

Comparing tidal potential in the Cook Strait NZ and Cook Inlet AK USA, specifically potential from in-stream turbines

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Tidal as a resource

- Types
- Kinetic Energy Potential H₂O vs air
- Sustainability, Renewability, and Predictability
- Factors of production from tidal energy

Wind vs Hydro

- Kinetic Energy = $\frac{1}{2} \cdot \rho \cdot A \cdot V^3$
- Rho H2O = 1000 kg/m³
- Rho sea H2O = 1020-1029 at depth 1050+
- Rho Air = 1.225 kg/m³

At the diameter of 10m and a velocity of 2.5m/s

Ek sea H2O = 628011.73 Joules

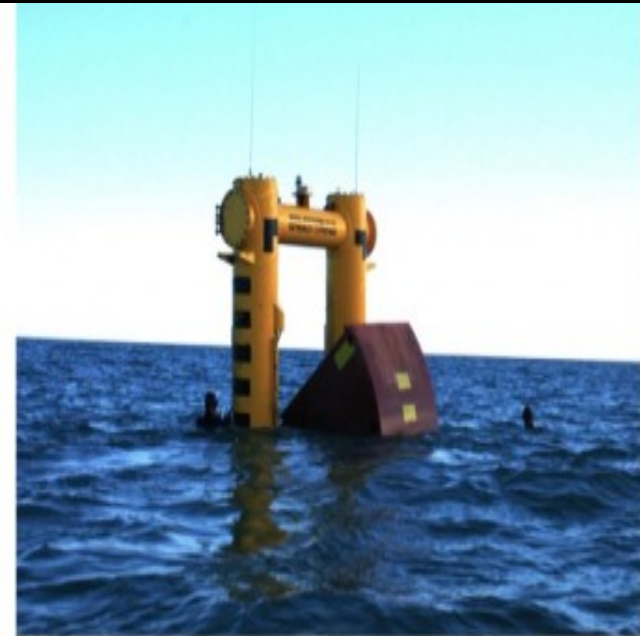
Ek air = 751.65 Joules

Betz limit vs hydro efficiency limit

Wind vs Hydro

- Power Difference
- $P_{\text{sea H2O}} = 288885.39 \text{ W}$
- $P_{\text{air}} = 445.73 \text{ W}$
- %difference = 99.84%

Turbine Technology from AWATEA



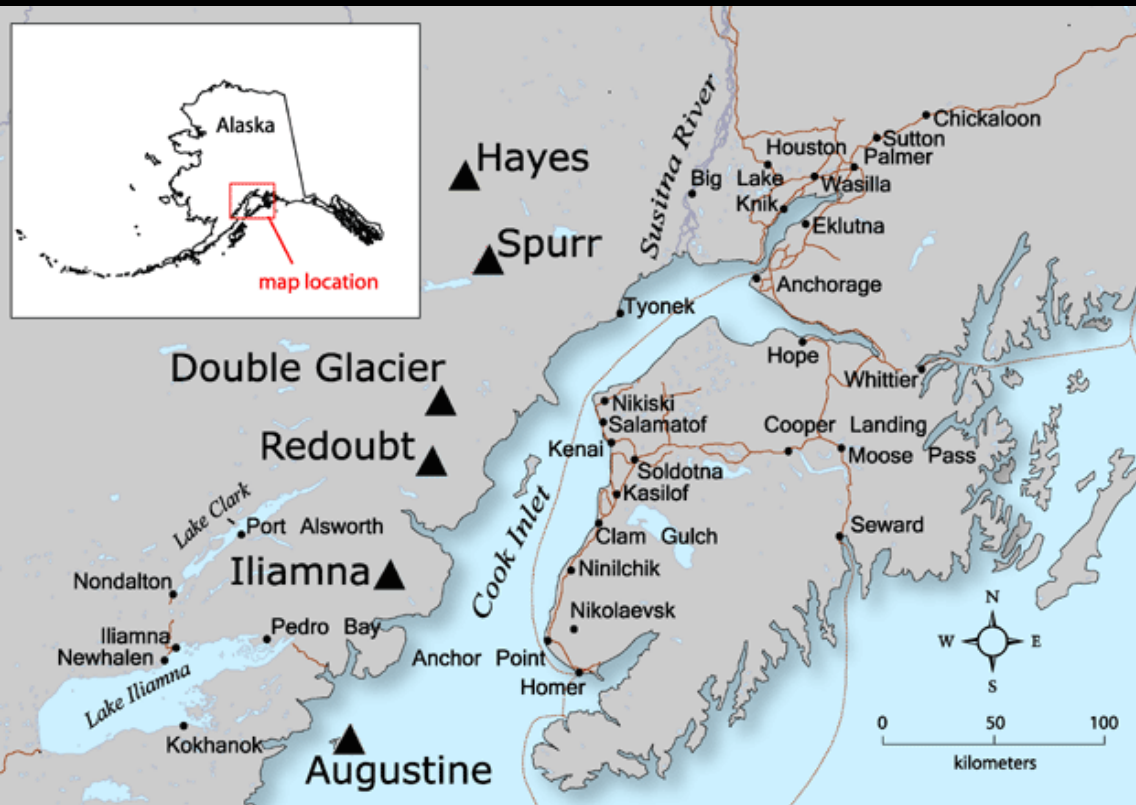
Tidal as a resource in US

- Praise DOE
- Potential independent of rivers and streams
- Estimated total capturturable potential

