

# Northwest National Marine Renewable Energy Center

Pacific Marine Energy Center

22 February 2012



# Today's Purpose & Goals

- Present to you:
  - Who we are, what we are proposing & why
  - Information about ongoing NNMREC activities and plans
  - Description of Pacific Marine Energy Center
- Input from you:
  - Potential sites
  - Zoning impacts we need to be aware of
  - Ocean user issues
  - Public acceptance
  - Shore-side capabilities
  - Who we need to engage



# NNMREC Mission and Objectives

**NNMREC's mission is to facilitate the commercialization of marine energy technology, inform regulatory and policy decisions, and to close key gaps in scientific understanding with a focus on student growth and development.**

## **NNMREC's Project Objectives:**

- **Develop facilities to serve as integrated test Center for wave & tidal energy developers**
- **Evaluate potential environmental and ecosystem impacts**
- **Optimize devices and arrays for deployment**
- **Improve forecasting**
- **Increase reliability and survivability**



# Technical Approach

## Environmental

*Sediment Transport*

*Marine Mammals*

*Benthic Ecosystems*

*EMF and Acoustics*

*Site Characterization*

## Technical

*Testing/Demonstration*

*Wave Forecasting*

*Survivability/Reliability*

*Advanced Materials*

*Device/Array*

*Optimization*

## Social

*Fisheries/Crabbing*

*Outreach/Engagement*

*Existing Ocean Users*

*Local/Oregon Economy*



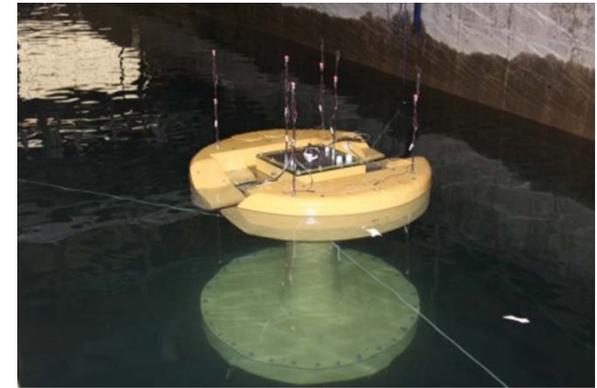
# Vision for NNMREC's Role in Oregon

- Expansion of research activities supporting development and deployment
- Continued developer support via joint research projects and **scaled testing**
- Continued developer support via **open ocean test facility at Newport**
- **Grid connected test facility** in Oregon providing TRL 5 – 9 testing via NNMREC: Pacific Marine Energy Center, PMEC



