Snohomish County PUD

Tidal Power Initiative

Agenda

- Snohomish PUD Overview
- Tidal Energy Overview
- Puget Sound Resources
- Current Status
- Path Forward

Snohomish PUD Overview

- Largest of 28 PUD's in Washington
- Serve population of ~750,000
- Annual energy sales of ~8,000,000 MW-Hrs
- ~90% of power from BPA
  - Largest BPA customer
- 80% hydro, 9% nuclear, 8% coal

The Challenge

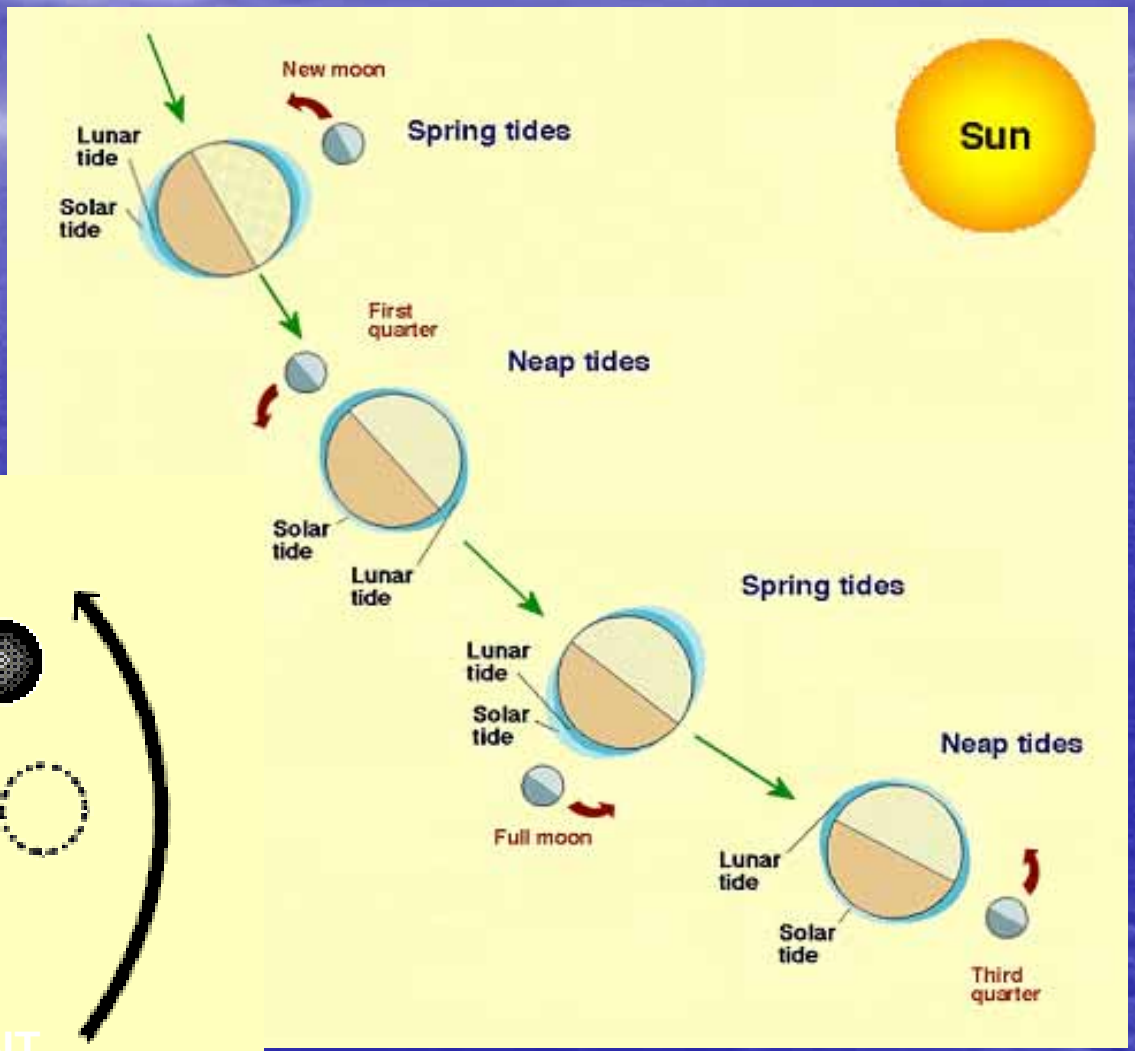
- Service Region Growth
  - Fastest growing county in the state - 10,000 new connections/year
  - Load growth of 15 to 20 aMW/year
- Renewable Portfolio Standard
  - Requires the addition of ~140 aMW by 2020.
- Wind/Intermittent Renewable Resource Integration Issues
- Transmission Constraints

