

Wave power



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Ocean waves are caused by the wind as it blows across the sea.

Waves are a powerful source of energy.



**Waves travel vast distances across oceans
at great speed.**

**The longer and stronger the wind blows
over the sea surface, the higher, longer,
faster and more powerful the sea is.**



The energy within a wave

**is proportional to the square of the wave height,
so a two-meter high wave has four times
the power of a one-meter high wave.**



The problem is
that it's not easy to harness this energy and convert it into
electricity in large amounts.

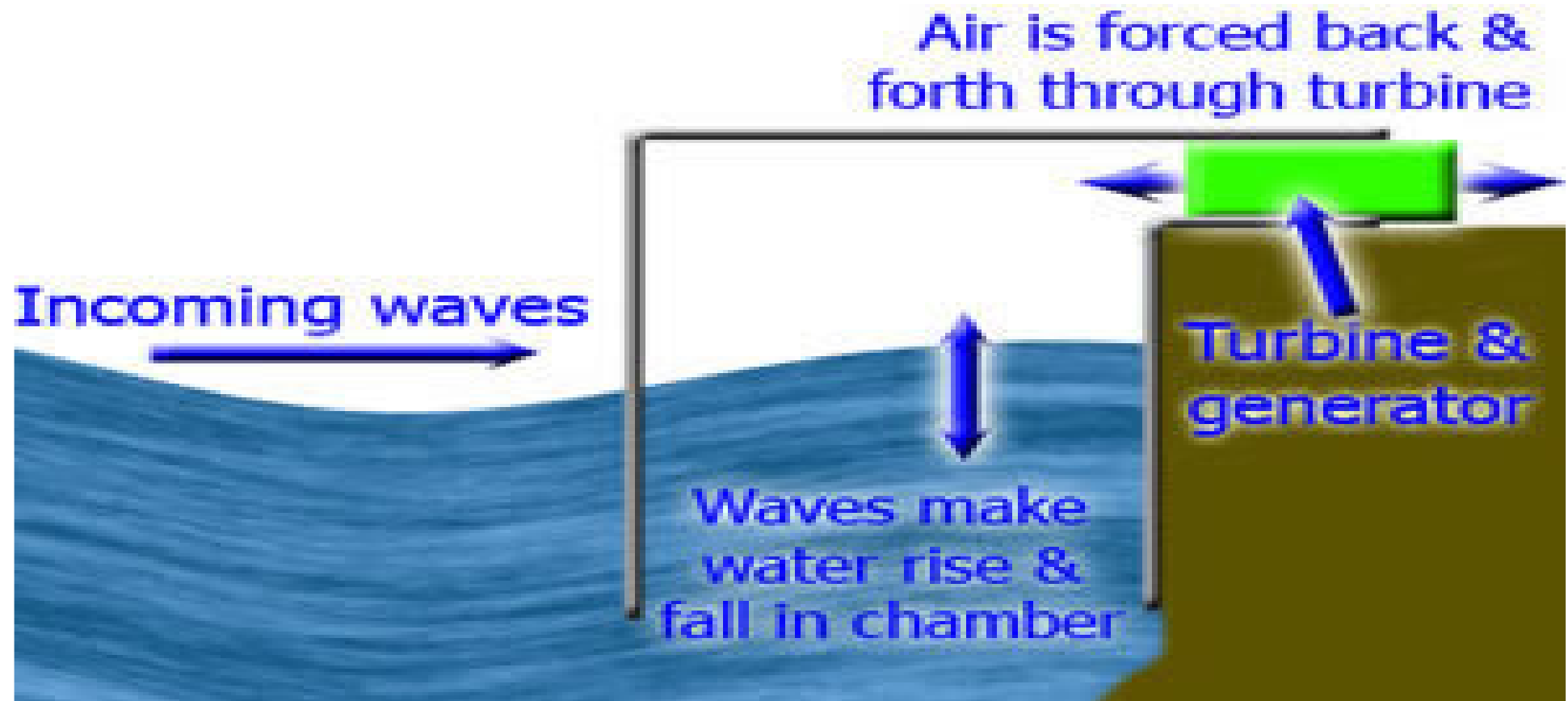
Thus, wave power stations are rare.



How it works

There are several methods of getting energy from waves.

One of them works like a swimming pool wave machine in reverse: air is blown in and out of a chamber beside the pool, which makes the water outside bob up and down, causing waves.



At a wave power station

the waves arriving cause the water in the chamber to rise and fall.