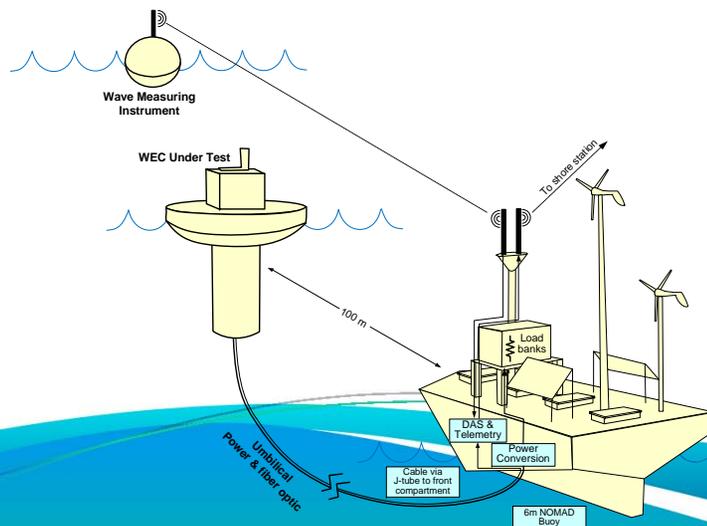
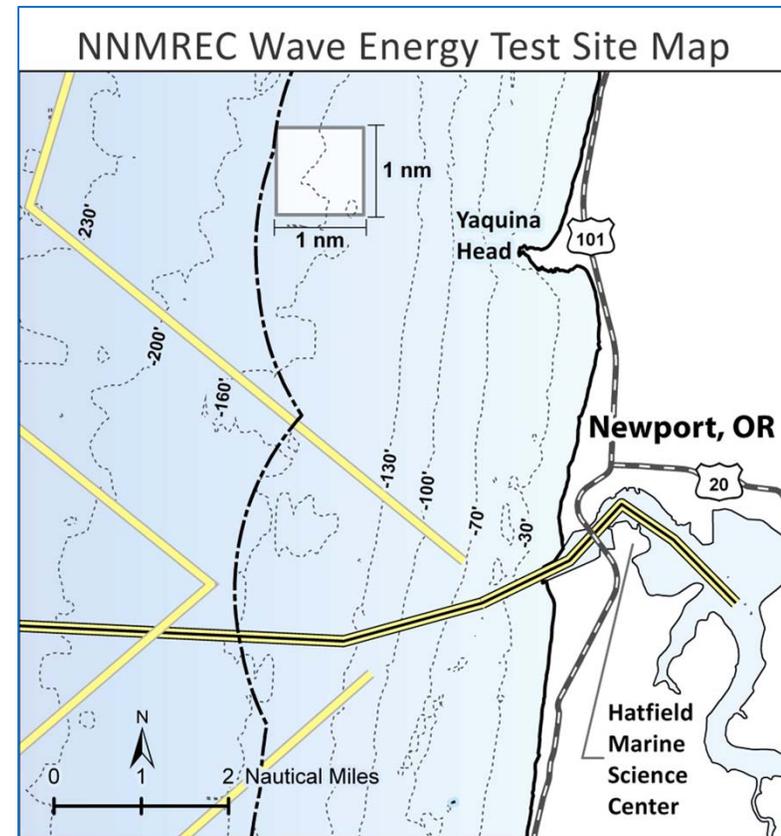
# Developer Scaled Testing Support

In 2011 NNMREC tested five different small scale technologies in our facilities



# Newport Test Site Development

- Permitted Open-Ocean Test Site
- Available Year round
- 2 devices can test concurrently
- Testing Scenarios:
  - Self-contained testing
  - Connected to ship
  - Connected to Ocean Sentinel



# Ocean Sentinel MOTB

- Based on 6m NOMAD design, working with AXYS Technologies
- Initial average power rating 100kw average
- Load bank: power processing & dissipation
- Data transmission via umbilical & wireless telemetry
- Device testing May - October
- Environmental testing October – May
- Expected delivery Mar '12



# Environmental Studies at the Test Berth Site

## OWET (Oregon Wave Energy Trust) collaborations

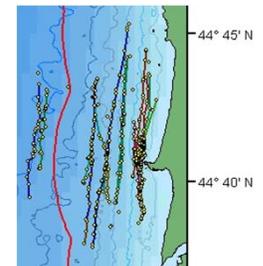
### • Baseline characterization of benthic community

- Box Core collects infaunal invertebrates and sediment for grain size and organics analysis
- Beam Trawl collects fish and large invertebrates, sometimes outfitted with video camera
- CTD casts collect water properties



### • Distribution and movement patterns of gray whales

Estimations of speed, distance to shore, bottom depth, sinuosity obtained for each tracked individual



## NNMREC Environmental "Seed Projects"

- Gap analysis of seabird colony and at-sea distributional information
- Development and calibration of a sound propagation model
- Population dynamics of mysid shrimp in relation to natural and artificial structures in habitats targeted for wave energy development



July 14, 2010

# Grid-Connected Site: The Oregon Advantage

- Resource required for TRL 9; summer mild for TRL 5-7
- Environmental testing results can be leveraged along the US West Coast
- Proximity to manufacturers
- Strong state support
- Oregon Wave Energy Trust
- Site accessibility
- NNMREC's "one stop shopping" for testing
- Oregon State University research leadership

