APPENDICES

[redacted]

Appendix A: Documentation of Legal Qualifications

Appendix B: Documentation of Technical Qualifications

- [redacted]

Appendix C: Documentation of Financial Qualifications

- [redacted]

Appendix D: Letters of Support

Appendix E: Feasibility Study for a Grid Connected Pacific Marine Energy Center

This final report, which was completed in December 2011, is provided as documentation of the Technical Evaluation of Candidate Sites conducted as part of the PMEC site selection process.

Appendix F: Newport Community Site Proposal for PMEC

The proposal developed by the Newport Community Siting Team for the Pacific Marine Energy Center, which was submitted to NNMREC-OSU in December 2012, is included here to provide additional information about the PMEC site selection process and site characteristics.

Appendix G: Examples of WEC Device Technologies

[redacted]

APPENDIX A: DOCUMENTATION OF LEGAL QUALIFICATIONS

JOHN A. KITZHABER, MD
GOVERNOR

February 5, 2013

Ellen Aronson, Pacific Region Director
Bureau of Ocean Energy Management
770 Paseo Camarillo, 2nd Floor
Camarillo, CA 93010

Dear Ms. Aronson:

I am writing on behalf of the Governor to confirm that OSU is an agency of the State of Oregon pursuant to Oregon Revised Statutes 351.011. Further, the Governor's Office authorizes Oregon State University, through the Oregon State Board of Higher Education, to negotiate the terms and conditions and enter into a renewable energy lease with the Bureau of Ocean Energy Management for the purpose of constructing and operating a Pacific Marine Renewable Energy Center on the Outer Continental Shelf (OCS).

Oregon State University (OSU) is home to the Northwest National Marine Renewable Energy Center (NNMREC). Within OSU's research and economic development mission, NNMREC is intended to serve as an integrated, standardized test center for entities interested in developing wave energy devices. To that end, NNMREC proposes to construct and operate a Pacific Marine Renewable Energy Center on the OCS.

Please contact me with any questions regarding this authorization.

Sincerely,

Gabriela Goldfarb
Policy Advisor - Natural Resources
Office of Governor John Kitzhaber

254 STATE CAPITOL, SALEM OR 97301-4047 (503) 378-3111 FAX (503) 378-6827
WWW.OREGON.GOV

APPENDIX B: DOCUMENTATION OF TECHNICAL QUALIFICATIONS

APPENDIX C: DOCUMENTATION OF FINANCIAL QUALIFICATIONS

APPENDIX D: LETTERS OF SUPPORT

APPENDIX E: FEASIBILITY STUDY FOR A GRID CONNECTED PACIFIC MARINE ENERGY CENTER

Northwest National Marine Renewable Energy Center Oregon State University

Feasibility Study for a Grid Connected Pacific Marine Energy Center

This report was developed by Pacific Energy Ventures, with technical support from Parametrix, on behalf of Oregon State University.

This page intentionally left blank.

Table of Contents

APPENDICES

I. Background

The Northwest National Marine Renewable Energy Center (NNMREC), one of three federally sponsored ocean energy centers, is a partnership between Oregon State University (OSU) and the University of Washington (UW). As national leaders in ocean energy research and development, NNMREC-OSU focuses on wave energy and NNMREC-UW focuses on tidal energy. The National Renewable Energy Lab (NREL) is also a key partner in the center. For the purposes of this report, references to NNMREC assume to be that of NNMREC-OSU.

Since its establishment in 2008, NNMREC has made great strides to assist and guide the development of the wave energy industry in the US through technology testing and validation, environmental study and analysis, and understanding the human dimensions of the emerging ocean energy industry. One of NNMREC's primary roles is to serve as an integrated, standardized test center for US and international wave energy developers. NNMREC is also home to world-class research facilities available to NNMREC and its partners, including the O.H. Hinsdale Wave Research Laboratory, the Wallace Energy Systems and Renewables Facility, and Hatfield Marine Science Center.

In addition to its land-based facilities, one of NNMREC's distinguishing attributes is its proximity to the ocean itself. The ocean waters just north of Newport Harbor have served as a primary testing ground for the wave energy industry in the US. In addition to testing various energy generation technologies, significant investment has been made in understanding ecosystem interactions and socioeconomic effects of this new industry. After four years of laboratory study and analysis, NNMREC will be home to the nation's first ocean test berth (non-grid connected) in 2012, capable of testing a variety of ocean energy technologies while monitoring interactions with the local ecosystem. At this Newport ocean site, NNMREC aims to have a full suite of testing capabilities to support the advancement of small-scale and full-scale devices supported by both land based and in ocean testing facilities.

While the NNMREC ocean test berth is a critical step forward, developers and policy-makers alike have determined that a full-scale, grid connected ocean test facility is needed to achieve industry commercialization and fully reap the benefits of this clean, renewable energy resource. Fulfilling this need is the primary purpose of the ***Pacific Marine Energy Center (PMEC).***

> ***PMEC Vision:*** *Leverage NNMREC expertise and industry partnerships to develop a full scale, grid-connected ocean energy demonstration center that can accommodate multiple devices of various technology types and scales.*

NNMREC has developed a four-phase approach to achieve the PMEC vision:

- Phase 1: Non-grid connected, ocean testing off the coast of Newport, OR for proof of concept through prototype devices (To commence in 2012).
- Phase 2: Grid Emulation System testing for prototype devices and system verification (Involves site selection, design and installation of subsea transmission cable and shore-based infrastructure).

