3. Ocean thermal

Water wheels

Water mills

- Ancient application for replacing physical labour
- Replaced with water turbines for energy generation

Types of water wheels



- Undershot
  - Vertically mounted with water flowing at the bottom of the wheel
  - Cheapest and least efficient
- Overshot
  - Falling water on the top of the wheel in direction of rotation
  - Use all water flow for power production
  - Does not require rapid flow of water
  - Uses the difference in weight between the 2 sides of the wheel to turn
- Backshot
  - Introduced behind the apex of the wheel
  - Water flows opposite the direction of rotation
  - Continues to function even when water in wheel put rises beyond height of axle
  - Technique useful for streams that experience extreme seasonal variations in flow

Types of Hydro Power

- Dam based
- Run of the river plants(diversion)
- Pumped storage technology
- Damless hydro power

Principles of power generation

Production of electricity by using gravitational force of falling water
$P = \eta\rho ghQ$
η = efficiency, ρ = density of water, Q = Volume of water flowing per second on turbine, h = Vertical distance between turbine and water surface