

Snohomish PUD --Tidal Energy Project



Craig Collar
Snohomish PUD



Utility Challenge

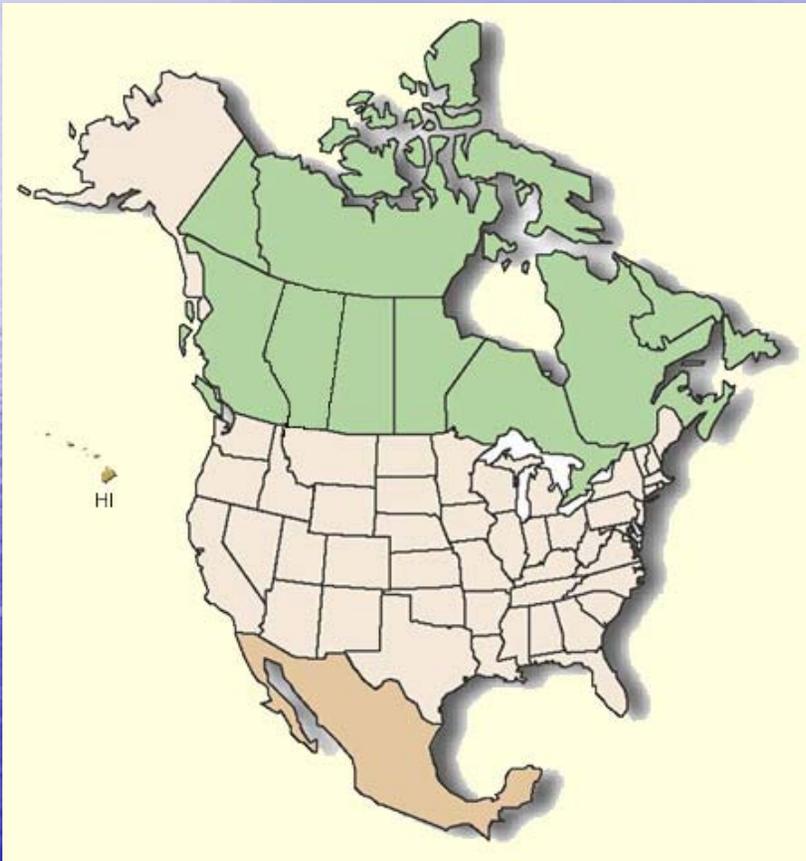
- Service Region Growth
 - Fastest growing county in the state - 10,000 new connections/year
 - Load growth of 15 to 20 aMW/year
- Renewable Portfolio Standard
 - Requires the addition of ~140 aMW by 2020.
- Wind/Intermittent Renewable Resource Integration Issues
- Transmission Constraints

Can tidal energy be part of the solution?

Ocean Energy Vision for the U.S.

