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Ocean renewable energy 2015-2050

Australia's ocean energy potential

Summary

Ocean renewable energy

CSIRO modelling projects that wave energy could play a large part in Australia's future energy mix. However, ocean energy extraction is an emerging technology and much further research and development is required on mapping the nature of the resource, technology performance and understanding the wider economic, societal and environmental impacts.

The resource is certainly there, the ocean around Australia provides an abundant source of renewable energy in the form of waves, tides, currents and thermal energy. Given this potential, CSIRO has conducted a multi-disciplinary analysis across the Wealth from Oceans and Energy Transformed Flagships.

This document summarises the CSIRO report: *Ocean renewable energy: 2015-2050*, a study that involved oceanographers, economists and engineers analysing all the variables of ocean renewable energy. The overall aim of the work was to understand ocean energy potential and whether it could be part of our future energy mix.

Did you know

Without considering any technical, economic or other barriers, the wave energy from Geraldton in WA to the tip of Tasmania is enough to

power the whole of Australia 5 times over.

Why wave energy?

- Zero emission
- Large resource in Australia
- Potential to be cost competitive
- Almost 80 per cent of Australia's population lives on the coast
- Output can be estimated 3 days in advance
- Is a consistent resource (contribution to 24-hour power)

What does CSIRO's research tell us?

The study produced a number of important findings:

Wave energy could supply about 11 per cent of Australia's electricity by 2050. This is equivalent to powering a city the size of Melbourne.

There are many other economic, technological, environmental and societal factors that will determine the success of ocean energy in Australia's future energy mix and research is required to map and quantify the resource, understand device performance and maintenance, and test full-scale prototypes.

Wider impacts also need investigation, including the positive and negative impacts on marine protected areas, Indigenous land (native title and land rights), shipping, tourism, recreation and real estate values, aquaculture and fisheries, mineral exploration and mining, defence and security.

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Australia has an abundant wave energy resource, concentrated along Australia's southern coastline. Australia's east coast also provides a consistent, albeit not as large, contribution. However, characterisation of the resource requires further attention. Wave energy converters are still an emerging technology; there are at least 200 devices in various stages of testing and demonstration, but relatively few have publically available data on deployments at sea in full operational mode.

Ocean current, tidal and ocean thermal energy, may supply important niche markets in key locations: tidal energy is most abundant in the Kimberley region and Banks Strait off Tasmania; ocean currents off the east coast of Australia; and ocean thermal energy off the coast of far north Queensland. However, there are significant challenges and wider impacts that require research.



Australia's coast line in the Southern Ocean has the best wave resources. Particular areas to note are the west coast of Tasmania, the southern ocean in Victoria and south-west Western Australia.

Wave energy a

The economic viability of wave and ocean current energy was assessed using available data and CSIRO's energy models:

- Global and Local Learning Model (GALLM)
- Energy Sector Model (ESM).

Harvesting energy from oceans: riding the wave

There are at least 200 different wave energy convertor (WEC) devices in various stages of development around the world.

These devices range in size from the size of an oil drum to structures the weight of a loaded bulk freighter.

There are three classes of devices that can be located in various depths:

- point absorber: a float that is free to follow the movement of the wave and gather wave energy from any direction. It can be submerged or float on the surface.
- **linear attenuator**: a float or series of floats that are aligned in the direction of the wave.
- **terminator**: a device that face the wave directly to collect the energy. These terminators include a stationary component and a component that moves in response to the wave, in a similar way to a piston in car.



The report, *Ocean renewable energy: 2015-2050* is now available online and CSIRO hopes that it will inform the ocean energy industry, government and investors about the challenges and potential for the technology.

For a copy of the full report visit: www.csiro.au/ocean-renewable-energy

FOR FURTHER INFORMATION

CSIRO Energy www.csiro.au/ocean-renewable-energy

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