In the USA

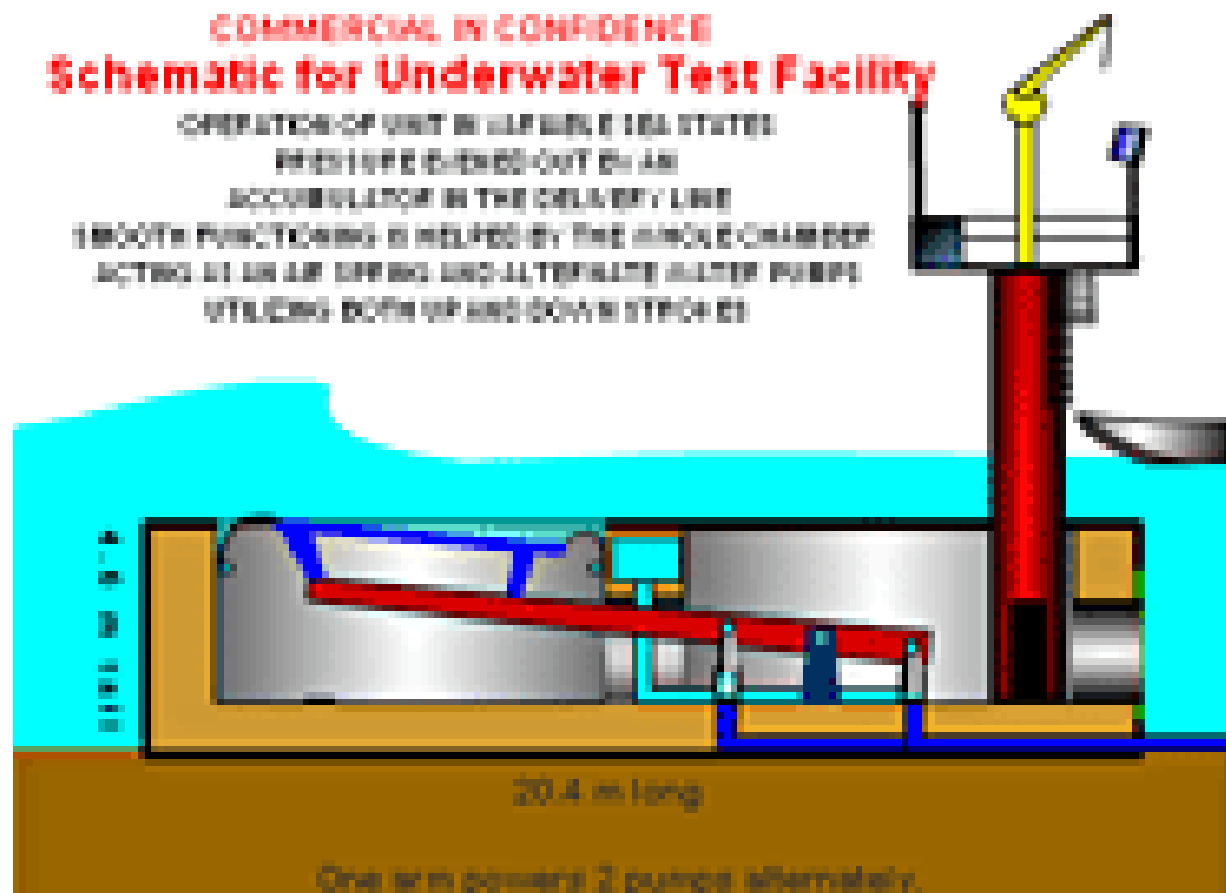
a company is called **Renewable Energy Holdings.**



Their idea for generating wave power (called "**CETO**") uses underwater equipment on the sea bed near the coast.

