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The Ocean Renewable Energy Group

A review of the challenge and opportunity in renewable ocean energy

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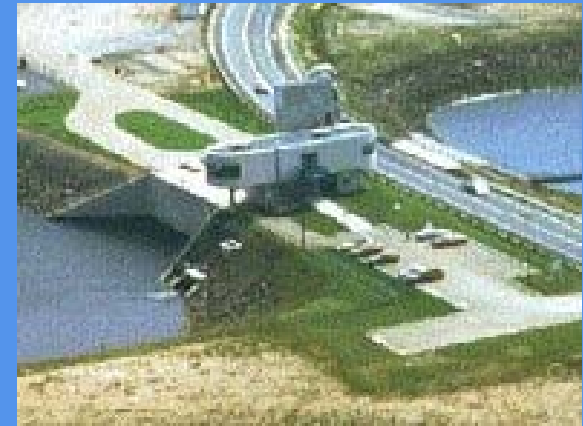
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- *collaboration between industry, academia & government*
- *proven Canadian energy project sector*
- *new and emerging ocean technologies*
- *production solutions for ocean renewable energy*
 - Ocean energy technology companies
 - Ocean power generation companies
 - Ocean technology and fabrication companies
 - Ocean engineering researchers, institutes and academia
 - Federal Interdepartmental Group on Ocean Renewables
 - Provincial ministries of energy and economic development
 - Atlantic and Pacific coastal utilities
 - International ocean energy companies

**Started in British
Columbia but
assuming national
role**

Canada - Ocean Energy leader

- 20 Mw (5,000 homes) - Nova Scotia since 80's
- One of two in the world





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The ocean energy opportunity

- Massive resource on three coasts
- Tidal currents are predictable, waves are persistent and forecastable
- Very high energy density
 - 1 metre of Ucluelet wave = 5 homes
 - Tide in Discovery Passage = 40,000 homes
- Essentially GHG free - small footprint
- IEA forecast - fastest renewable growth rate by 2025



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Ocean energy: strategic opportunity

- Distributed/remote coastal community generation
- Green power for Canada and for export
- Employs Canada's power project, ocean technology, marine industry, research/training infrastructure
- Emerging world market for ocean power projects
- As yet, no dominant technology or supplier