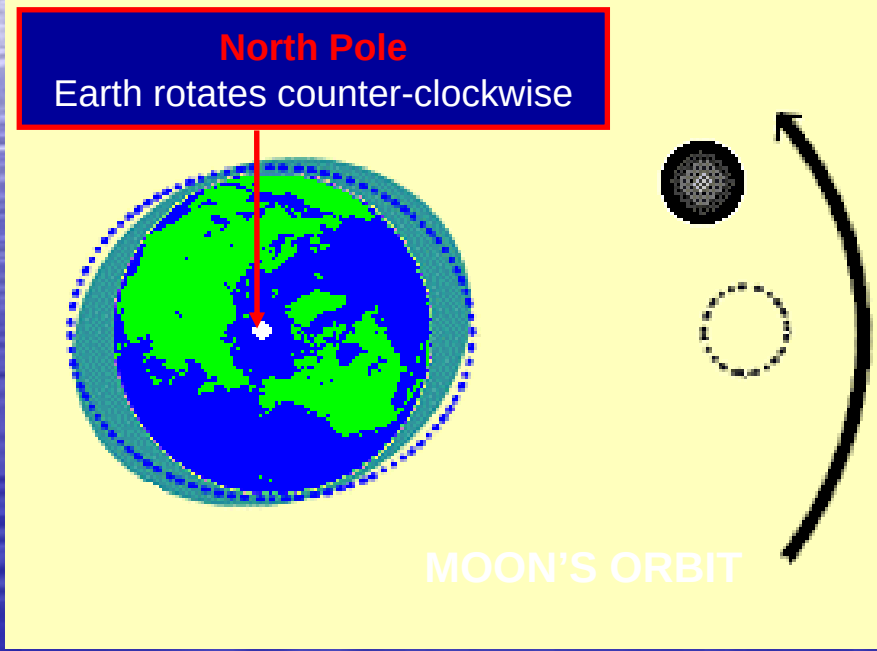
Why Tidal?

- Renewable
- Clean/Emission-Free
- Close to the loads
- Increasing level of global R&D
  - Potential for cost competitiveness
- Responsibility to investigate potential resources in our own backyard

Predictable!

Tidal changes in sea level occur as Earth rotates beneath bulges in ocean envelope, which are produced by solar and lunar gravitational forces.