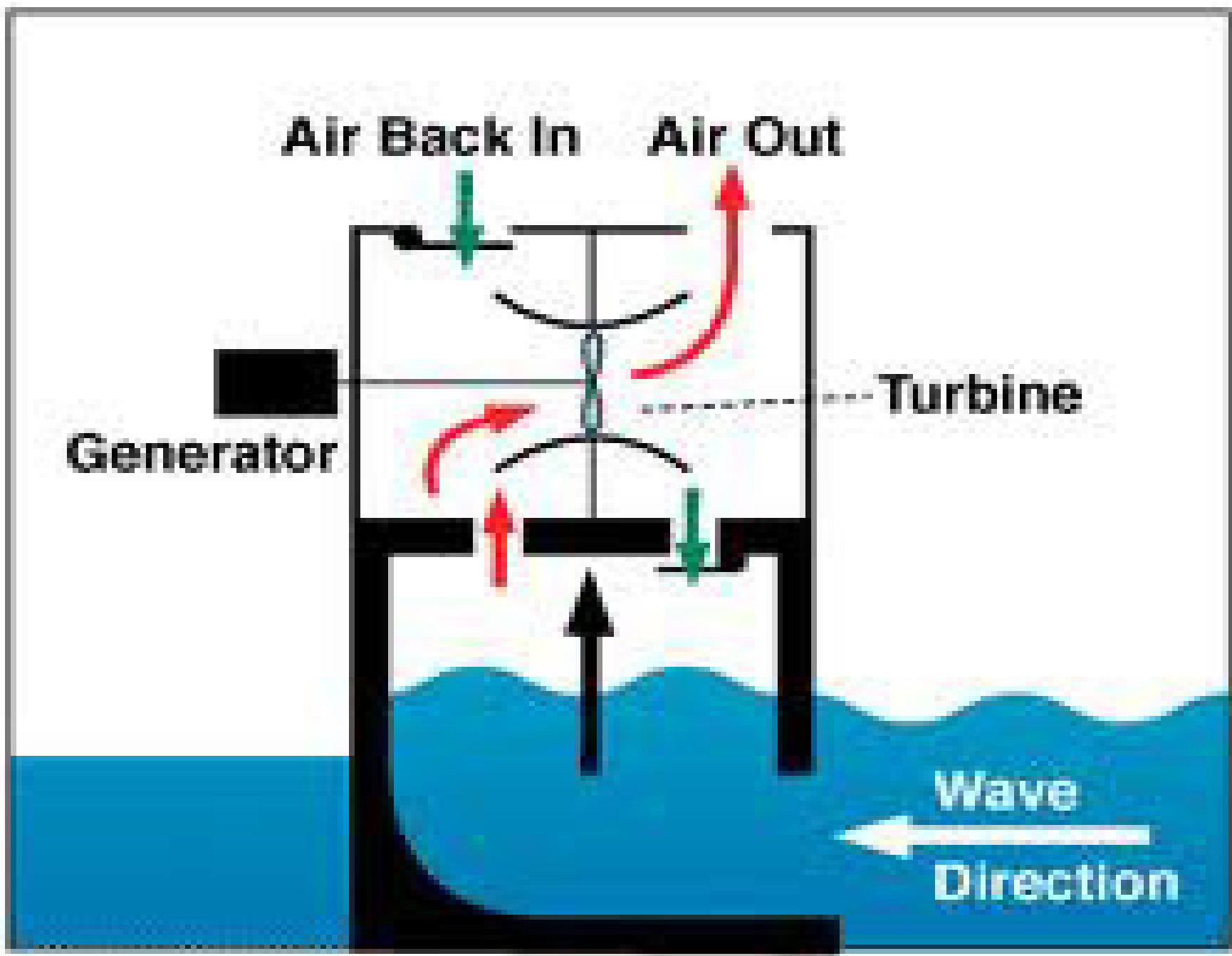


- Waves passing across the top of the unit make a piston move, which pumps seawater to drive generators on land. They're also involved with wind power and biofuel.