- Phase 3: Grid connection of the cable to support final demonstration and testing (involves permitting for grid connect and shore-based infrastructure).
- Phase 4: Additional grid connected ocean test berths to support final demonstration and testing (Involves design and installation of a second subsea transmission cable and shore-based infrastructure).

As noted, the non-grid connected ocean test site discussed above in Phase 1 will be located just north of Newport, OR, approximately 2-3 miles offshore, and NNMREC plans to begin wave energy device testing at this location in the summer of 2012. It is possible that Phases 2-4 could be performed at the ocean test site off the coast of Newport; however, additional site characteristics will be required for the services provided in Phases 2-4. For example, to meet required water depths for some devices, the test site would need to be deeper than the current Newport site. Therefore, three other locations are being evaluated along with the Newport site as part of this feasibility study. The purpose of this study is to:

- **Identify the site characteristics required for the successful development of PMEC; and**
- **Conduct a technical evaluation of candidate sites that meet these criteria.**

II. Pacific Marine Energy Center

A grid connected ocean energy demonstration center is a critical component of advancing the marine energy industry in the US. The interest and value in this type of test center has been documented in numerous reports reflecting industry and stakeholder interests. In particular, The Ocean Renewable Energy Coalition's recently published MHK Roadmap[1] for ocean energy acknowledges that the development of a demonstration center is a necessary step in commercializing this sector. Furthermore, the report acknowledges the ***most pronounced underlying success factor for this industry is the ability to focus resources – commercial, financial, scientific and political – on deploying MHK devices and studying their interactions with the natural environment, increasing technical efficiencies and learning from direct experience.*** PMEC can meet this objective by serving as the cornerstone for the industry to not only maximize current investment, but also to direct future investment in such a way that accelerates the development of new ocean energy generating technologies.

To that end, the PMEC is designed to demonstrate the viability of marine energy off the northwest coast of the US by providing a fully functional ocean test facility for prototype and commercial scale devices (TRL 5-9). PMEC will offer up to four test berths connected to the regional grid, and will be capable of testing individual devices up to one megawatt in size. By offering numerous device testing options in conjunction with transmission and grid interconnection infrastructure, the PMEC will facilitate wave

[1] http://www.oceanrenewable.com/wp-content/uploads/2011/05/MHK-Roadmap-Final-November-2011.pdf

energy technologies' progress from early-stage ocean testing through final demonstration for commercialization use. Specifically, the PMEC will meet the following key industry development needs:

- Site for testing subscale devices with grid simulation capability;
- Ocean test berth for single device testing;
- Multiple-berth testing (e.g., small arrays of 2 to 10 devices) for commercial scale devices and prototypes; and
- Opportunity for potential expansion to commercial activity.

The PMEC is intended to be a full service test facility. Although the specific PMEC offerings are still under development, it is expected they will include, but are not limited to the following:

- Standardized testing at reduced cost;
- Standardized power analysis at accredited facility;
- Grid interconnection data from accredited facility;
  - Grid synchronization data
  - Standardized fault testing
- Power dissipation;
- Demonstration of power on the grid (e.g., technical and contractual);
- Procedures and protocols for all stages of development.

In addition, the PMEC will provide assistance through each stage of testing:

- Pre-Test Stage
  - Guidelines for Streamlined Permitting Process
  - Deployment and Testing Plans
  - Research and Monitoring Plans (including IP plans)
- Test Stage
  - Testing Protocols and Procedures
  - Device Monitoring (power and performance)
  - Environmental Monitoring
- Post-Test Stage
  - Data Analysis
  - Demobilization
  - Decommissioning

Figure 1. Ocean Power Technologies PB150 being deployed in Scotland. A similar device is planned for deployment in Oregon in 2012.

III. The Oregon Advantage

The State of Oregon and the Northwest Region of the US are uniquely positioned to lead the development of ocean energy. Oregon and the Northwest have invested more resources and expertise than any other region in the US. In addition to successful demonstration projects, Oregon will likely be

home to the Nation's first commercial license for ocean generated electricity. Oregon has clearly demonstrated its ability to attract investment and develop successful projects.

In short, the Oregon advantage consists of:

- Resource Required to Test TRL 9 Utility Scale Devices (and summer climates suitable for TRL 5-7)
- Information Transferable to US West Coast Commercialization
- Oregon Wave Energy Trust and State of Oregon
- Proximity to Supply Chain
- Site Accessibility
- Comprehensive R&D Facilities
- Stakeholder Consortium

Resource Required to Test TRL 9 Utility Scale Devices (and summer climates suitable for TRL 5-7)

Oregon's wave resource is one of the best in the US, giving developers the opportunity to test a range of scaled devices, including, TRL 5-7 and most importantly TRL 9 testing capability. Although certain small scale devices may be preferable to test the only the summer months, the Oregon resource has the ability to demonstrate to utilities and other investors the commercial viability and survivability of related commercial technologies.

Information Transferable to US West Coast Commercialization

The information collected and analyzed at the PMEC in Oregon can be applied to future commercial developments along the west coast. Because the Oregon coastline is similar to the California and Washington coasts, both physically and biologically, information regarding site development, interactions with the environment, and other attributes of project development can be used to inform future ocean energy projects on the US west coast.

Oregon Wave Energy Trust and the State of Oregon

Oregon is home to the nation's only state-sponsored public/private partnership established with the sole mission to advance the wave energy industry. Since its inception in 2007, the Oregon Wave Energy Trust[2] (OWET) together with the State has invested over $10 million to advance wave energy development, funding numerous environmental, social and technical studies needed to support the industry. Furthermore, Oregon is home to multiple Technology Readiness Level (TRL) 5/6 and 7/8 and ocean energy companies, and OWET has provided direct cost match to various US Department of Energy (USDOE) sponsored programs.