WAVE

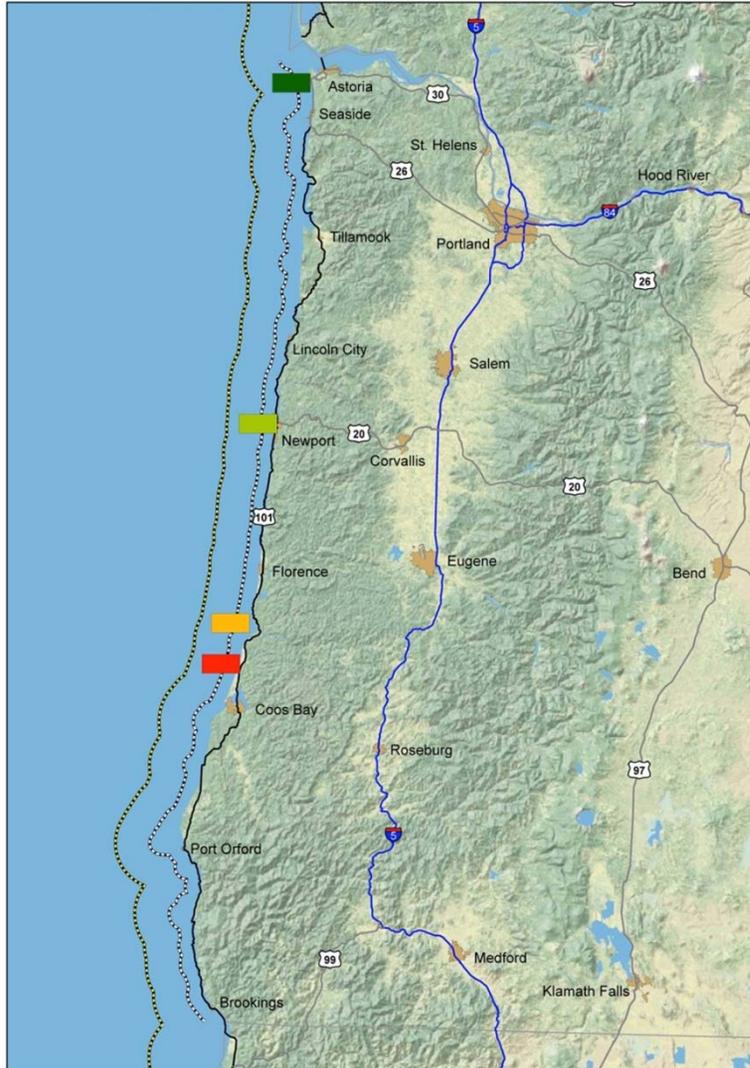


# Grid-Connected Site: Feasibility Study

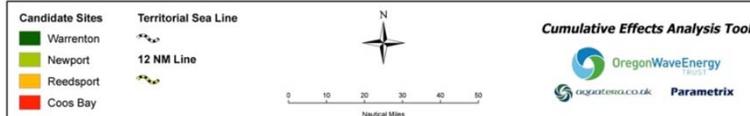
- **Four sites selected: Warrenton, Newport, Reedsport, Coos Bay**
- **Desired Site Characteristics**
  - 60m in depth, 80 – 100m optimal
  - Sandy or soft bottom preferred
  - Proximity to deep water port (min 30 – 35m depth)
  - Suitable on-shore location for monitoring
  - Proximity to Interconnection: Maximum desired cable length: 3 – 5 miles
  - Proximity to O&M facilities: 1 hr transit each way
  - Minimal negative effects on environment and prior use



