

Haida Gwaii / Queen Charlotte Islands Demonstration Tidal Power Plant Feasibility Study – Summary Results

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The Project Working Group

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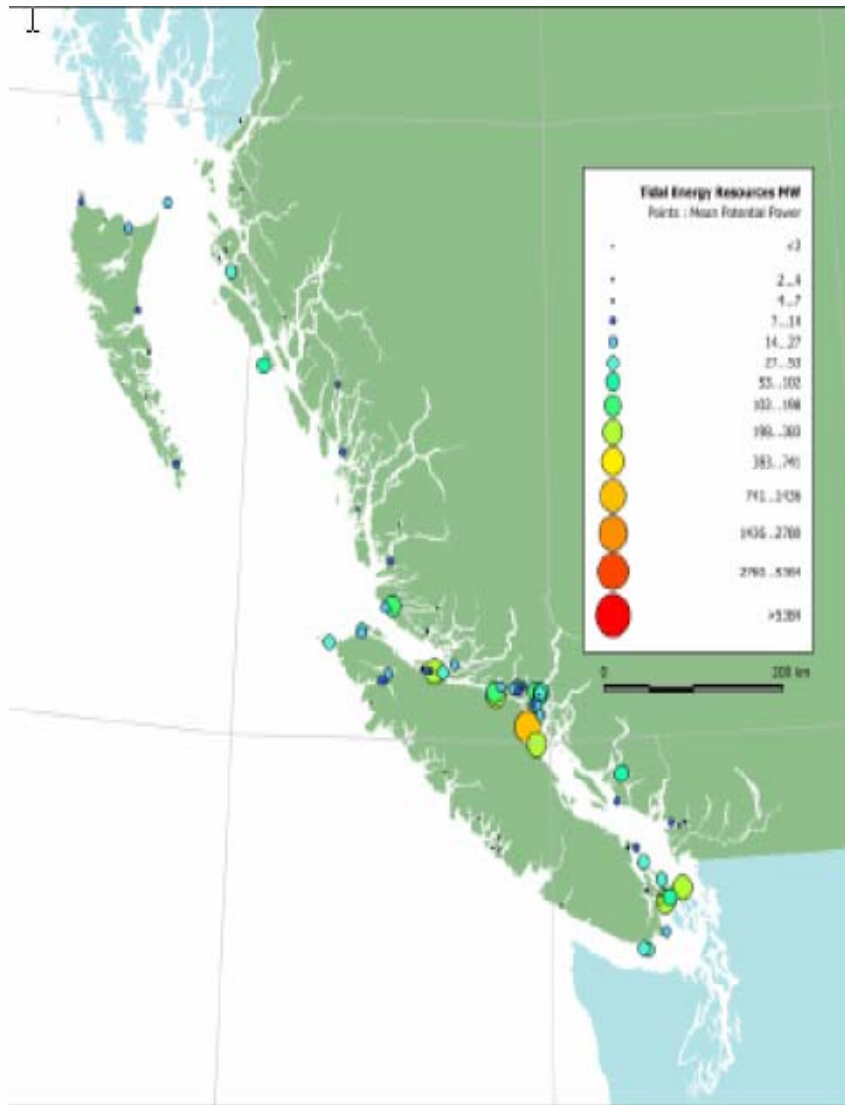


Council of Haida Nation



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FOR GENERATIONS





- Remote Communities may have advantages for tidal energy – GHG & cost reductions from diesel
- Interesting tidal resource in some remote communities
 - 18 sites in North Mainland, 9 sites on QCI
- Scan of candidate communities in BC based for resource, load profile, distribution infrastructure and community interest pointed to QCI



- To assess the feasibility for a tidal demonstration project on HG/QCI
 - Where is an appropriate site?
 - Who / Which technology?
 - What scale?
 - How much?
 - What next?

Where?



- Site selection based on resource and proximity to grid infrastructure
 - Identified 18 sites with largest tidal power production potential with average speeds $>1\text{m/s}$
 - Only 2 sites - Masset Sound and Juskatla Narrows – had current speeds $>2\text{m/s}$ and were close to grid
- Detailed Tide2D model built for Masset and Juskatla
- Identified 3 hotspots in Masset Sound and a hotspot at Juskatla Narrows

Tidal hotspots in HG/QCI

Name	Depth (m)	Long	Lat	Mean Max Speed (m/s) ^{1,3}	Peak Speed (m/s) ^{1,3}	Mean Energy Density (kW/m ²) ^{2,3}
Juskatla Narrows	10.6	-132.3498	53.6732	5.23	5.3	9.05
Watun River	19.61	-132.0967	53.8974	2.74	3.28	1.34
Cook Point	36.46	-132.202	53.8049	3.34	4.03	2.49
Masset City	32.71	-132.163	54.0163	2.65	3.15	1.18



- Two fundamental types of site: high speed but shallow (Juskatla) or moderate speed and moderate depth (Cook Point)

