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Measuring Marine Energy for Specific Applications

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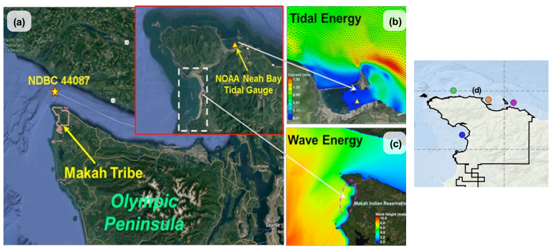
Powering the Blue Economy

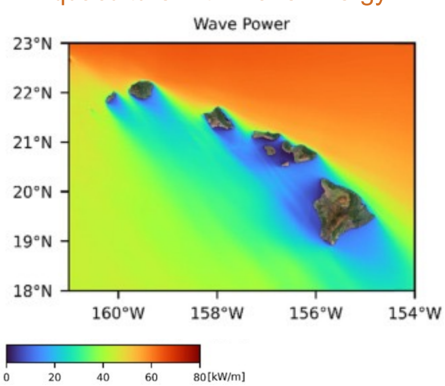
At this early stage in development, marine energy appears to be best suited for powering offgrid applications including generating and using power at sea, and for supplying the electricity needs for small coastal communities and islands. Estimating the available marine energy resources for these smaller scale uses requires assessing power densities that are specific to areas where the power will be used.

Powering Desalinization for Tribal Community in PNW

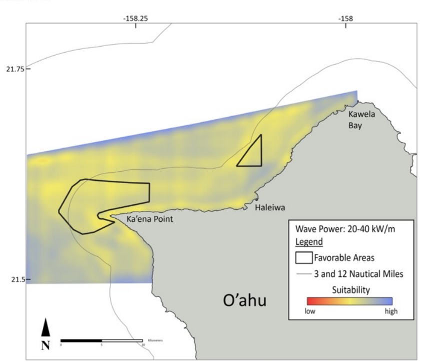


The Makah Tribe (a) in the Olympic Peninsula of Washington state lacks a reliable freshwater supply in the summer. Tidal (b) and wave (c) energy sources are assessed for powering desalinization plants (d) and minimizing environmental impact from brine discharge (*Wang et al., 2023, PNNL Report*)

Co-locating & Powering Offshore Aquaculture with Wave Energy



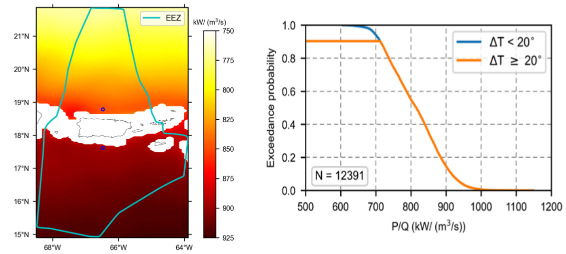
Simulated winter seasonal average wave power density (kW/m) based on 42-year wave hindcast in major Hawaii Islands (from *Li et al., 2021, Renewable Energy*)



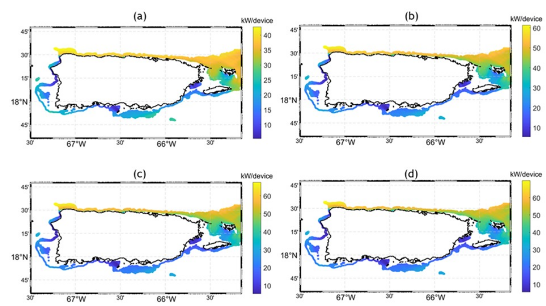
Suitability for co-locating offshore aquaculture and wave energy in Hawaii off northwest O'ahu with wave power between 20 and 40 kW/m. The shapes outlined in black represent favorable areas for co-location (from *Garavelli et al., 2022. Ocean and Coastal Management*)

Supporting Puerto Rico's Regional Energy Resilience

Wave, ocean thermal energy conversion, tidal and ocean currents, are assessed to support Puerto Rico's regional grid resilience and transition to 100% renewable energy by 2050 (*Copping et al., 2023*)



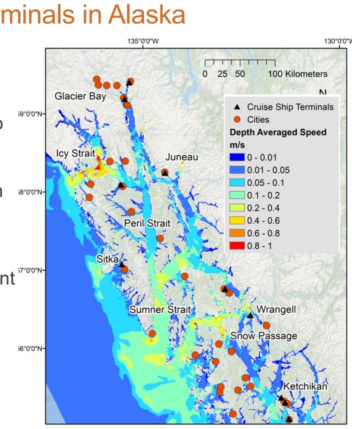
Left: Power density at a sample depth of 1 km based on mean sea surface temperature and mean ΔT > 20°C.
Right: Exceedance probability of power density at south of Puerto Rico.



Geographical distribution of 10-year averaged (technical) electrical power production per unit device along the 25–75 m water depth regions: (a) 50 kW-rated power, (b) 100 kW-rated power, (c) 150 kW-rated power, and (d) 200 kW-rated power

Tidal Energy for Powering Cruise Ship Terminals in Alaska

Alaska is home for many cruise ship terminals, which require power for ship hoteling during the summer peak cruise season. The figure on the right shows the depth averaged tidal current in SE Alaska. The triangles represent cruise ship terminals. Tidal energy can also support local grid resilience for communities (circle) that rely on diesel.



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