# Potential PMEC Sites

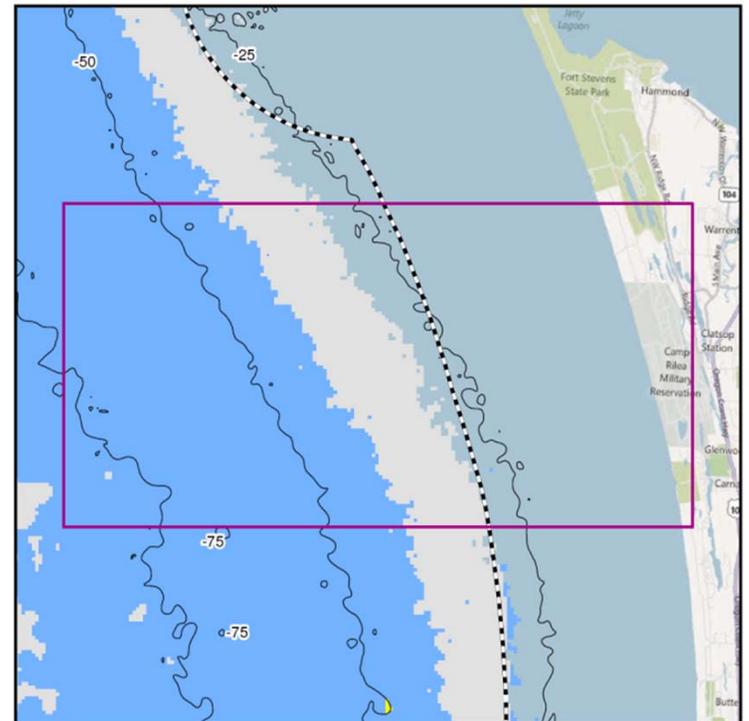
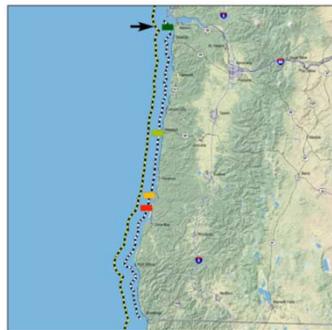


North Coast: Warrenton  
Central Coast: Newport  
South Central Coast: Reedsport  
and Coos Bay



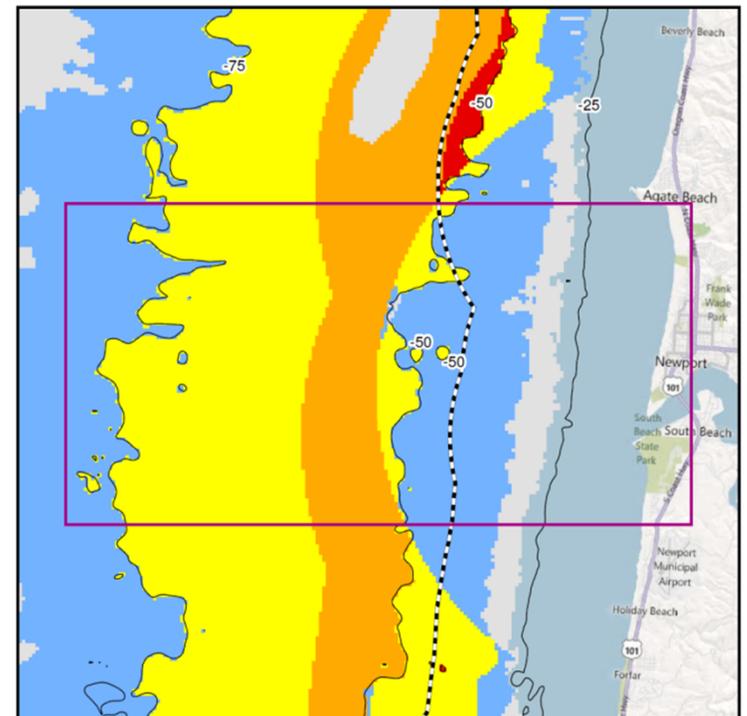
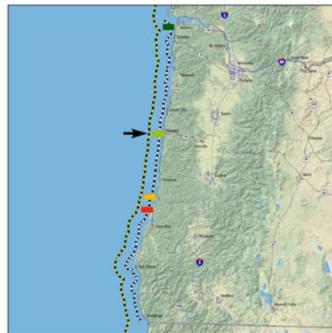
# Warrenton, OR

- Camp Rilea, Oregon's only DoD facility located here (National Guard)
- Shortest distance to Portland and Columbia River
- Potentially less impact on commercial fishing
- Longest transmission distance: 8.9NM to 75m depth
- Slowly increasing water depth