Proximity to Supply Chain

Oregon is home to world class manufacturing and supporting industries for the ocean energy sector. Facilities both in Portland and along the coast are situated to construct, deploy and maintain wave energy devices and supporting services.

Site Accessibility

All potential sites are within a three hour drive of the Portland International Airport, and within 125 miles of OSU's campus in Corvallis. In addition, all sites are located within 50 nm of a deep water port that will allow for easy access to manufacturing capabilities, deployment services, and vessels.

[2] www.oregonwave.org

Comprehensive R&D Facilities

NNMREC has become a "one stop shop" for the wave industry, providing comprehensive testing facilities for all technologies from early TRL (e.g., wave tank) to advanced TRL (e.g., ocean test berth). With the ability to leverage existing world class research facilities both in Corvallis and at the Hatfield Marine Science Center in Newport, PMEC is the final component that is needed to position the US West Coast as truly competitive in the international marketplace of ocean energy industry.

Stakeholder Consortium

NNMREC is developing an consortium of stakeholders that support the vision of a grid connected test facility in Oregon. The role of this consortium is to provide technical input to both guide and contribute to the PMEC's development. The stakeholders include a variety of industry participants, including technology developers, government agencies and community leaders.

IV. Industry Benefits

A grid connected ocean test facility has been discussed and analyzed at various levels of industry and government. In addition to offering a centralized location for testing and evaluating ocean energy technologies, the PMEC will provide benefits to a variety of industry partners and stakeholders:

Technology Developers

- Provides economical means of deploying and testing prototypes in the ocean environment.
- Leverages infrastructure and experience gained through ongoing and planned investments by DOE, OWET, BOEM, and others.
- Provides performance data for third-party validation.

NNMREC

- Offers centralized location to conduct technological and environmental testing.
- Increases likelihood of significant financial support for testing activities by the public sector, given the unified industry and academic beneficiaries of the project.

State and Federal Government

- Focuses funding for infrastructure across several proposed wave energy projects to benefit the industry as a whole.
- Accelerates information gathering, technology design and testing, as well as environmental impact analysis.
- Provides standardized testing metrics for technology performance evaluation.

West Coast Region

- Limits potential conflicts among competing uses for multiple ocean energy test sites.
- Serves as a "magnet" for federal/regional/private funding for ocean energy research and development.
- Increases efficiency and effectiveness of public funding by concentrating it on one, full-service facility.
- Provides a training ground for future jobs in the ocean energy industry.

V. Technical Evaluation of Candidate Sites

In order to perform a comprehensive evaluation of potential sites for the PMEC, it is important to consider the industry perspective. As such, collection of industry input was the first step in the technical site evaluation. This information was combined with regulatory needs and stakeholder interests to develop both initial screening criteria and detailed site evaluation criteria. The screening criteria were used to select four candidate sites for further evaluation. Finally, the detailed site evaluation criteria were utilized to evaluate the four candidate sites identified.

V.1 Input from Industry

Utilizing resources from NNMREC and OWET, feedback on requirements for an optimal grid connected ocean test site was gathered from industry. This industry input was used as the basis for the preliminary and detailed site evaluation criteria discussed below in Section V.3. In addition, the Cumulative Effects Tool developed by OWET was used to help guide the site evaluation process. For the purposes of this feasibility study, results of the Cumulative Effects Tool analysis are provided in spatial maps included as appendices to this report, including an industry report prepared by Parametrix. The table below summarizes input from industry, representing the most commercially advanced technologies.

Table 1: Industry Input on Site Requirements

Physical	
Min/Max/Optimal water depth for Point Absorbers	○ Single Device: 60m min., 80 - 100m opt., 150m max ○ 10 MW array: bathymetry driven and distance from shore, 100m if close enough to shore
Mooring footprint	○ Single Device: largest radius of 400m, 800m diameter ○ 10 MW array: same as single device until more information collected
Bottom Conditions	○ Preferred Types: sandy/mud bottom ○ Feasible Types: rock bottom (if use drilling to install anchors) ○ Non-feasible Types: reef
Construction	
Assembly/deployment scenarios:	○ Location for pre-commissioning tests of 4 - 8 weeks in sheltered area, min. 30-35m water depth (e.g., Swan Island near Portland or Vigor shipyard in Portland; considering dredging an area that would be deep enough) ○ Either barged to site or towed to site ○ At site, use ballasting to upright the system, then mooring, umbilical etc.
Required facilities:	Place to perform monitoring activities: Space for at least 3 engineers and their laptops, 120ft x 150ft staging area, covered work space of about 90ft x 120ft, AC power 120V, 200A; 240V, 200A; 480V, 200A, 150lbs air, potable water, waste water collection, fork lift, external lighting and shop lighting,