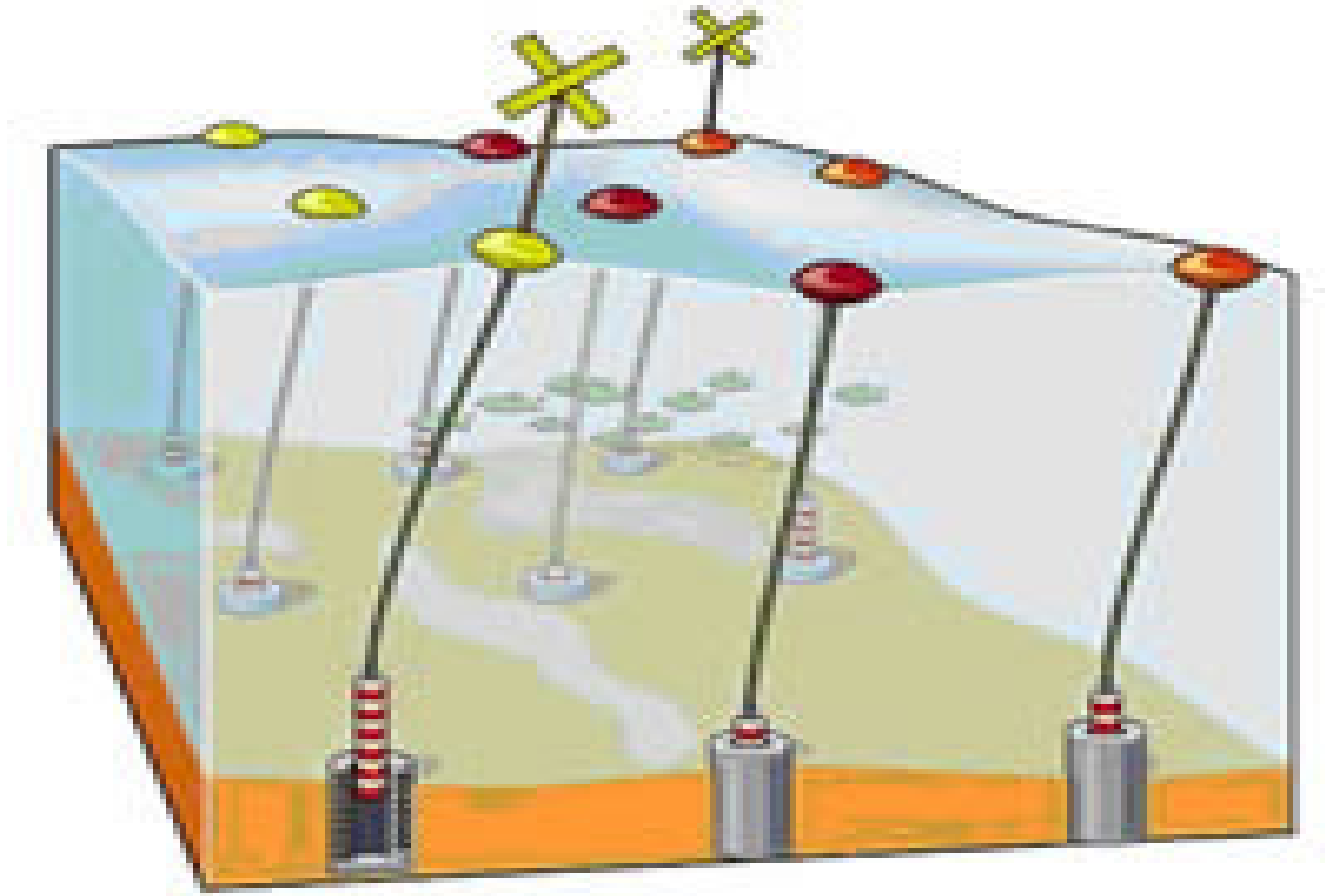


The action of the waves moves the device, pumping hydraulic fluid to a shore station to drive a generator.





Capturing the energy of ocean waves in offshore locations has been demonstrated as **technically feasible**.