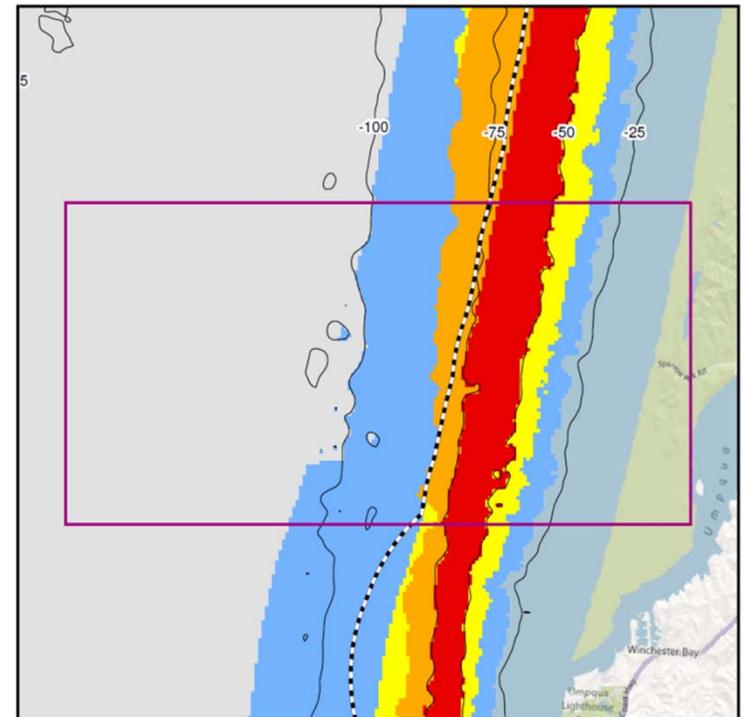
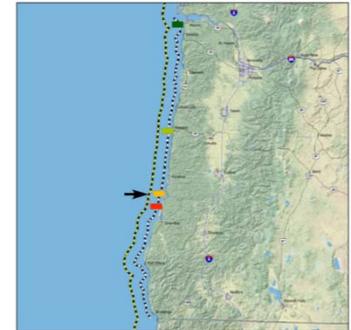
# Newport, OR

- Proximity to current test site; City leaders have vision of marine science & engineering hub
- Strong relationship with fishing community
- Shallowest port of those considered
- Good proximity to OSU's ship operations, HMSC and Corvallis
- Good proximity to NSF's OOI effort
- Slowly increasing water depth



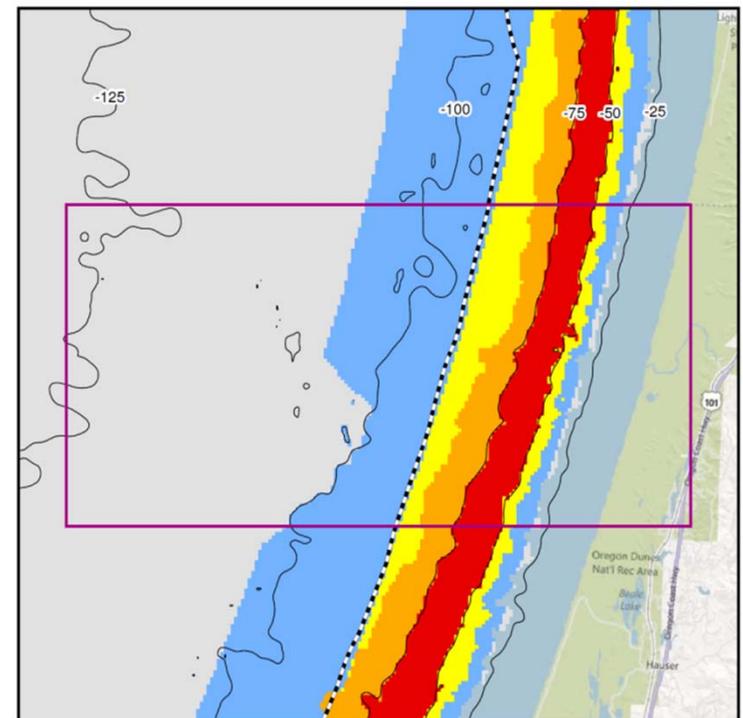
# Reedsport, OR

- Proximity to OPT project—possibility for shared infrastructure (cable and on-shore assets)
- City leaders appear to be receptive to dual use
- Moderate proximity to very good deep water, all weather port (Coos Bay)
- Good proximity to maintenance location (Winchester Bay)
- Rapidly increasing water depth