	500sq feet of office space, heating/AC, 120V, 50A; 240V 50A, internet and LAN access, phone lines, restrooms, etc.
Required equipment:	Power monitoring equipment, utility connection with fiber optic communication line
Mode of transport	From fabricator to assembly and deployment area: towed or barged from shipyards in Portland
Construction Window	○ Single Device: 12 months ○ 10 MW array: 6 - 8 months per device.
Interconnection/Power Sale	
Voltage – Min/Max/Optimal:	○ Developers are still investigating (11 - 40kV).
Mooring	○ Number of anchors: 1, 2, 3 or 6 ○ Cable length/type: synthetic line, 4 - 6in. diameter, likely chain, 400m. ○ Installation technique: anchor handling tug, or special purpose barge drop anchors ○ Removal technique: Same as installation. ○ Approach to providing financial surety for removal: bonding
Maximum Cable Length (Subsea/Terrestrial)	○ Single Device: 3 - 5miles subsea, to substation location ○ 10 MW array: similar to single device.
Power Conditioning – onboard or centralized	○ Single Device: Energy storage on WEC, Power Quality leveling improvement on WEC ○ 10 MW array, some energy storage and power quality may be centralized due to power smoothing of multiple device
Load Bank – for non-grid connected device	○ Capacity of load bank on board: example of 400 kW average, 2 MW peak
Operations and Maintenance	
Maximum transit distances for dockside and at-sea maintenance	○ Single Device: 1 hr transit each way (2 - 4 nm dockside, 8 - 12 nm at sea), to allow 6 hrs on site (full day) ○ Multi-Device Array (10 MW): Same as above
Required facilities and equipment: vessel requirements, and similar to above	○ Regular O&M ○ Major overhaul ○ Emergency response

V.2 Initial Site Screening

In order to conduct a detailed site evaluation, an initial set of screening criteria were used to develop a short-list of sites for consideration. In developing the screening criteria both the objectives of the PMEC and industry needs were used. PMEC is designed to test a variety of technologies in the near term (2-5 years) and to have a facility capable of testing both near shore and deep water technologies in the long term (5 - 10 years). Therefore, the near-term focus of the PMEC site will be to accommodate those technologies closest to commercialization (higher TRL levels in need of grid connection) and those currently funded by USDOE. The following screening criterion were developed based on industry needs expressed through project development and site assessment activities in Oregon over the last five years, i.e., technologies closest to commercialization.

Primary Site Requirements:

- Within 50 nautical miles of deep water port
- Within 15 nautical miles of service port
- Water Depth 60 - 100 meters
- Within 5 miles to 115kv transmission line from shore landing
- Soft Bottom
- Leverages existing industry activity

Secondary Site Requirements:

- Water Depth 15 - 40 meters

Based on these initial screening criteria, the following locations off the Oregon coast were identified as appropriate for further evaluation:

- Warrenton, OR
- Newport, OR
- Reedsport, OR
- Coos Bay, OR

Figure 2. WET-NZ device being deployed in New Zealand. A similar device is planned for deployment in Oregon in 2012.

V.3 Evaluation Criteria

To further evaluate the sites identified during the initial screening, detailed evaluation criteria were developed based on input from industry and from information gathered from site assessment and project development activities in Oregon over the last few years. For each site, information was collected and reviewed for each of the following criteria. (Table 2 on page 20 provides a summary of the information gathered for each site.)

Proximity to Facilities for Deployment

This criterion provides an assessment of the proximity of the project site to facilities that are suitable for final assembly and deployment of wave energy devices. For each proposed project site, the nearest port with deep water access and the required infrastructure was determined and the distance from the port

to the project site was calculated using Google Earth. Note that Coos Bay has the largest industrial complex with manufacturing facilities and wharf side assembly areas that are suitable. Astoria and Yaquina Bay have less infrastructure, but are likely suitable for demonstration programs in single device deployments. Commercial deployments from these ports, however, would require new investments in infrastructure. As such, it is important to evaluate transit distances to facilities that currently have the required infrastructure. Accordingly, distances to Vigor Marine (Portland), American Bridge (Reedsport), and Saus Brothers (Coos Bay) were determined.

Note that Ocean Power Technologies plans to deploy its first wave energy device from Vigor Marine in Portland. However, its moorings are being fabricated by American Bridge in Reedsport. Vigor is approximately 287 miles from the Reedsport project site, while American Bridge is about 16 miles. This illustrates that for demonstration programs, the capabilities of the manufacturer are likely more important than the transportation distance. This is likely to change as deployments get larger and companies seek to minimize transportation costs.

Proximity to Port for Service Vessels Capable of Conducting Onboard Maintenance

This criterion provides an assessment of the proximity of the project site to facilities that are suitable for ongoing operations and maintenance that will be performed at the project site. It is assumed that these operations will be conducted by vessels approximately 40 feet in length. As such, ports with less infrastructure are suitable for this purpose. Interviews with wave technology developers have indicated that a minimum transit time from port to project site is essential. A general rule of thumb is that the transit distance should be less than two hours. The four candidate sites that have been selected generally meet these criteria. The Newport site is the closest (8 miles) and the Coos Bay site is the longest (14 miles). The Coos Bay case assumes that the operations base is located at the Saus Brothers facility, which is approximately 10 miles upriver from the jetties; however, distance to the Coos Bay site could be significantly shorter if the operations base was located closer to the jetties.

Another important factor in proximity to port is the site's susceptibility to closures due to treacherous conditions at the harbor entrance during bad weather. While recent, detailed data from the US Coast Guard are not presently available, Coos Bay and Newport are generally considered to be the best all weather ports. Access to Astoria and Winchester Bay can be significantly more difficult in the winter months because of severe weather. This is an important consideration, as early-stage projects will likely require frequent trips for maintenance, inspection, and repairs.

Proximity to Facilities for Dockside Repair

Unlike operation and maintenance, this criterion assumes that the ocean energy device must be returned to a port with infrastructure suitable for the intended repair. Failure analysis will likely indicate that devices will need dockside repair and/or maintenance approximately once per five years. This analysis assumes that it is financially infeasible to tow devices back to Portland for service. As such, ports with moderate levels of infrastructure are considered. Disconnecting and towing an ocean energy device will likely only be attempted during periods of calm weather, so port accessibility is a somewhat lesser criterion than dockside repair during severe weather.