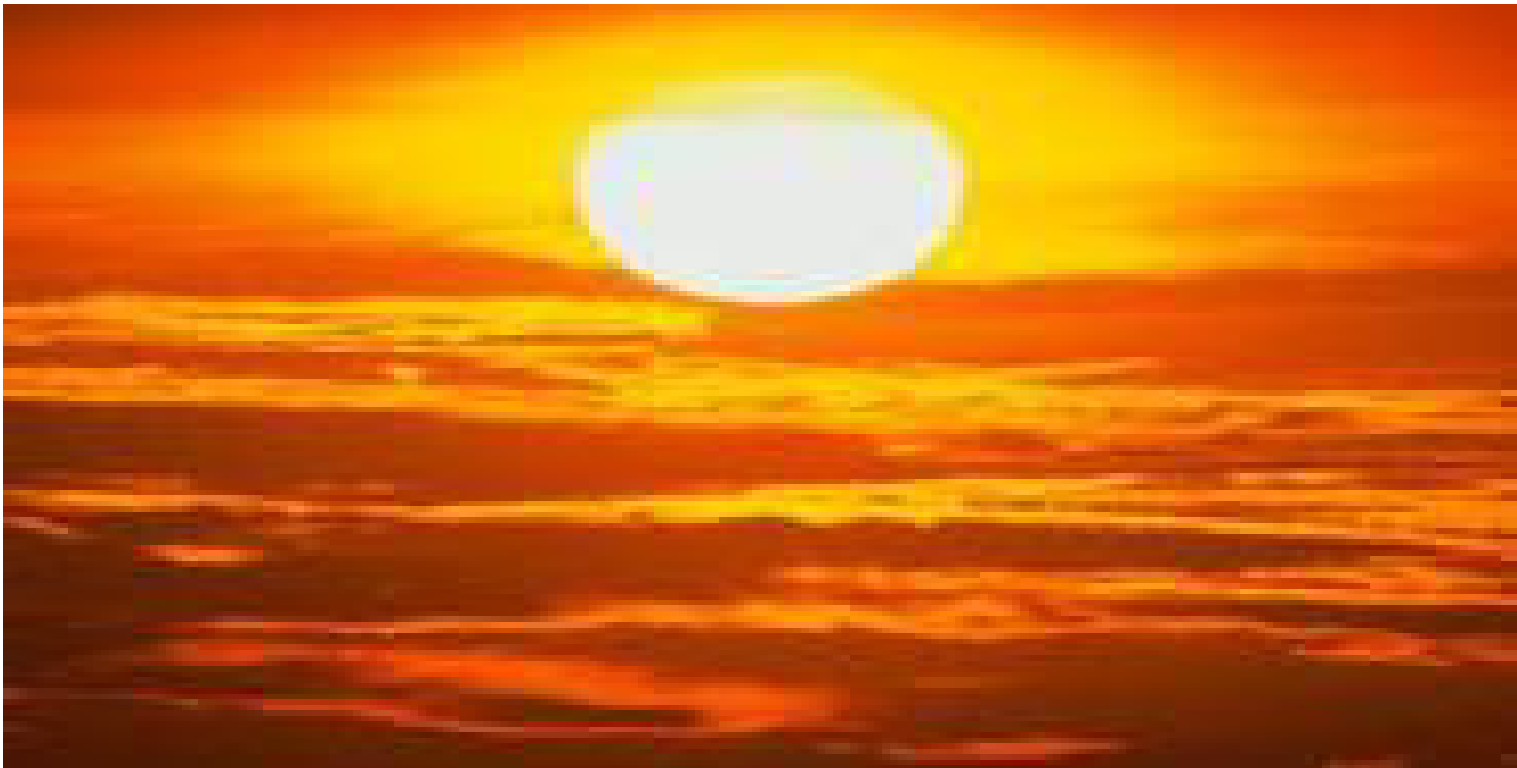


Compared with other forms of offshore renewable energy, such as solar photovoltaic (PV), wind, or ocean current,

wave energy is continuous but highly variable,
although wave levels at a given location can be confidently predicted several days in advance.

- The common measure of wave power, P , is
- π
- ρ
- 32
- $g^2 T H^2$
- $P =$
- watt per meter (W/m) of crest length (distance along an individual crest),
- where:
- ρ = the density of seawater = 1,025 kg/m³,
- g = acceleration due to gravity = 9.8 m/s/s,
- T = period of wave (s), and
- H = wave height (m).

- **Because wind is generated by uneven solar heating, wave energy can be considered a concentrated form of solar energy**



The transfer of solar energy to waves is greatest in areas with the strongest wind currents (primarily between 30° and 60° latitude), near the equator with persistent trade winds and in high altitudes because of polar storms.



Ireland's wave potential is the highest in Europe - typically 70kw/m generating megatt-hours per annum per metre.



As oil prices rise wave energy is obviously going to be incredibly valuable -

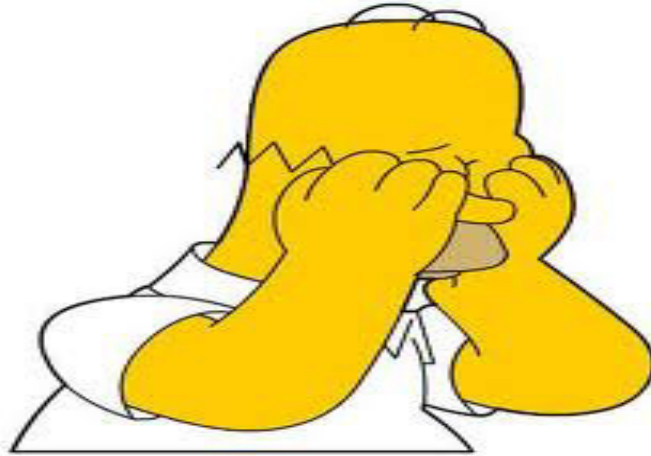
Advantages

Wave power is
renewable!!!!!!!!!!!!