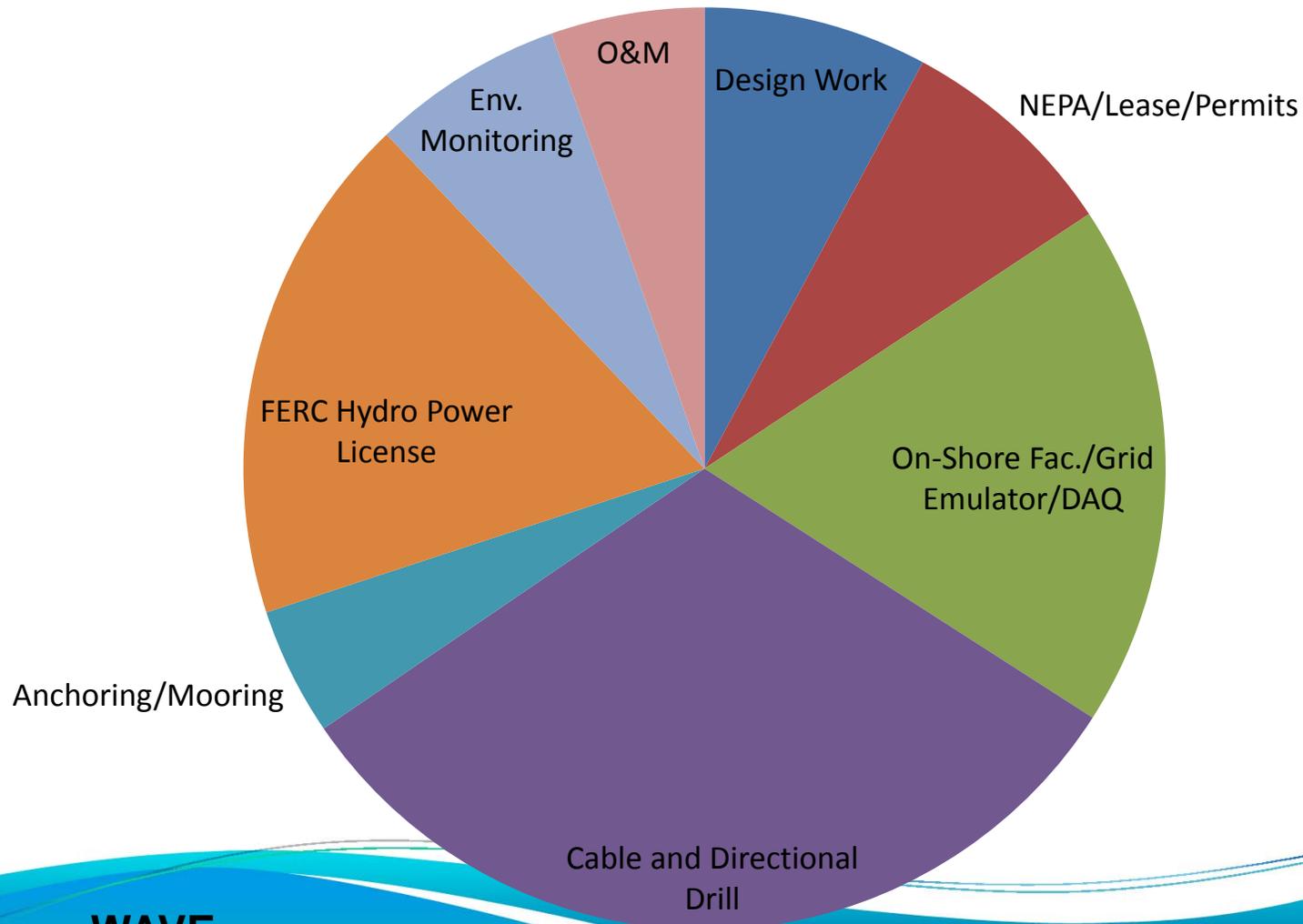


# Coos Bay, OR

- Proximity to possible Principle Power off-shore wind project—possibility for shared infrastructure (cable and on-shore assets)
- Very close proximity to very good deep water, all weather port
- Shortest transmission route
- Longest driving distance from PDX
- Rapidly increasing water depth
- Best site for deployment and maintenance