**Canada can be one of the
leaders in development of
renewable ocean energy**



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Prospects

- Pollution Probe - ca 20,000MW
- National Energy Board - 20,000+MW

Phase 1 Canadian Ocean Energy Atlas

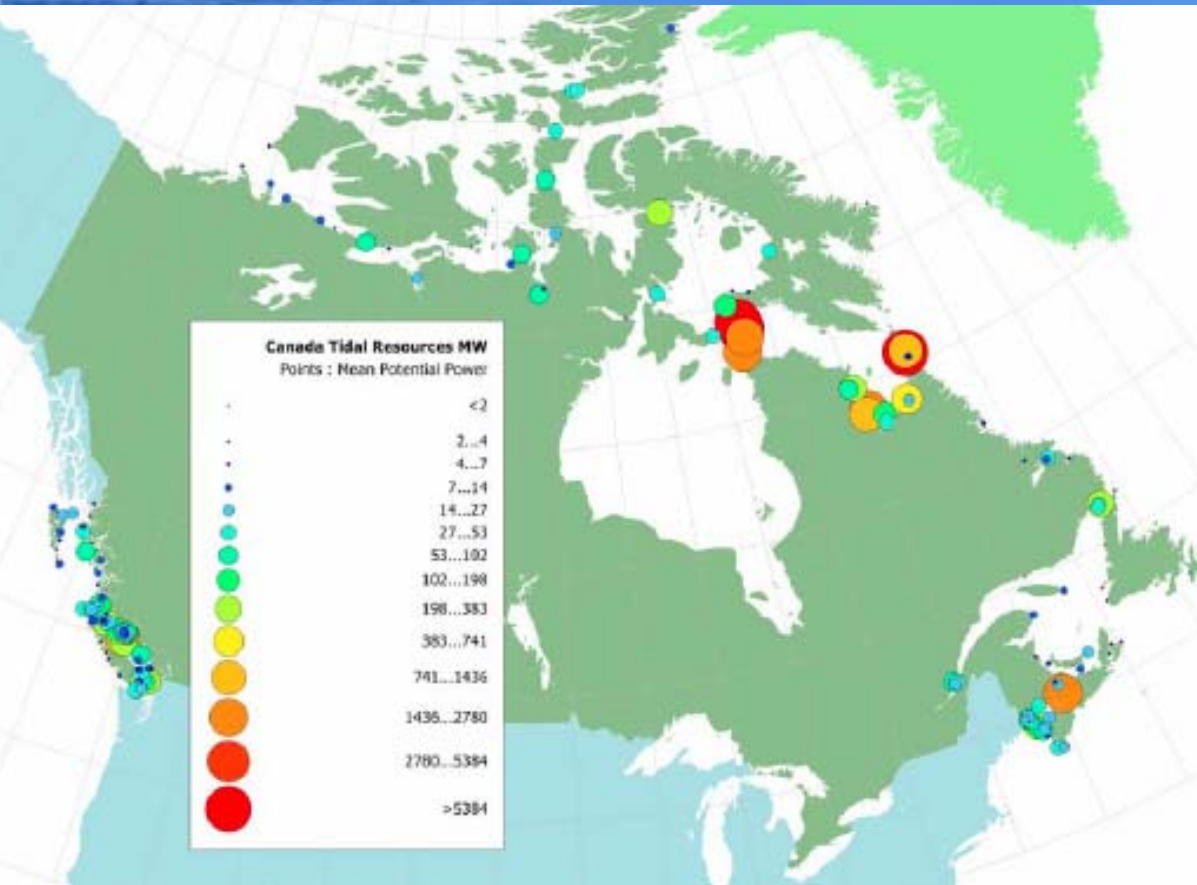
- Major tidal stream opportunities
 - Pacific - ca 4,000MW
 - North - ca 34,000MW
 - Bay of Fundy - ca 3,000MW
- Incident offshore wave energy
 - Pacific - ca 40,000MW
 - Atlantic - ca 150,000MW



