

Geothermal & Ocean Energy

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Slide 2: *Geothermal Energy: Uses*

- Beneath the earth's surface lies hot, molten rock. The energy it contains is called geothermal or earth energy.
- Geothermal energy is used in many ways, e.g. for heat pumps and heating of living space.
- Geothermal power plants use the earth's natural heat to vaporise water or an organic medium.
- The steam drives a turbine that generates electricity.

Slide 3: *Geothermal Energy: Heat Plants*

- Geothermal heat plants require lower temperatures and the heated water is used directly.
- If near the source, the heat can be used directly to heat homes, buildings and hot water supplies.

Slide 4: *Ocean Energy: Wave, Tidal & Current*

- Surfers use the kinetic energy of waves to push them to shore.
- The kinetic energy in waves can be used to generate electricity.
- Wave-power machines use the vertical displacement of the waves to generate electricity.

Slide 5: *Ocean Energy: Wave Energy*

- The structure interacts with incoming waves, converting this energy into electricity through a hydraulic, mechanical or pneumatic power take-off system.
- The structure is kept in position by a mooring system or placed directly on the seabed/seashore.
- Power is transmitted to the shore by a sub-sea cable.

Slide 6: *Ocean Energy: Ocean Currents*

- Ocean currents are caused mainly by the rise and fall of the tides resulting from the gravitational interactions between earth, moon and sun, causing the whole sea to flow.
- Other effects such as regional differences in temperature, salinity and the Coriolis effect due to the rotation of the earth are also major influences.

Slide 7: *Ocean Energy: Tidal Currents*

- Tidal currents are caused mainly by the rise and fall of the tides resulting from the gravitational interactions between earth, moon and sun, causing the whole sea to flow.
- Tidal currents occur close to the shoreline.
- The kinetic energy of tidal currents can be converted in much the same way that a wind turbine extracts energy from the wind, using various types of open-flow rotors.
- There is a huge potential for generating electric power from ocean tidal currents.

Slide 8: *Tidal Energy: Generating Electricity*

- Tidal power can also be harnessed by constructing a dam or a barrage across an estuary or bay with a suitable tidal range.
- Gates in the barrage allow the incoming tide to build up in a basin behind it.
- The gates are then closed so that when the tide flows out, the water can be channelled through turbines to generate electricity.

Slide 9: *Tidal Energy: Tidal Barrages*

- Tidal barrages have been built across estuaries in France, Canada and China.
- High cost and environmental objections have limited further expansion of this technology.