Logistical Convenience for Staff, Developers, Researchers

This criterion attempts to provide an assessment of the convenience of the site for staff, researchers, and developers. Recognizing that the selected site will be visited frequently, it is important to consider flying and driving times. Driving distances were calculated using Google maps and flying times were calculated based on direct or one-stop flights. As expected, the Warrenton and Newport sites are the most convenient to the Portland International Airport.

Energy Resources

The Oregon coast has been studied and identified as having some of the best ocean energy resources in the lower US. The energy resource is assumed to be relatively equivalent for all sites analyzed in this study. Below is an excerpt from the work conducted by Pukha Lenee-Bluhm, Robert Paasch, and H. Tuba Ozkan-Haller on Oregon's wave energy resource (included as Appendix 1 to this report):

> *The wave energy resource has been assessed and characterized at ten locations in the US Pacific Northwest using archived spectral records from wave measurement buoys. Seasonal bias due to the distribution of missing records was compensated for by weighting the existing records such that the appropriate number of hours for each month was considered. The wave energy resource at each location was characterized using six quantities derived from each hourly spectrum: omnidirectional wave power, significant wave height, energy period, spectral width, direction of maximum directionally resolved wave power and directionality coefficient.*
>
> *. . . Strong seasonal trends were observed with greater wave power, significant wave height, energy period and directionality coefficient, and narrower spectral width, when comparing winter months to summer months. The mean wave power during the winter months was found to be up to 7 times that of the summer mean. The direction of maximum directionally resolved wave power tends to head more towards the south in the summer months, with a typically 10° - 20° less in the summer than in the winter. The sea states observed at stations closer to shore (depth <50 m) exhibited much greater directional uniformity, with a larger directionality coefficient and the direction of maximum directionally resolved wave power occurring within a smaller range.*
>
> *The wave resource was presented in detail for two representative locations, with mean water depths of 135 and 40 m. Monthly means and statistical ranges were presented for the six characteristic quantities, showing the broad range of sea states that should be anticipated at any time of the year. In addition to knowing how the characteristics of the wave resource are distributed over time, it is critical to consider distributions over energy. Empirical cumulative distributions were presented, in terms of both occurrence and contribution to total energy, for six quantities characterizing the resource.* ***While a mean annual wave power of 31 kW/m was observed at the shallower location, mean hourly wave power varied over a vast range. Wave power of 10 kW/m or less occurs 40% of the time, contributing only 8% of the expected annual energy while wave power of 200 kW/m or more occurs 1% of the time and accounts for 10% of the annual energy.***

Proximity to Interconnection

Cable length is perhaps the single largest cost factor in the development of a wave energy demonstration center. This criterion evaluates both the subsea and terrestrial distances from the proposed project sites to electrical substations (69 kV, 115 kV, 230 kV). Subsea cable lengths were calculated using the bathymetry shown in the NOAA map for each site (in Appendix 20 and assumes a perpendicular route to the beach. The terrestrial routes are based on existing rights-of-way between the beach and the substation, and the distances were determined using Google Earth. Additionally, this criterion presents the seafloor conditions for the cable route and a littoral geology, both of which could have significant influences on installation costs and permitting. Information for subsea bottom conditions was obtained from Oregon Marine map, and Google Earth was used to estimate the littoral geology (defined as the type of soil conditions at the interface between ocean and land).

It is assumed that each site would require directional drilling as the cable crosses the beach. Soil conditions are unknown for each site as detailed cable routing has not yet been established. However, it is assumed that conditions are similar at each site and that the cable crossing could be made in areas of sand and low lying land in order to minimize cost. Therefore, the primary cost differential of the transmission infrastructure is distance, with the subsea distance being the dominating factor. The general bathymetry of the Oregon coast is characterized by shallower water along the North Coast and deeper water along the South Coast. As such, the Warrenton and Newport sites have the longest subsea transit distances of 8.9 nm and 7.8 nm, respectively, to 75-meter water depth. Reedsport and Coos Bay have much shorter subsea transmission distances – 2.9 nm and 2.0 nm respectively, to 75-meters. Terrestrial distances are minimal for all four sites, with Newport being the shortest (0.8 nm) and Reedsport being the longest (3.4 nm). In summary, Warrenton will likely have the highest transmission cost, with Newport, Reedsport, and Coos Bay having similar total costs of interconnection.

Figure 3. Northwest power grid.

Potential Environmental Effects

As the environmental resources are homogenous in sandy bottom regions of the Oregon coast, no particular site is likely to have a relative benefit over another. However, the four candidate project sites are be evaluated with the goal of minimizing potential environmental effects. Based on the environmental analyses conducted by Ocean Power Technologies for their Reedsport OPT Wave Park and the West Coast Wave Energy Framework conducted by Pacific Energy Ventures, there is a strong understanding of potential stressors and receptors. Detail analyses of a selected site for a given technology type (e.g., point absorber) will be required, however, to further determine the suitability.

Potential Effects to Human Uses

This criterion evaluates each of the proposed sites based on potential for conflicts with human uses. Impacts to commercial fishing vary with the depth of the project site: shallower sites typically have more impact on the Dungeness crab fishery while sites with depths exceeding 60 m generally have little to no impact to this fishery. This assumption will be validated with the maps for each site provided by Parametrix (see Appendix 2). Aesthetics are also an important factor in site selection; devices located closer to shore (e.g., Oyster) would likely have higher potential for aesthetic effect. Similarly, sites near headlands may experience more view shed effects.