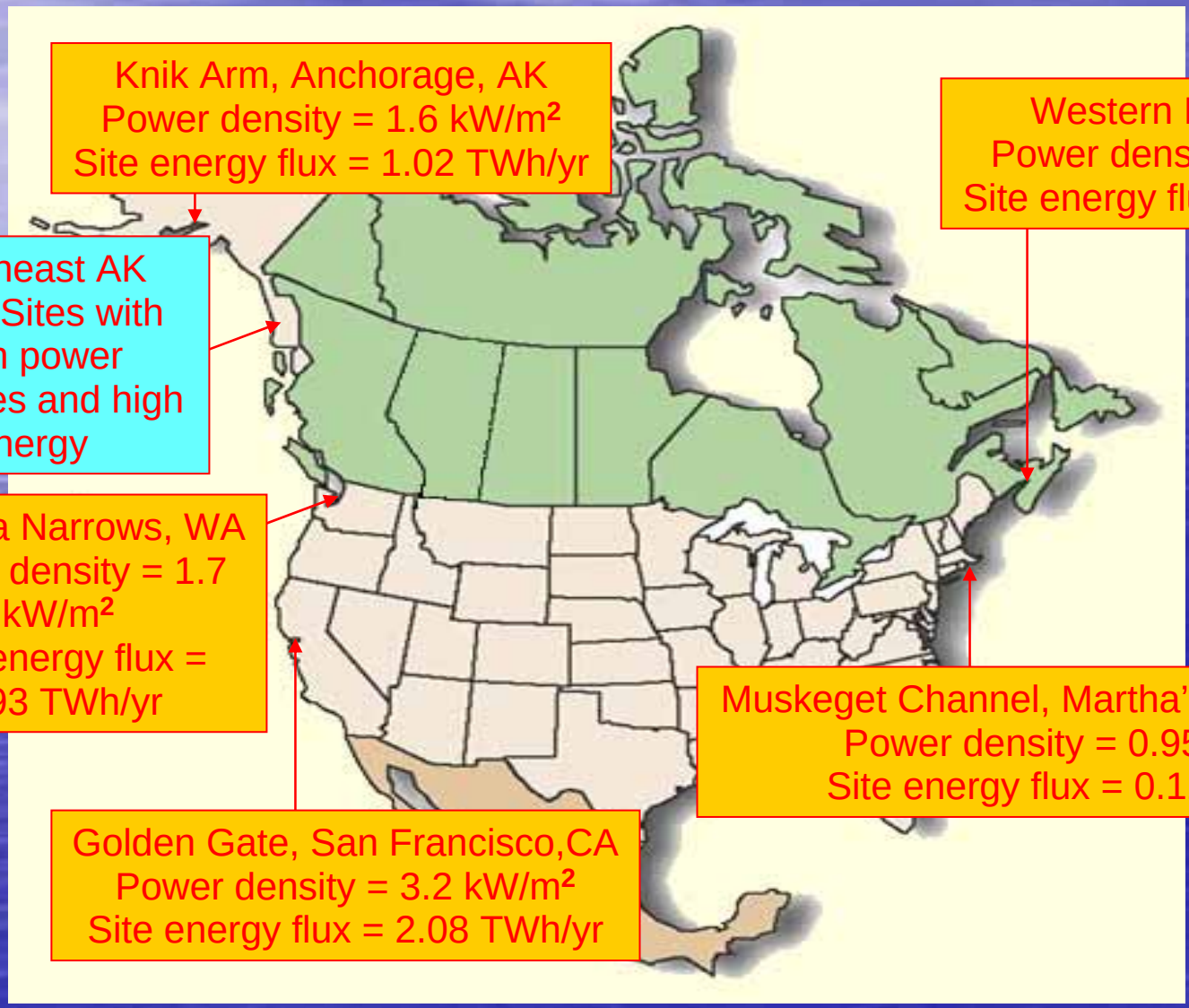


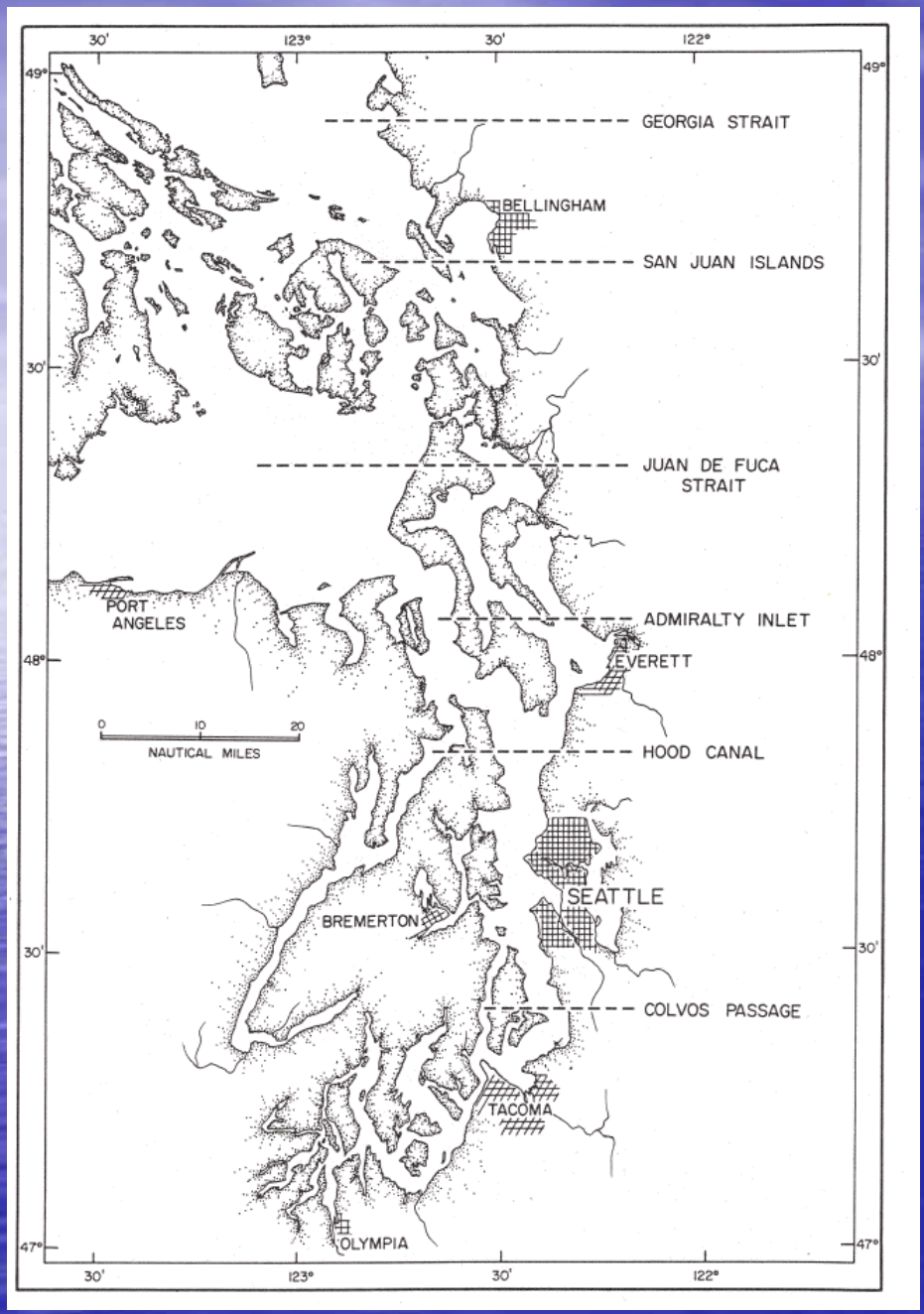


Tidal Current Turbines

- GCK (vertical-axis, Gorlov helical rotor)
- Lunar Energy (h-axis, shrouded rotor)
- Marine Current Turbines (h-axis, open rotor)
- Open Hydro (h-axis, open rotor, rim-drive)
- SeaPower (vertical axis, Savonius rotor)
- SMD Hydrovision (h-axis, open rotor)
- UEK (h-axis, shrouded rotor)
- Verdant Power (h-axis, open rotor)

Tidal Resource Examples





The Puget Sound:

- Seven sites under consideration by Snohomish:
  - Spieden Channel
  - San Juan Channel
  - Guemes Channel
  - Deception Pass
  - Admiralty Inlet
  - Agate Passage
  - Rich Passage
- Tacoma Narrows site under investigation by Tacoma Power
- Potential of over 100 aMW if all sites were developed.

Issues

- Regulatory
  - Jurisdictional and permitting considerations.
- Technical
  - Does/will the technology represent true utility scale power potential?
- Economic
  - Can this technology be applied in Puget Sound cost effectively?

Issues

- Environmental
  - Fish and Marine Mammals
  - Habitat protection
  - Impact on estuarial flows
  - Aesthetics
  - Impact of Arrays vs. Devices
- Multiple Use
  - Impact on fishing and recreational interests.

Current Status

- Snohomish permit applications submitted to FERC in June 2006.
  - No preliminary permits received
  - FERC re-evaluating permitting process
- Partnering with Electric Power Research Institute and University of Washington staff.

Path Forward

- Site evaluations and economic feasibility studies.
- Detailed resource definition (Acoustic Doppler Current Profiling) at viable sites.
- Current velocity prediction model.
- Engineering studies & Outreach for potential pilot site(s):
  - Current velocity, bathymetry, geo-tech, device selection, environmental/permitting, multi-use considerations, marine construction plans, etc.
  - Install, startup, operate, and evaluate pilot plant.

Questions?