Tidal as a resource in NZ

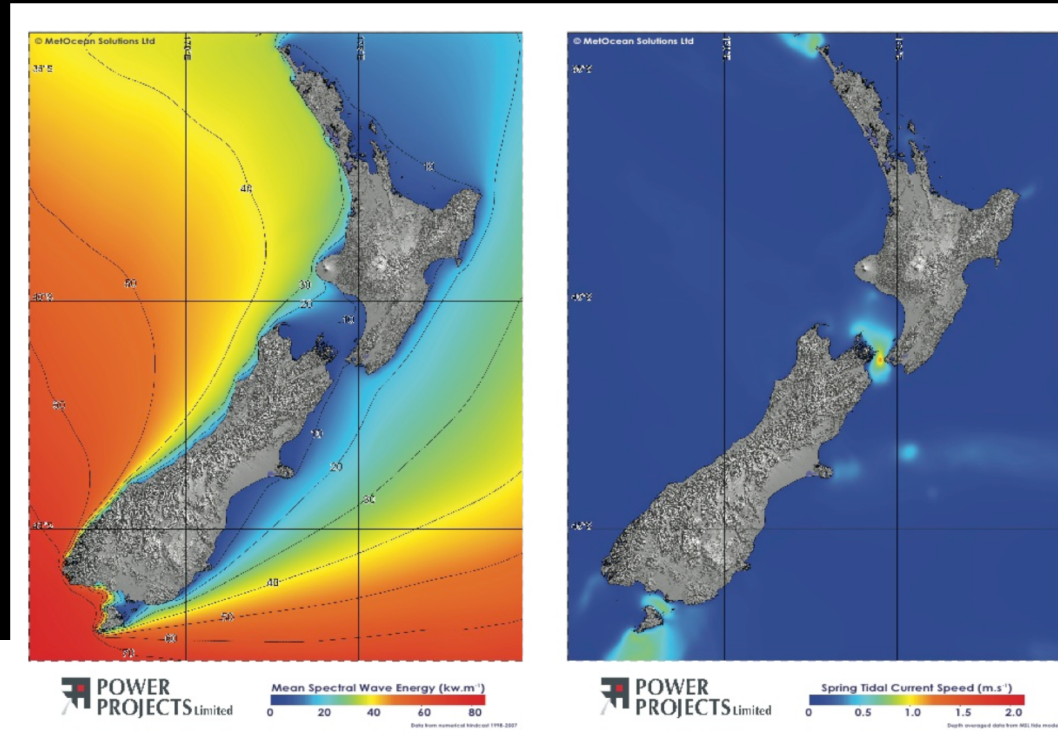
- Location Location Location
- Kaipara Harbor

Cook Inlet, Alaska US

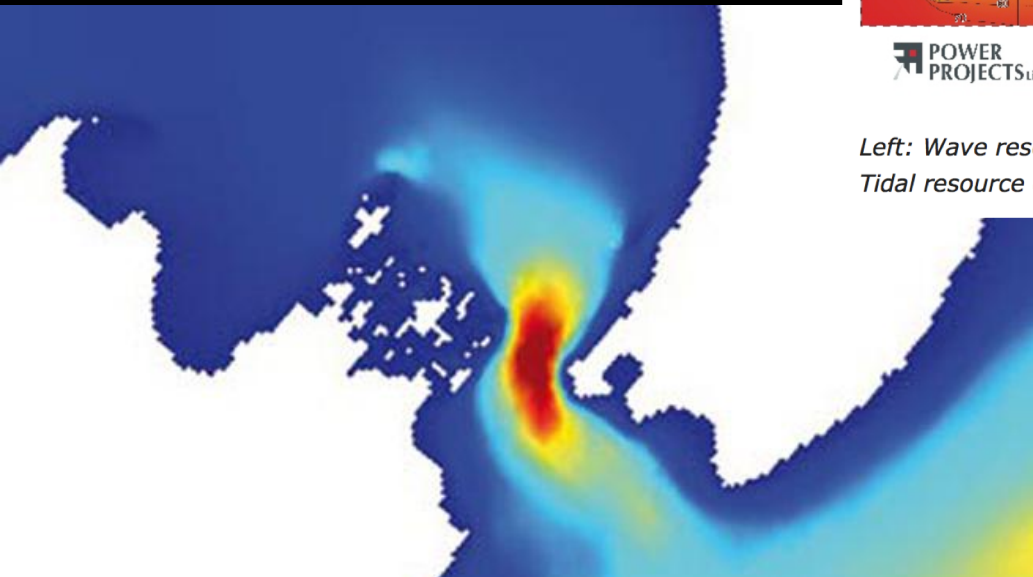


Cook Strait, New Zealand

<https://gifer.com/en/BGd2>



Left: Wave resource chart for New Zealand (PPL & MetOcean Solutions 2008), Right: Tidal resource chart for New Zealand (PPL & MetOcean Solutions 2008)



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