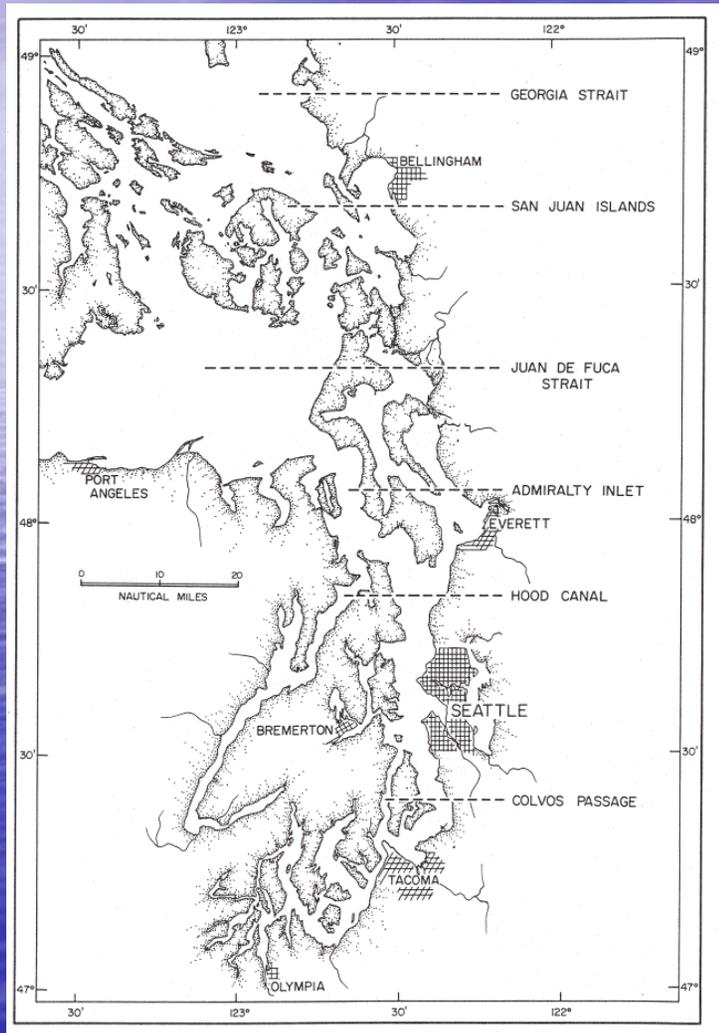
EPRI

ELECTRIC POWER
RESEARCH INSTITUTE



Credible potential to
ultimately meet nearly 5-10%
of national demand

Snohomish PUD Tidal Energy Exploration



Snohomish PUD has received preliminary permits to study seven sites in the Puget Sound:

- Spieden Channel
- San Juan Channel
- Guemes Channel
- Deception Pass
- Admiralty Inlet
- Agate Passage
- Rich Passage

Potentially over 100 average MW if all sites were developed.

Past development of the tidal resource has involved barrages:

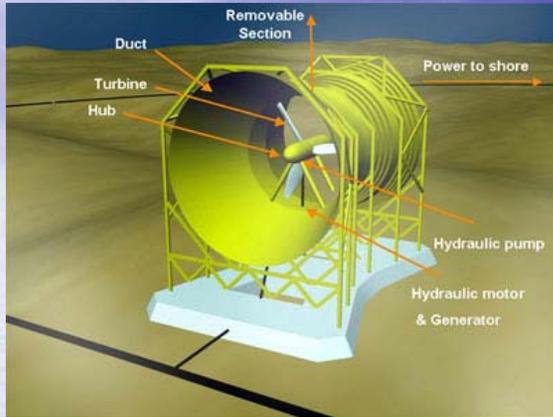


250MW barrage in La Rance, France
(constructed 1960)

- Dam constructed across estuary requiring long construction time and large financial commitment
- Power produced by impounding tidal waters behind dam
- Drastically alters circulation of estuary in addition to attendant problems with conventional hydroelectric
- Low-cost power production at very large scale

Clearly not a viable approach for Puget Sound...

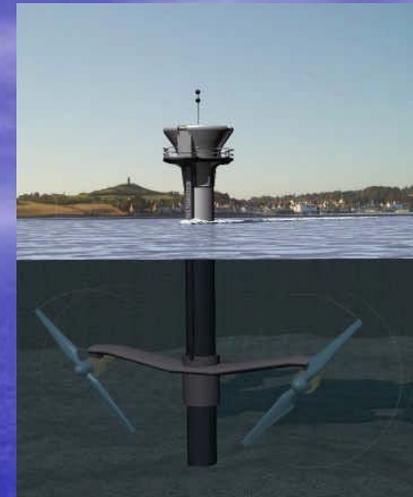
New Tidal Energy Technology



Lunar Energy – UK



Verdant Power – U.S.



Marine Current Turbines - UK



Clean Current - Canada



Open Hydro - Ireland



Tidal vs. Wind Comparison:

1MW wind turbine
compared with
1MW tidal turbine

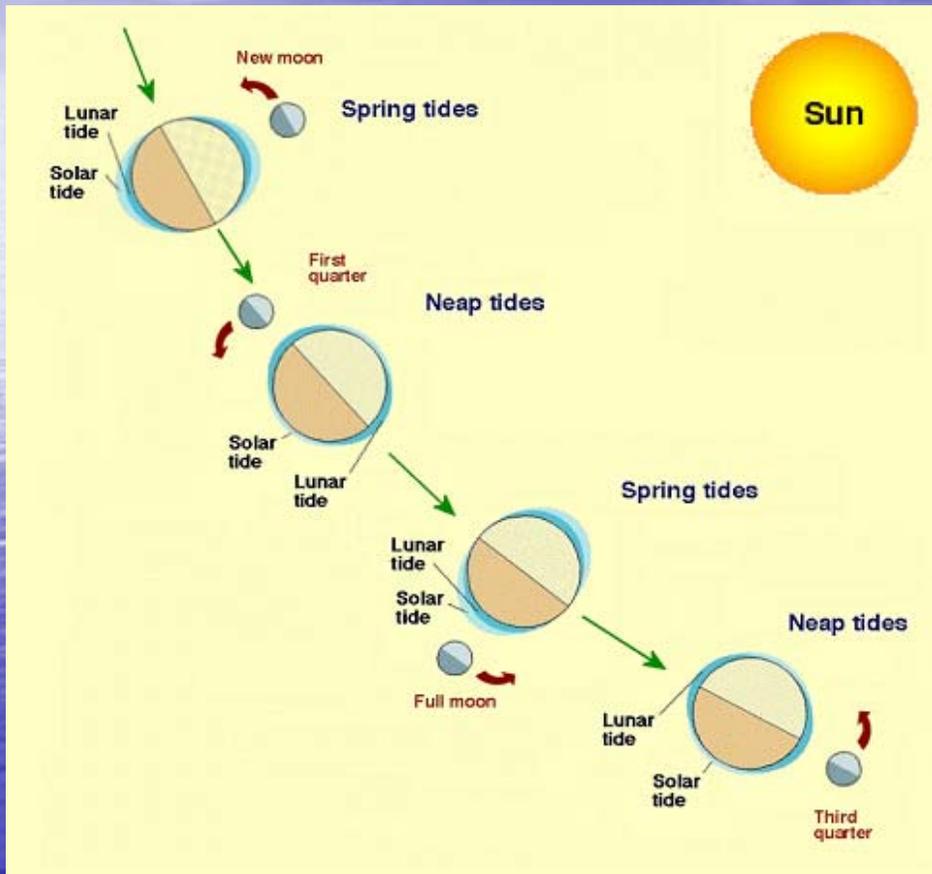
Tidal turbines
rotate at only 20-
30 rpm.

Utility Industry Strategic Fit

- Climate Change
 - Tidal = Clean, renewable, emission-free energy
 - Meets Renewable Portfolio Standard requirements
 - Likelihood of society imposed costs on carbon emissions
 - Carbon “cap and trade”, carbon tax, etc.



Utility Industry Strategic Fit



- Predictable
 - Determined by the motion of the moon and sun
 - Mitigates integration issues associated with other intermittent renewable resources

Utility Industry Strategic Fit

- Located close to population centers
 - Diminishes/delays need for additional transmission infrastructure
 - Distributed Generation potential
- Energy Security & Reliability
 - Contributes to a more diversified and robust regional and national energy portfolio



Economic Development

- Technology Cluster Potential
 - Ocean energy research and development
 - Device manufacturing and installation
 - Tidal and wave energy plant operation and maintenance
 - Spin off industries



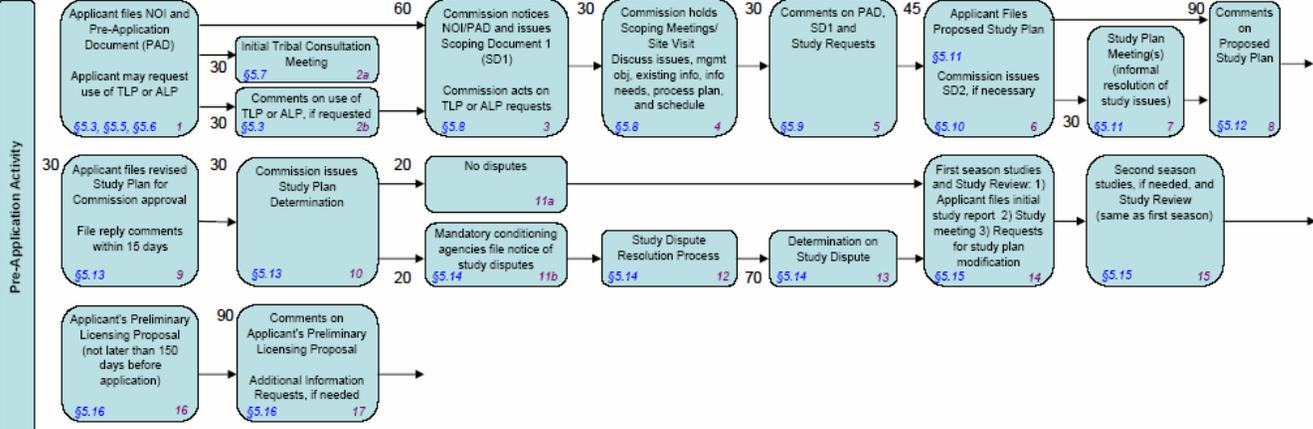
Issues/Questions

- Technical/Economic
 - Does/will the technology represent true utility scale power potential?
 - Can this technology be deployed in Puget Sound cost effectively?
- Regulatory
 - Lack of clarity regarding federal/state/local permitting requirements.
- Multi Use
 - Great breadth of stakeholders in the Puget Sound.
- Environmental
 - Potential effects on fish/marine mammals and habitat.