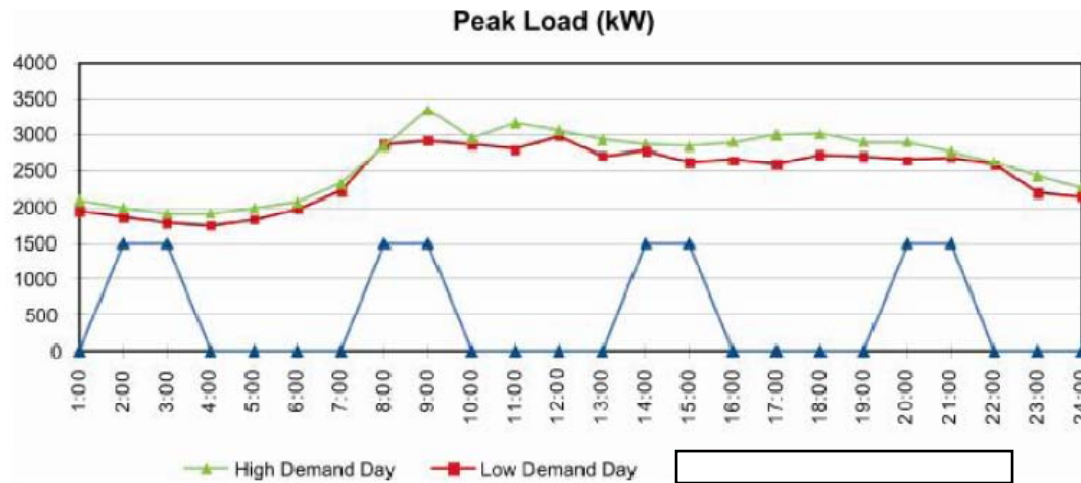
- Technology Providers were solicited for their input, “COULD YOUR TECHNOLOGY MAKE USE OF EITHER SITE IN HG/QCI?”
 - Technology providers only interested in Cook Point (lower speed, deeper).
 - Juskatla is too shallow. Turbines require 1.5m clearance for boats, and tend to be elevated off the channel bottom where velocities are slowest. Juskatla, at 5-7m, is too shallow.
- Technology Providers also solicited for information on unit performance, cost, and trials to date
 - Based on a preliminary evaluation, 4 technologies were judged most suitable for demonstration: Clean Current, Marine Current Technology, Open Hydro, & Verdant (alphabetical)
 - Limitations in data, views of the the consultant.

What scale / what could it look like? **BChydro**

- Demonstration or future commercial deployment is limited by resource and by ability of grid to accommodate power
- Resource limitation @ Cook point ~ Masset Sound is limited to ~10MW peak (eg 15% of total energy). Largest proposed installation is 6MW peak
- Grid Limitation – Diesel genset ability to accommodate intermittent power
 - Northern Grid supported by a combination of 2.5MW and 850kW diesel units
 - Because diesel gensets must run at least 50% load (performance) and not stop/started on a 2X daily schedule (thermal wear), diesels in HGQCI can only accommodate a limited amount of intermittent power in their current configuration
 - Energy Storage can be used to increase utilization of tidal

Diesel Generators limit Tidal Energy **BChydro**

Figure 4.12 Northern Grid Daily Load Profile for June 2006 versus 1,500 kW Tidal Resource



- Consider a summer day on the Northern Grid...
 - The lines represent the community load, the blue lines the injection of tidal energy from a 1.5MW tidal plant
 - At 1.5MW of tidal, the 2.5MW diesel generator must start/stop multiple times and the multiple 850kW units operate at low efficiency to accommodate the rise and fall of generation.
 - This is a very coarse assessment, but in the absence of energy storage, tidal energy on QCI is limited to 750 kW

How much?

	750 kW Demo, no energy storage	6 MW power plant, with bulk NaS energy storage
Mobilization	\$400k	\$2,000k
Device – Procure	\$2,730k	\$21,820k
Device – Install	\$1,170k	\$9,350k
Transmission / Interconnection	\$1,420k	\$2,180k
Energy Storage	N/A	\$18,000k
Permitting / Environmental	\$690k	\$2,600k
Contingencies, Engineering, etc	\$1,830k	\$15,150K
Total Costs	\$8,580k (\$10,680 / kW)	\$71,100k (\$11,600 / kW)
Energy Costs	\$0.66 / kWh (incl debt service and O&M)	\$0.81 / kWh (incl debt service and O&M)

- Report will be made public soon – available on OREG website
- Council of Haida Nation committed to leading efforts to carrying forward consultant recommendations:
 - 3-D modelling and field verification of tidal flows
 - Bathymetric measurements
 - Detailed cost and performance estimates from interested technology proponents
 - Review and develop mitigation strategies for potential environmental impacts at Cook Point
- Discussion with interested parties on how the working group can support the sector leadership

Thank you

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