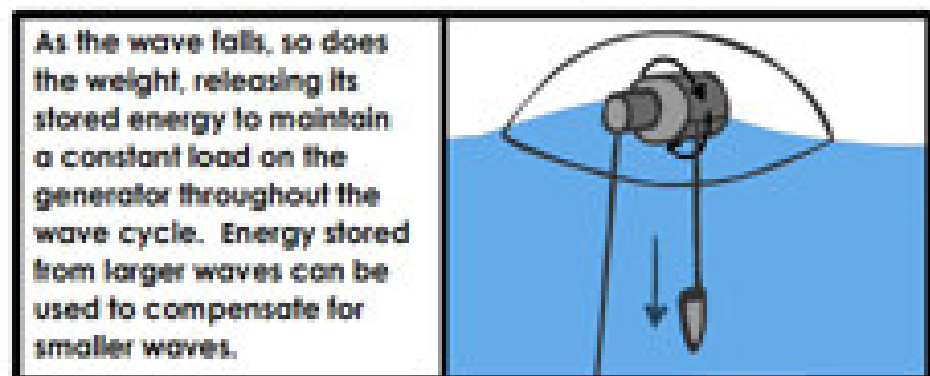
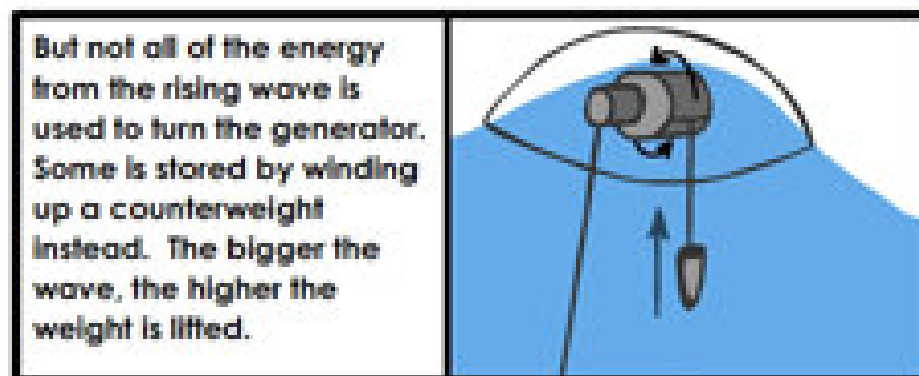
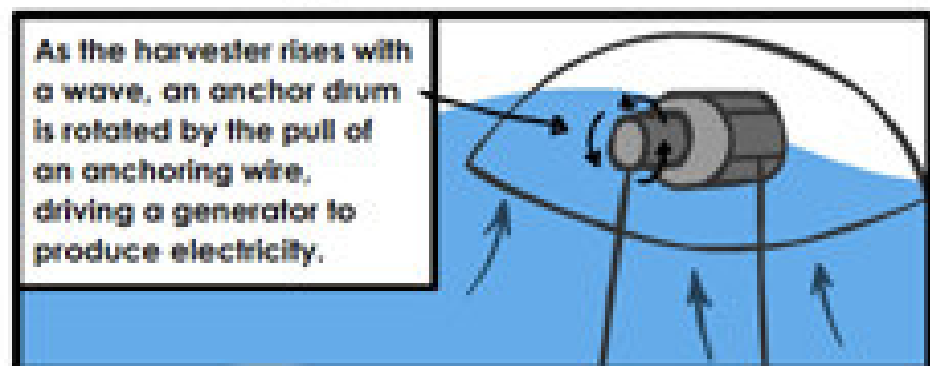
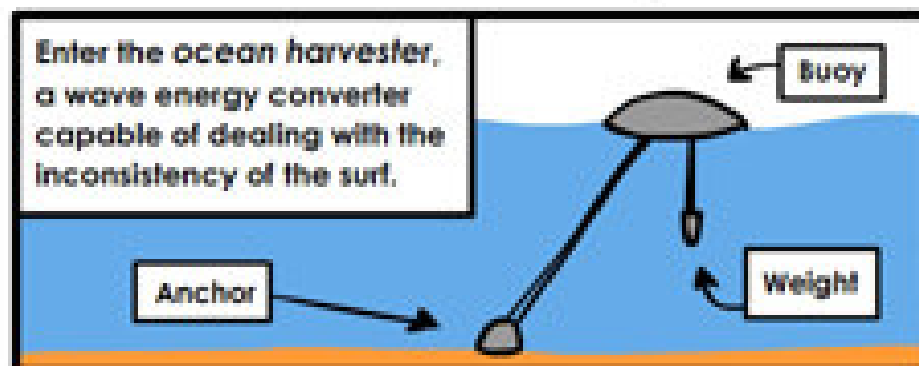
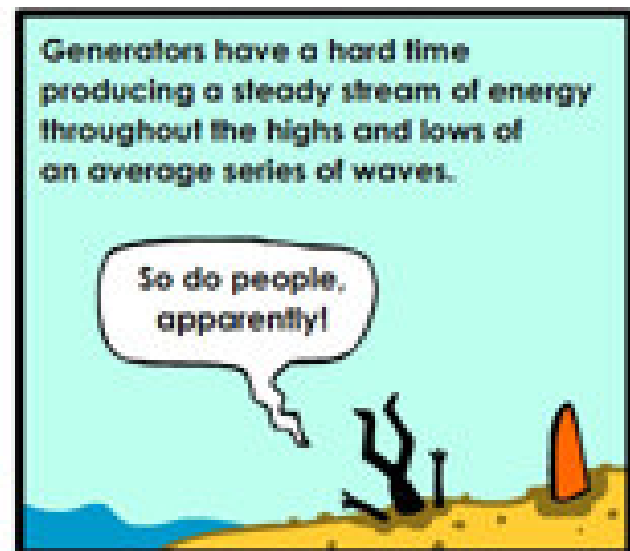
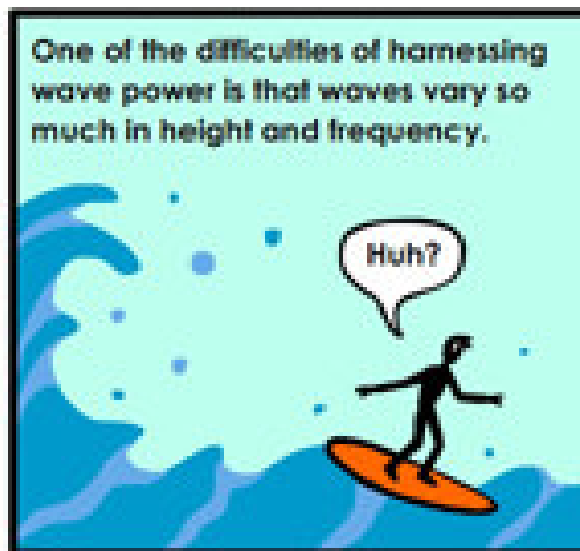
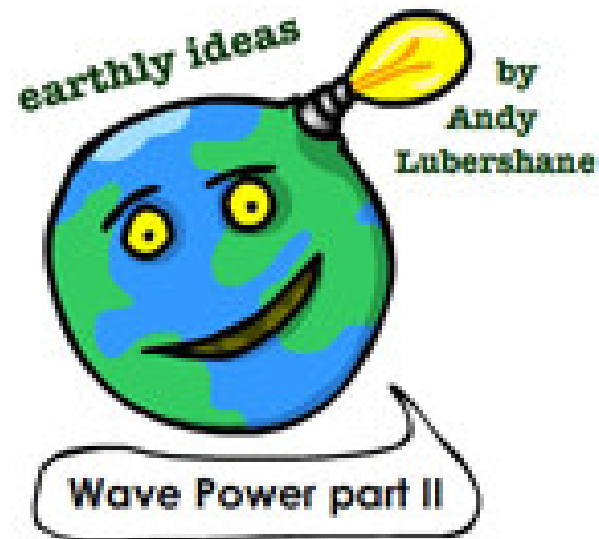
- **The energy is free - no fuel needed, no waste produced.**
- **Not expensive to operate and maintain.**
- **Can produce a great deal of energy.**