Access to Utilities for Energy Off-Take

This criterion presents some basic information on utilities that are likely to purchase power from the grid connected demonstration project. The value for this power may be a function of utilities' demand for renewable energy or mandate to buy renewable power. Interconnecting to a utility that has neither a government mandate nor self-imposed requirement (e.g., Central Lincoln Public Utility District) may require that the power be wheeled to a customer that does. This criterion is especially important as projects transition from single device testing to small array demonstration.

In addition to the above criteria discussed, site selection will be subject to other considerations such as:

- Economic Development
- Marine Traffic
- Marine Debris
- Salvage plans
- Permits/Authorizations (e.g., Oregon Territorial Sea vs. OCS)
- Baseline studies
- Long-term environmental monitoring
- Adaptive Management Plans

V.4 Candidate Site Options

Based on the initial screening criteria discussed in Section V.2, the following locations off the coast of Oregon were identified as appropriate for continued evaluation:

- Warrenton, OR
- Newport, OR
- Reedsport, OR
- Coos Bay, OR

The following section offers a detailed technical description of each of the above site location options and a summary of distinguishing features. Further detailed analysis of each site as well as stakeholder outreach will be required to determine the final, optimal location for PMEC.

SITE OPTION 1: WARRENTON, OREGON

LOCATION

This site is located on the northern coast of Oregon, west of the Camp Rilea Military base, approximately 10 miles south of the Port of Astoria.

Deployment Port:	Astoria, 10 NM
Maintenance Port:	Astoria, 10 NM
Dist. to Portland via Barge:	114 NM
Dist. to Coos Bay via Barge:	179 NM
Driving Dist. from Corvallis:	172 mi.
Driving Dist. from PDX:	97 mi.

INTERCONNECTION

Subsea Transmission Dist.:	2.7 NM to 25 m depth
	5.6 NM to 50 m depth
	8.9 NM to 75 m depth
Substrate for Cable Run:	Sand/Mud
Onshore Dist.	1.0 mi. to 115 kV
to Substation:	7.8 mi. to 230 kV
Geology at Cable Crossing:	Sand
Interconnection Utility:	PacifiCorp

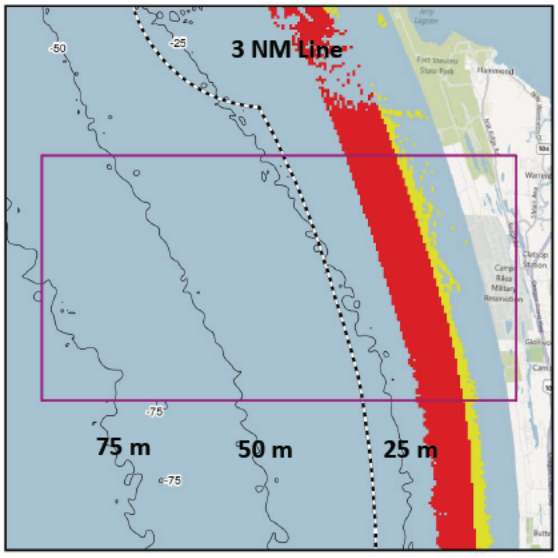


Figure 4. Warrenton Site Location Map. The lower map illustrates "locations suitable for ***coastal devices"***. More detailed analysis can be found in Appendix 2.

POTENTIAL IMPACT ON EXISTING USES

Commercial Fishing:	Mod at 25 m depth
	High at 50 m depth
	High at 75 m depth
Aesthetics from Land:	High at 25 m depth
	Low at 50 m depth
	Low at 75 m depth
Surfing:	Low

SUMMARY OF DISTINGUISHING FEATURES

- Close proximity to the Port of Astoria, but weather windows may be limited for port access.
- Shortest driving distance to PDX and longest driving distance from Corvallis.
- Potential to partner with OR Military Department and leverage Department of Defense infrastructure investment.
- Potentially less impact on commercial fishing pending a higher resolution analysis.
- Longest transmission distance will increase infrastructure costs.
- Gradually increasing water depth provides large potential for future commercial expansion.

SITE OPTION 2: NEWPORT, OREGON

LOCATION

This site is located off the central coast of Oregon to the southwest of the Newport test berth. It is southwest of Yaquina Head and approximately 8 miles north of the Port of Newport.

Deployment Port:	Newport, 8 NM
Maintenance Port:	Newport, 8 NM
Dist. to Portland via Barge:	221 NM
Dist. to Coos Bay via Barge:	94 NM
Driving Dist. from Corvallis:	52 mi.
Driving Dist. from PDX:	144 mi.

INTERCONNECTION

Subsea Transmission Dist.:	1.3 NM to 25 m depth
	2.8 NM to 50 m depth
	7.8 NM to 75 m depth
Substrate for Cable Run:	Sand/Mud
Onshore Dist.	0.8 mi. to 115 kV
to Substation:	10.1 mi. to 230 kV
Geology at Cable Crossing:	Sand/Mud
Interconnection Utility:	Central Lincoln PUD

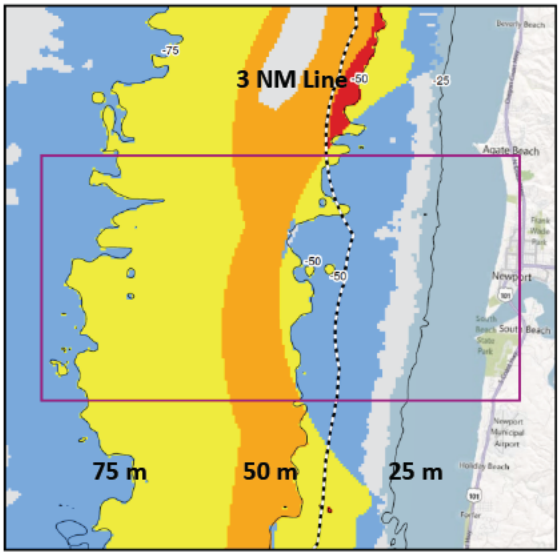


Figure 5. Newport Site Location Map**.** The lower map illustrates "locations suitable for ***off-shore devices***". More detailed analysis can be found in Appendix 2.