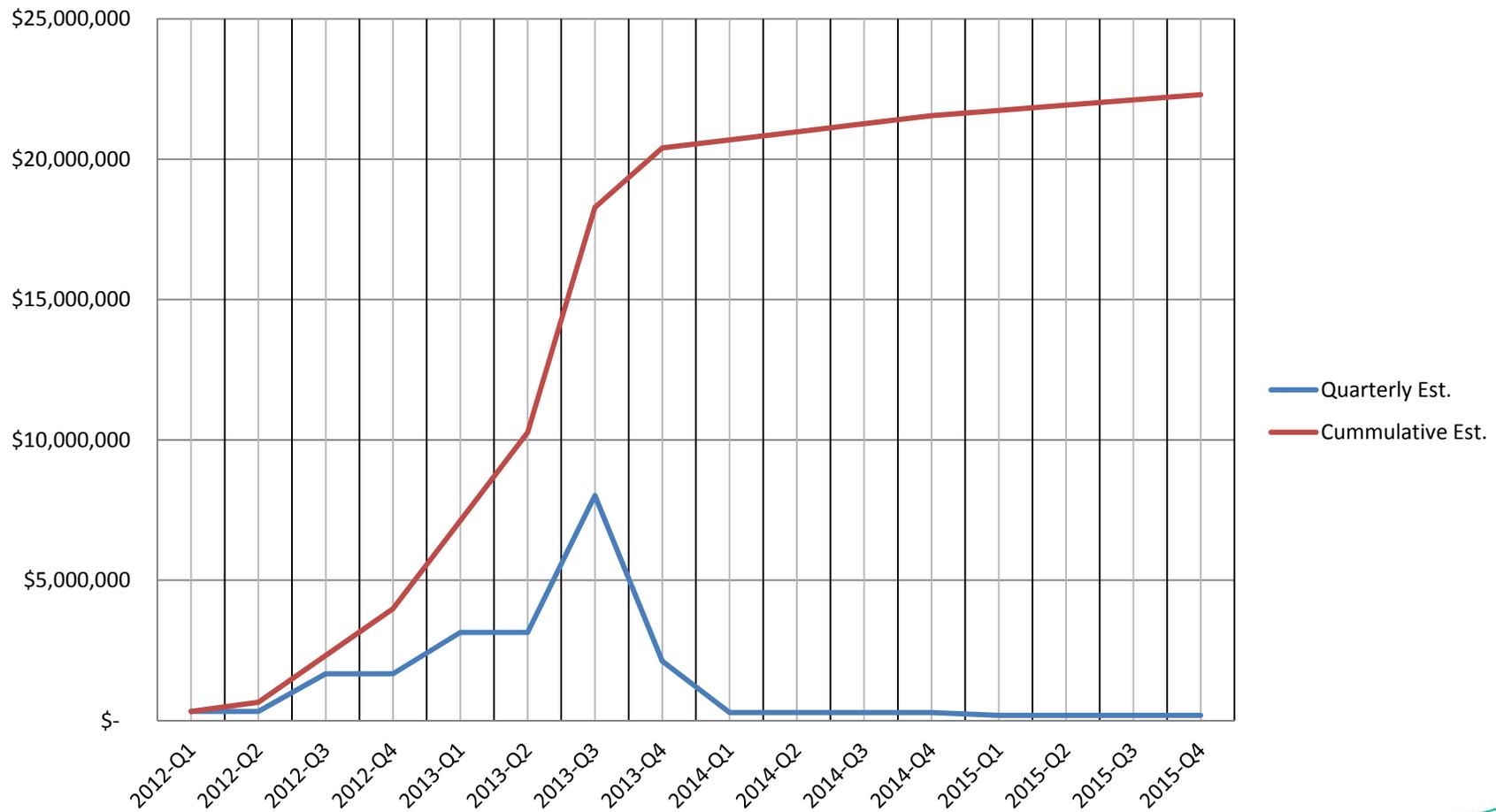
# Major Cost Categories for Grid Connected Facility



**WAVE**



# Cost Estimates for Grid Connected Facility



# Our Process

- Goal: Eligibility for USDOE funding this year (2012)
- Meet with smaller groups of community leaders to identify issues of concern and interest in each area
- Prepare preliminary development plans for sites
- Meet with larger community group to vet local options
- Select site
- Prepare Development Plan
- Apply for funding