Disadvantages



- Depends on the wave you'll get loads of energy, sometimes almost nothing.
- Needs a suitable site, where waves are consistently strong.
- Some designs are noisy. But then again, so are waves, so any noise is unlikely to be a problem.
- Must be able to withstand very rough weather.

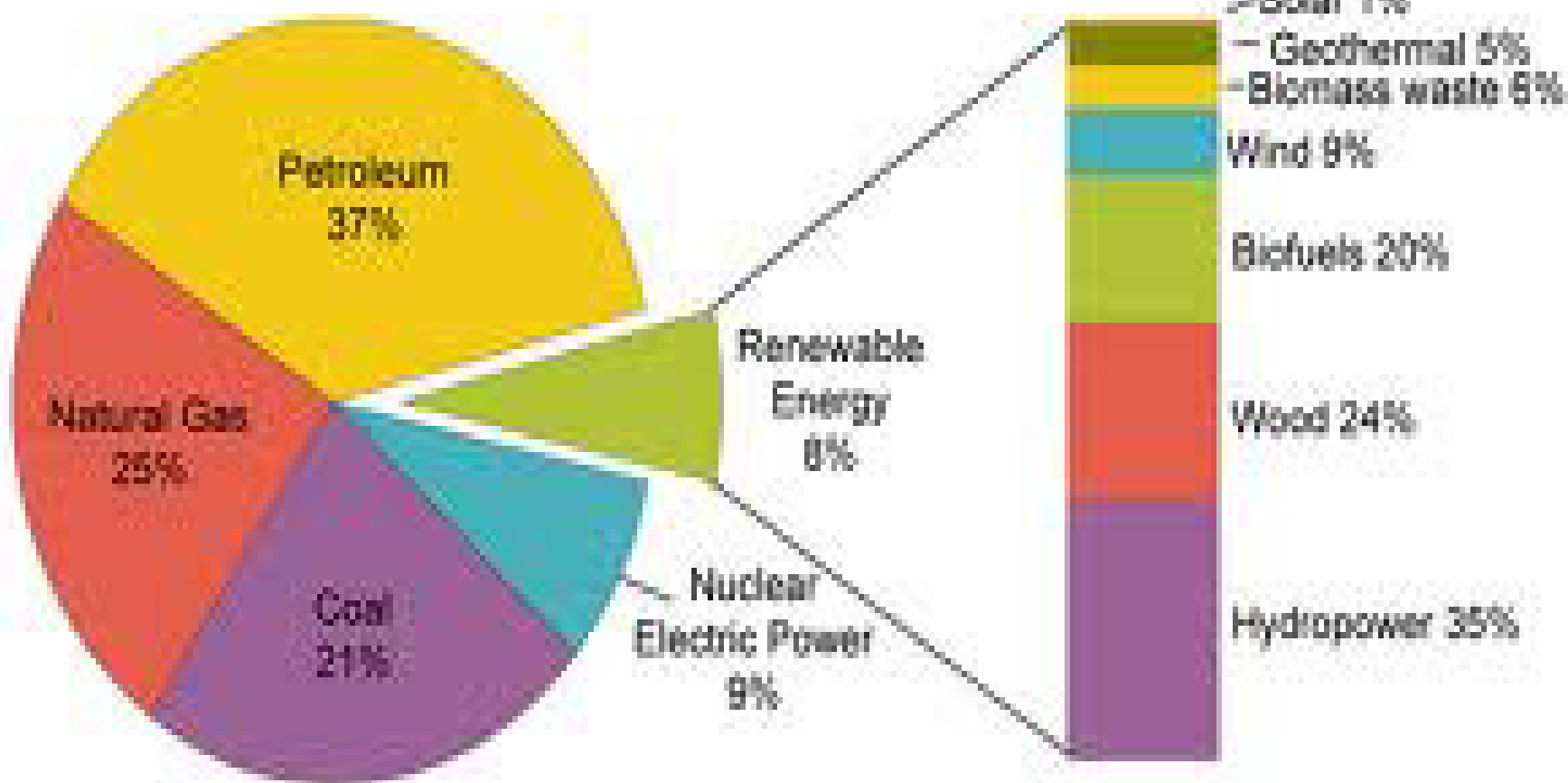
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U.S. Energy Consumption by Energy Source, 2009