POTENTIAL IMPACT ON EXISTING USES

Commercial Fishing:	Mod at 25 m depth
	High at 50 m depth
	High at 75 m depth
Aesthetics from Land:	High at 25 m depth
	Mod at 50 m depth
	Low at 75 m depth
Surfing:	Low

SUMMARY OF DISTINGUISHING FEATURES

- Close proximity to the Port of Newport.
- Only interconnection is with Central Lincoln PUD, a public utility with no RPS requirement.
- Very close to OSU facilities, including Hatfield Marine Science Center and Oregon Sea Grant.
- Closest site to OSU campus in Corvallis.
- Strong existing relationship with Fishermen Involved in Natural Energy (FINE).
- Gradually increasing water depth provides large potential for future commercial expansion.

SITE OPTION 3: REEDSPORT, OREGON

LOCATION

This site is located on the southern coast of Oregon, due west of the Ocean Power Technologies (OPT) Reedsport Project site and approximately 40 miles north of Coos Bay.

Deployment Port:	Coos Bay, 39 NM
Maintenance Port:	Winchester Bay, 11NM
Dist. to Portland via Barge:	287 NM
Dist. to Coos Bay via Barge:	39 NM
Driving Dist. from Corvallis:	114 mi.
Driving Dist. from PDX:	211 mi.

INTERCONNECTION

Subsea Transmission Dist.:	1.0 NM to 25 m depth
	2.0 NM to 50 m depth
	2.9 NM to 75 m depth
Substrate for Cable Run:	Sand
Onshore Dist.	3.4 mi. to 115 kV
to Substation:	4.9 mi. to 230 kV
Geology at Cable Crossing:	Sand
Interconnection Utility:	CLPUD, PNGC, BPA

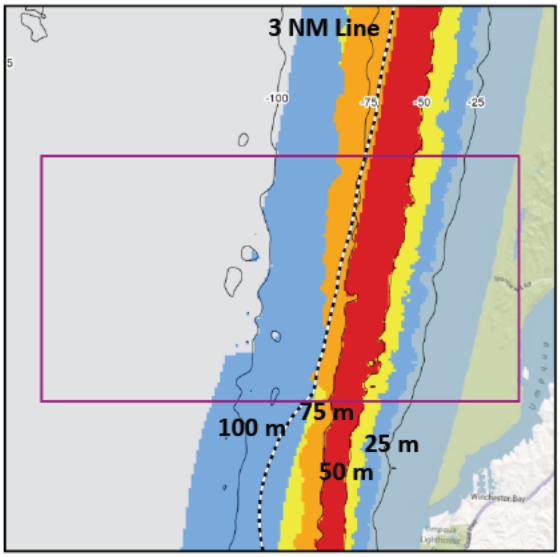


Figure 6. Reedsport Site Location Map. The lower map illustrates "locations suitable for ***off-shore devices***". More detailed analysis can be found in Appendix 2.

POTENTIAL IMPACT ON EXISTING USES

Commercial Fishing:	Mod at 25 m depth
	High at 50 m depth
	High at 75 m depth
Aesthetics from Land:	High at 25 m depth
	Mod at 50 m depth
	Low at 75 m depth
Surfing:	Low

SUMMARY OF DISTINGUISHING FEATURES

- Moderate proximity to the Port of Coos Bay, a very good all weather port.
- Very close to Winchester Bay, suitable for ship based maintenance.
- Good access to transmission and potential load base.
- Potential to partner with OPT and leverage extensive environmental analyses and studies.
- Deep water depths near shore minimize cost of infrastructure.
- Rapidly increasing water depth may limit ability to expand site for commercial development.

SITE OPTION 4: COOS BAY, OREGON

LOCATION

This site is located off of the southern coast of Oregon, west of the town of Lakeside and approximately 14 miles north of Coos Bay

Deployment Port:	Coos Bay, 14 NM
Maintenance Port:	Coos Bay, 14 NM
Dist. to Portland via Barge:	303 NM
Dist. to Coos Bay via Barge:	14 NM
Driving Dist. from Corvallis:	136 mi.
Driving Dist. from PDX:	234 mi.

