

Renewable Ocean Energy

Renewable energy is energy from sources that are constantly renewed by natural processes.¹ The most relevant renewable energy sources to PNCIMA are wind power, water (hydroelectric) power, and ocean power from tidal and wave energy. Tidal and wave power potential are presented in the accompanying map.

Tidal energy can be harnessed from the rapidly flowing currents produced by tidal cycles. It is considered to be a relatively stable source as its production is the result of the lunar orbit and, therefore, highly predictable and independent of weather patterns and climate change.²

Large waves and ocean swell contain relatively large amounts of stored energy.² Wave energy resources on Canada's Pacific coast show strong seasonal variability, being seven times greater during the winter months than during the summer.³

Data Sources

Tidal and wave power resources presented in the accompanying map are based on the results of the Inventory of Canada's Marine Renewable Energy Resources. These data illustrate the estimated potential energy resources available in tidal flows and waves. The data were developed as part of a preliminary tidal current and wave resource inventory for all of Canada's oceans.³

The estimates are potential resources, not economically or practically realizable resources. Energy calculations are based on preliminary estimates of existing tidal flows and wave regimes, and no consideration has been given to the following factors: environmental impacts, technological developments and limitations in power extraction, climate related factors (e.g. ice, global climate change), site location versus power grid accessibility and power demand, hydrogen economy developments, the effect of potential energy extraction schemes on existing flow conditions and wave regimes, and economic factors.³

Energy can be harnessed from renewable sources such as tides and large waves

Canada Tidal Current Power Resources

The accompanying map shows the annual mean tidal power estimated over a period of one year at 65 passages and reaches within PNCIMA. Seymour Narrows, near Campbell River, presents the strongest tides and the highest mean potential tidal power within PNCIMA. The identification of these sites was based on a variety of data sources including: Canadian Sailing Directions, nautical charts, tide books, tide and tidal current constituent data, and numerical tidal modeling data.³ Back eddies that occur in localized areas, and which may also affect energy production potential, are not displayed in this map.

A detailed assessment of tidal feasibility on Haida Gwaii was also conducted in 2008; however, this information was not incorporated into the map.⁴

Canada Wave Power Resources

Wave energy resources in Canada's Pacific waters were analysed using a large quantity of data obtained from two main sources: direct wave measurements obtained at more than 60 stations, and wind-wave hindcasts of the Northeast Pacific.³ The wave energy resources within PNCIMA decrease toward the mainland, and on the east coasts of Vancouver Island and Haida Gwaii. The mean annual energy flux decreases from approximately 44 kW/m 100 km offshore to approximately 36 kW/m at the west side of Haida Gwaii and north Vancouver Island.

Wave conditions at a particular site are highly variable at many different time scales. The accuracy of wave energy data decreases closer to shore, at depths of 100 to 150 m due to sheltering and the effects of bathymetry (water depths).⁵

Material presented is drawn from the following literature reviews, which include primary references:
 1 Government of BC. 2007. The BC energy plan. Ministry of Energy, Victoria, 44pp.
 2 MacConnachie, S., Hillier, J. and Butterfield, S. 2007. Marine use analysis for the Pacific North Coast Integrated Management Area. Can. Tech. Rep. Fish. Aquat. Sci 2677: viii + 188 p.
 3 Cornett, A. 2006. Inventory of Canada's marine renewable energy resources. Canadian Hydraulics Centre, National Research Council. CHC-TR-041. 156 pp. http://chc.nrc-cnrc.gc.ca/Coastal/Projects/proj-6_e.html (Accessed October 2010)
 4 Hatch Energy Ltd. 2008. Haida Gwaii/Queen Charlotte Islands demonstration tidal power plant feasibility study final draft report. Volumes 1 & 2. BC Ministry of Energy, Mines and Petroleum Resources: Victoria.
 5 British Columbia Marine Conservation Analysis Project Team. 2011. Marine atlas of Pacific Canada: a product of the British Columbia Marine Conservation Analysis. Available from www.bcmca.ca (Accessed March 2011).



Photo: Coral Cargill

