Wave power

The friction of winds blowing over water creates waves. The kinetic energy of the vertical movement of the water can be harnessed.

Locational constraints

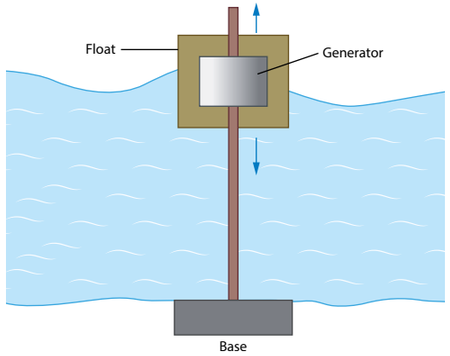
The kinetic energy of the waves is greatest where:

- mean wind velocities are high and winds are consistent in strength and direction to allow the wave height to increase;
- there is a long 'fetch' – distance of open water over which waves can build up.

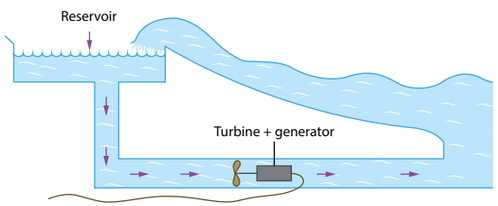
Harnessing wave power

A wide variety of technologies have been proposed or demonstrated to use the vertical movement of water caused by waves. Competition with well-established energy technologies has delayed their development.

Point absorber wave power



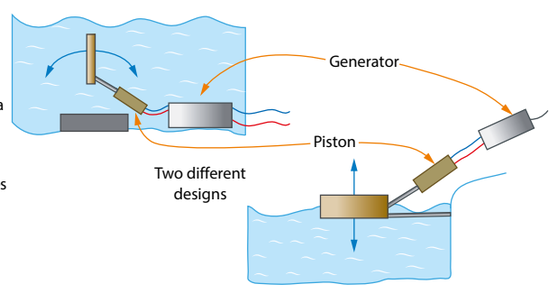
Overtopping device wave power



Oscillating wave surge converter

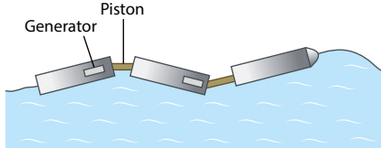
Oscillating wave surge converter

As waves pass, water moves both horizontally and vertically, producing a cycle. The oscillating horizontal or vertical movement pushes a flat plate which moves pistons to pump fluid over a turbine to generate electricity. e.g. Wave Clapper

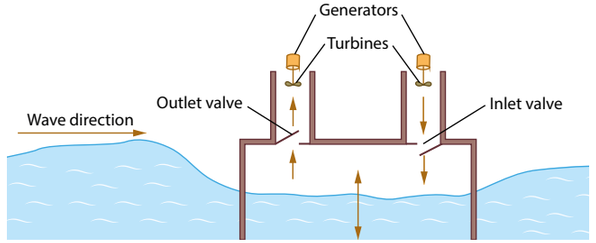


- **Point absorber:** point absorbers have a floating structure which rises and falls as waves pass. This is attached to a non-moving base located on the seabed or in static deep water. The movement of the floating part turns a generator, for example, Power Buoy.
- **Overtopping/Terminator device:** breaking waves force water into a storage reservoir which is above sea level. The water flows back to the sea passing through a turbine which generates electricity. Sea walls may be used to increase the height of the waves and therefore the volume of water that enters the reservoir, for example, Wave Dragon.
- **Oscillating Wave Surge Converter:** as waves pass, water moves both horizontally and vertically, producing a cycle. The oscillating horizontal or vertical movement pushes a flat plate which moves pistons to pump fluid over a turbine to generate electricity. For example, Oyster.
- **Surface attenuator wave power:** this is a hinged floating device. As waves pass, the moving sections push and pull pistons which force a fluid over a turbine, generating electricity, for example, Pelamis.
- **Oscillating water column wave power:** the rise and fall of water, as waves pass, forces water up and down in a submerged chamber. The air that is forced in and out flows over turbines, generating electricity, for example, Islay Limpet.

An oscillating wave surge converter built by Eco Wave Power



Surface attenuator wave power



Oscillating water column wave power

Pistons between the sections of Pelamis

Design problems

- Equipment must be able to withstand storms and corrosion.
- It can be difficult to anchor equipment off stormy coasts or in deep water.
- It may be expensive to transport electricity from isolated areas, where wave energy can be harnessed, to the consumers.

Environmental impacts

Wave power systems have very limited environmental impacts. As with all energy systems, equipment manufacture and installation has environmental impacts. The anchoring of floating systems affects the seabed but can also create new habitats.