Total = 94.578 Quadrillion Btu

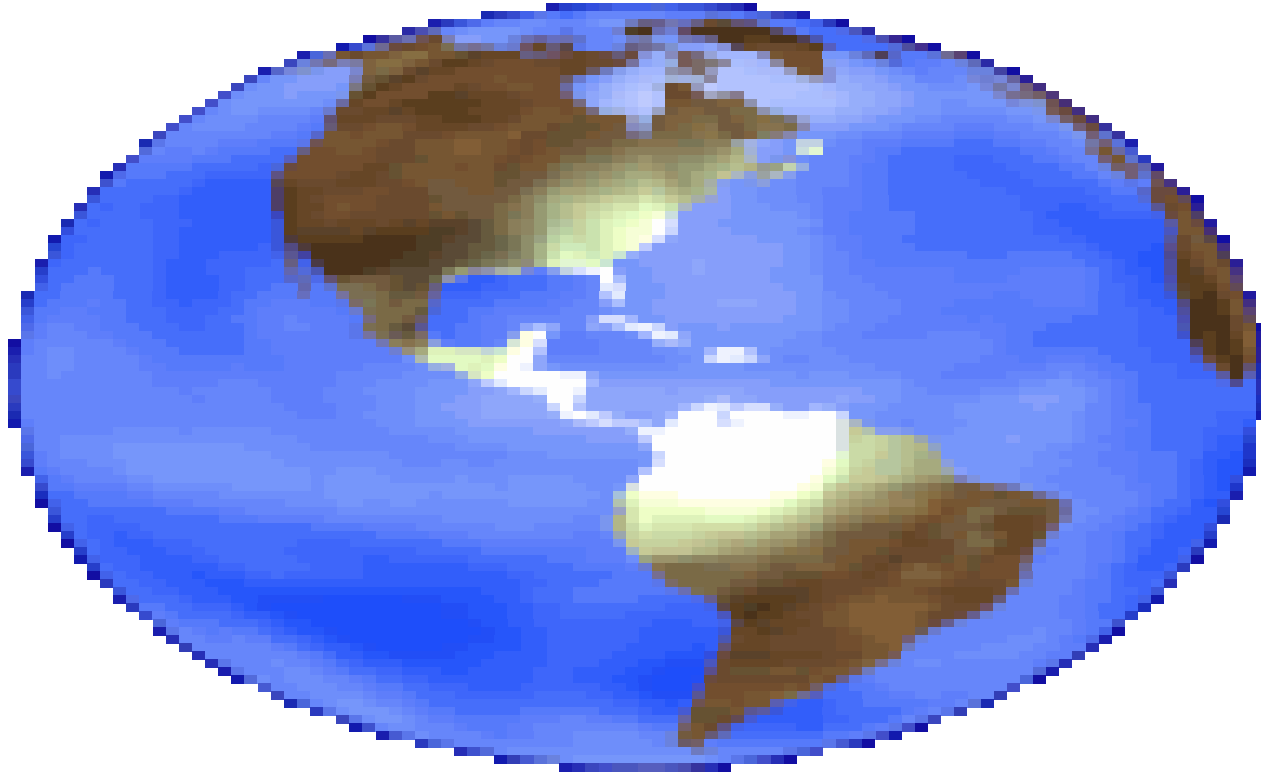
Total = 7.744 Quadrillion Btu



Note: Sum of components may not equal 100% due to independent rounding.

Source: U.S. Energy Information Administration, Annual Energy Review 2009, Table 1.3, Primary Energy Consumption by Energy Source, 1949-2009 (August 2010)

What a pity!!!!!!



THE END!!!!!!