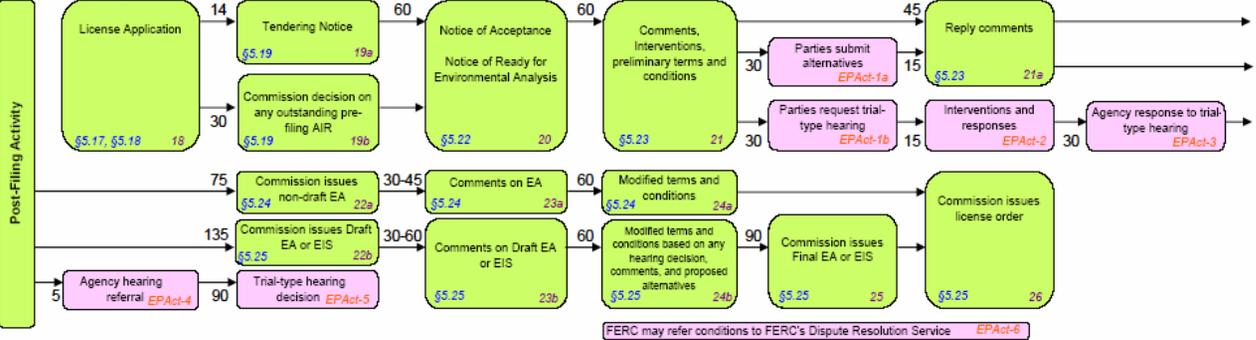
The FERC Licensing Process

Integrated Licensing Process (Section 241 of the Energy Policy Act of 2005)

5.5-5 years before expiration for relicense



2 years before expiration for relicense



FERC may refer conditions to FERC's Dispute Resolution Service EPAAct-6

*Section 241 of the Energy Policy Act of 2005 in pink.

Alternative Licensing Process

Applicant's Pre-Filing Process

Form Working Group With State and Federal Agencies, Citizen Groups And Indian Tribes

Prepare Communications Protocol

Request Use of Alternative Process

FERC Issues Notice of Request to Use Alternative Process

Issue Information Package

Conduct Cooperative Scoping To Identify Issues

Conduct Studies

File At FERC Final Application And Preliminary Draft Environmental Review Document

Traditional Licensing Process

Applicant's Pre-Filing Process

Issue Information Package

Hold Public Meeting

Consult With Federal And State Agencies And Indian Tribes On Studies

Conduct Studies

File Application With FERC

Other Federal Agencies

- Army Corps of Engineers
- NOAA/National Marine Fisheries Service
- Dept. of Fish and Wildlife
- Environmental Protection Agency
- Dept. of the Interior
- Coast Guard
- Marine Minerals Service

Tribal Interests

- Intervening Tribal Governments

- Sauk-Suiattle Indian Tribe
- Swinomish Tribal Community
- Tulalip Tribes

- Identified Tribal Governments

- Jamestown S’Klallam Tribe
- Lower Elwha Klallam Tribe
- Lummi Nation
- Muckleshoot Tribe
- Nisqually Tribe
- Nooksak Tribe
- Port Gamble S’Klallam Tribe
- Puyallup Tribe
- Samish Indian Nation
- Skokomish Tribe
- Squaxin Island Tribe
- Stillaguamish Tribe
- Suquamish Tribe
- Upper Skagit Tribe
- Yakama Nation

Washington State Agencies

- Department of Ecology
- Dept. of Natural Resources
- Dept. of Fish and Wildlife
- Dept. of Archaeology and Historic Preservation
- Parks and Recreation Commission
- Dept. of Community, Trade & Economic Development
- Dept. of Transportation
- Local governments – Shoreline development

Current Status



Large resource
Strong currents



Small resource
Weaker currents

- Partnering with the Electric Power Research Institute and the University of Washington.
- Funding support from the BPA.
- Preliminary studies are investigating:
 - Tidal current characterization
 - Environmental and Multi-use issues (FERC PAD development)
 - Bathymetry and Geotechnical data
 - Grid interconnection
 - Economic assessment
 - Energy conversion device technology assessment

Needs

- Research and Development Funding
- Environmental Studies Funding
- Effective FERC pilot plant licensing process
- State and local permitting clarity/facilitation
- State Leadership Mandate in support of ocean energy development

Questions?

www.snopud.com

cwcollar@snopud.com