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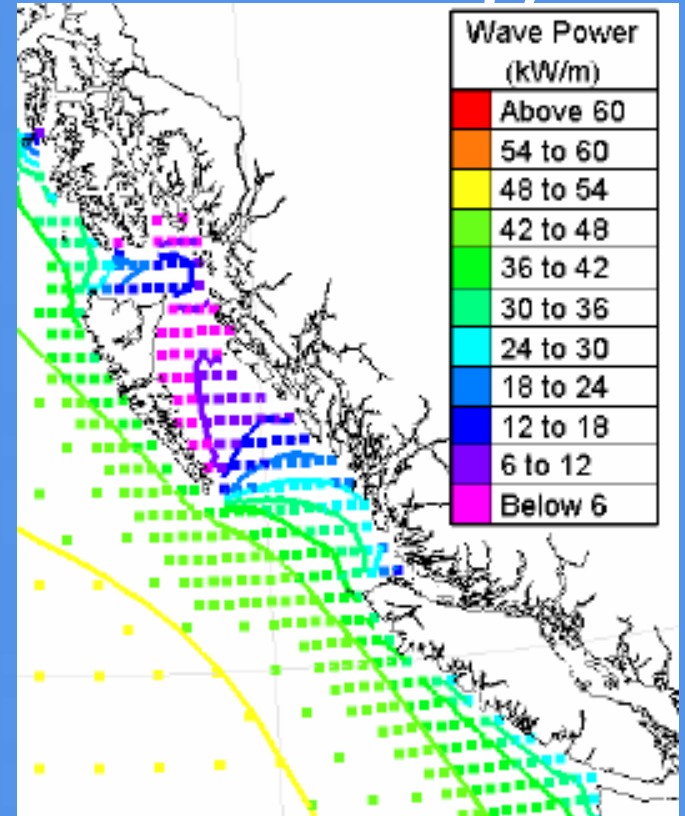
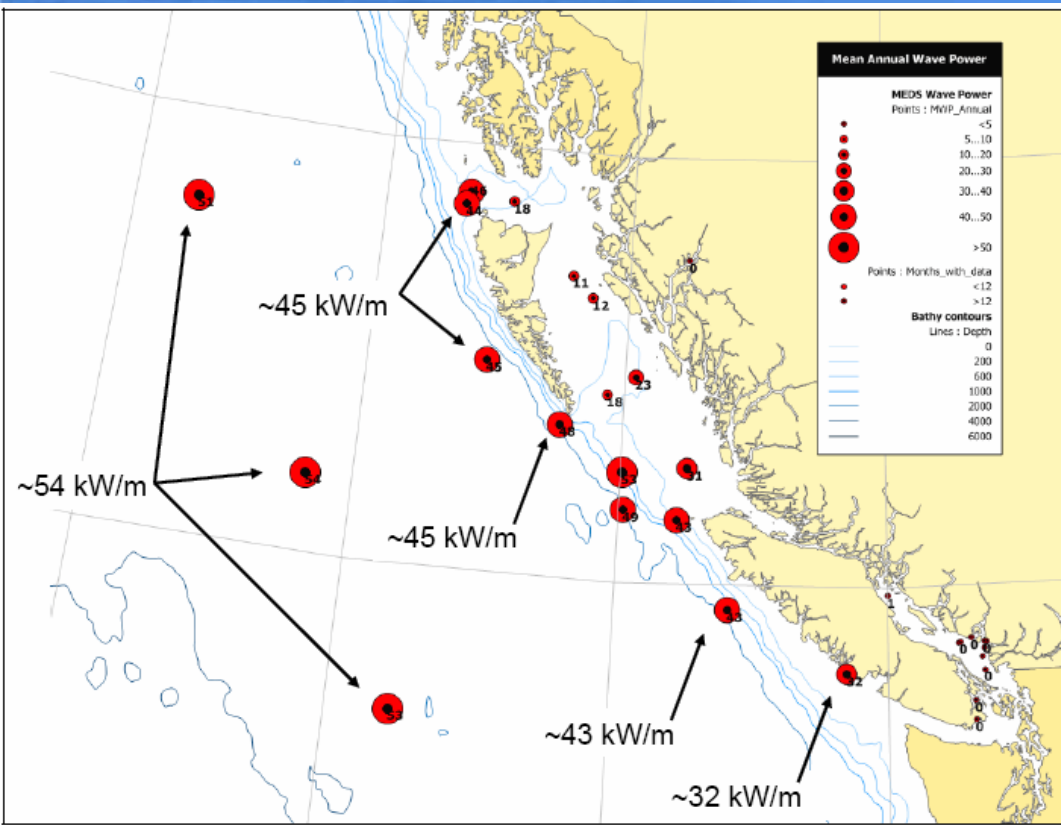
~100 tidal sites in BC



Region	Potential Tidal Current Energy (MW)
Vancouver Island	3,580
Mainland	
Pacific Mainland North	353
Queen Charlotte Islands	81
Arctic	1,008
Hudson Strait	29,595
Ungava	4,112
St. Lawrence River	153
Gulf of St Lawrence	537
Atlantic North	65
Atlantic South	30
Bay of Fundy	2,725
TOTAL	42,240

Triton Consultants,
2006

25% of Canada's incident wave energy



NRC, CHC - 2006



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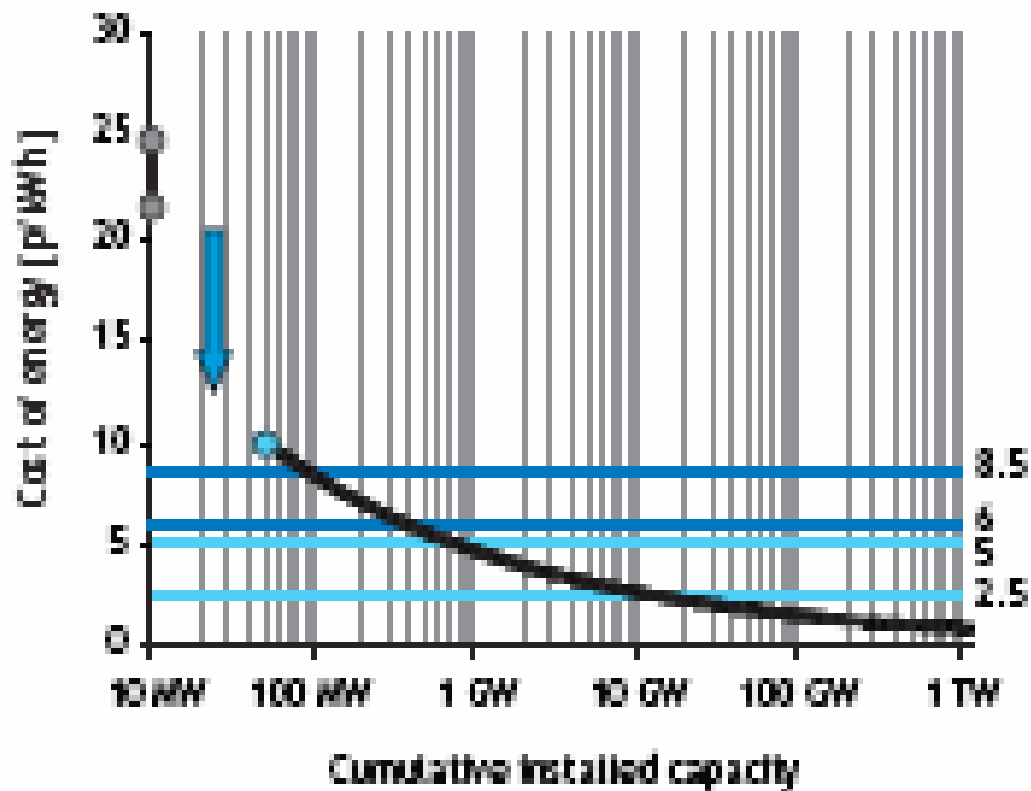
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Target: “25+25 by 25”

- Pilot plants in 2007
- By 2025:
 - 25,000 MW Canadian capacity
 - 10,000+ jobs in supply, service and operation
 - \$25 billion+ in equipment and service sales
- Accelerators
 - Government focus
 - Investment
 - A “home” market and infrastructure support
 - Centre of excellence/clustering
- Issues
 - R&D -> Commercialization -> Adoption
 - Procurement/pre-commercial strategies
 - Utility interconnection
 - Environmental assessment/permits

The Challenge - gaining experience

Figure 10c Offshore wave energy cost reduction scenarios
Scenario C: 10.0¢/kWh starting point, 10% learning rate





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Meeting that challenge

- Policy to diversify energy resources
- Interconnection and access to grid
 - Standards
 - Who pays?
- Power purchase agreement
 - Bridging market price to early costs
 - Who pays?



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What are hopes for new Energy Plan?

- Direct BCUC/BC Hydro - strategy for diversity, security and economic benefits
 - Use dams to firm up power from more intermittent renewables
 - Ensure access to the grid by emerging energy
 - Allow financial incentives
 - Pre-Commercial Call to diversify resource options
 - Development initiative for emerging energy options
- Specifically for Ocean energy
 - BC to join with other Provinces, feds and utilities to launch a Canadian Renewable Ocean Energy Development Initiative
 - Centre of excellence in ocean energy