INTERCONNECTION

Subsea Transmission Dist.:	0.9 NM to 25 m depth
	1.4 NM to 50 m depth
	2.0 NM to 75 m depth
Substrate for Cable Run:	Sand
Onshore Dist.	2.0 mi. to 115 kV
to Substation:	12.0 mi. to 230 kV
Geology at Cable Crossing:	Sand
Interconnection Utility:	CLPUD, PacifiCorp, BPA

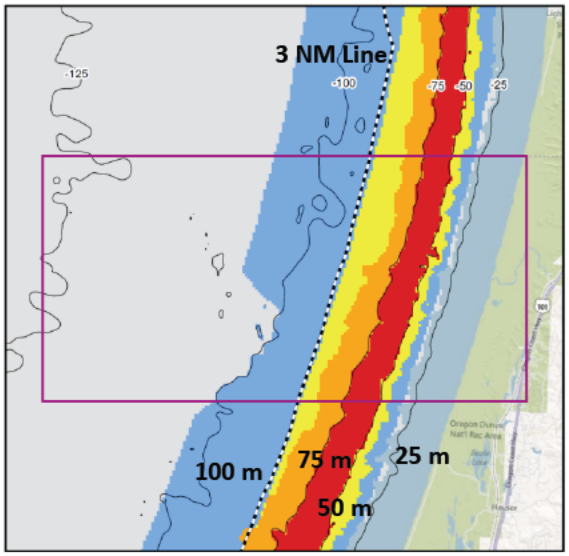


Figure 7. Coos Bay Site Location Map. The lower map illustrates "locations suitable for ***off-shore devices***". More detailed analysis can be found in Appendix 2.

POTENTIAL IMPACT ON EXISTING USES

Commercial Fishing:	Mod at 25 m depth
	High at 50 m depth
	High at 75 m depth
Aesthetics from Land:	High at 25 m depth
	Mod at 50 m depth
	Low at 75 m depth
Surfing:	Low 7

SUMMARY OF DISTINGUISHING FEATURES

- Very close proximity to the Port of Coos Bay, a very good all weather port.
- Best site for deployment and maintenance.
- Very good access to transmission and potential load base, including investor owned utilities with RPS requirements.
- Longest driving distance from PDX.
- Shortest transmission route will minimize cost of infrastructure.
- Rapidly increasing water depth may limit ability to expand site for commercial development.

Table 2: Site Evaluation Summary Table

Evaluation Criteria	Candidate Site Location			
	Warrenton	Newport	Reedsport	Coos Bay
Proximity to Deployment Facilities	10 miles	8 miles	39 miles*	14 miles
Distance to Port for Vessel Based Maintenance	10 miles	8 miles	11 miles	14 miles
Proximity to Port for Dock Repair	10 miles	8 miles	39 miles*	14 miles
Convenience to Staff, Developers and Researchers	Good	Best	Good	Good
Wave Resource	Excellent	Excellent	Excellent	Excellent
Subsea Transmission Distance	5.6 miles to 50 m*	2.8 miles To 50m	2.0 miles To 50m	1.4 miles To 50m
Potential Environmental Effects	Known Manageable	Known Manageable	Known Manageable	Known Manageable
Potential Effects to Existing Users	Low	Low to Moderate	Dungeness Fishery*	Dungeness Fishery*
Access to Utilities for Energy Take-Off	PacifiCorp	CLPUD	CLPUD PNGC BPA	BPA PacifiCorp CLPUD

* Denotes attribute that may not meet the criteria discussed in Section V. Further investigation is required to assess accurate site characteristics.

VI. Cost Drivers and Estimates

NNMREC has estimated the cost of developing the PMEC to be approximately $25 million. This estimate is based on outreach with industry representatives and international marine energy centers similar in size and scope. At this cost, it is anticipated the PMEC could accommodate up to four full scale ocean energy devices at a time. A more detailed analysis of the total costs of the PMEC is underway, in conjunction with a robust fundraising strategy.

Although a more detailed cost proposal is still under development, NNMREC has determined that the majority of the cost drivers for this project include:

- Sea Based Infrastructure (e.g., subsea cables, power pod, etc.)
- Land Based Infrastructure (e.g., interconnection, load bank, shore based facilities, etc.)
- Operations and Maintenance
- Testing and Commissioning

Based on current analysis, it has been determined that the subsea cable lengths will the primary cost differential between the sites, whereas the other cost drivers should remain relatively constant.

NNMREC anticipates a combination of private and public funds to fully develop PMEC, and has a proven track record in developing industry partnerships. These leveraged funds will come from a variety of sources, but likely to include the following:

- State of Oregon
- Federal Agencies
- Private Foundations
- Industry Associations
- Developers/Utilities

VII. Conclusion and Next Steps

Based on the detailed site analysis outlined in this report, all four locations meet the technical feasibility requirements for a grid connected test facility. However, there are other factors to consider before a final site selection is made. NNMREC will pursue the following actions over the next few months to determine which site would best support the grid-connected elements of PMEC.

- *Cost Evaluation*: NNMREC will pursue detailed cost estimates and evaluate how each site may increase or decrease the cost of deployment and operation.
- *Leveraging Value*: NNMREC will evaluate each site in how best they leverage existing and future activities and investments.
- *Stakeholder Input*: NNMREC will take the analysis to local stakeholders and other interested parties to gather additional input prior to moving forward on one or more PMEC site options.

Results from this information gathering will inform the final site-selection decision, with an anticipated completion date of early 2012.

APPENDIX F: NEWPORT COMMUNITY SITING PROPOSAL

PROPOSAL: NEWPORT SITE FOR THE PACIFIC MARINE ENERGY CENTER

EXECUTIVE SUMMARY

The Newport Community Site Selection Team has selected a Newport ocean site and proposes that it serve as the site for the Pacific Marine Energy Center (PMEC) with Newport and Toledo supplying land-based assets. Our team has identified options for elements needed to support the development of the PMEC test site as detailed in our proposal.

Our unique blend of a strong marine science research base, one of the largest fishing fleets on the west coast, a strong education presence, and a top tourist destination on the Oregon Coast makes us an ideal choice for PMEC's location. With emphasis on ocean-based economic development, our region has superb attributes for PMEC that will improve with time. The infrastructure that supports these ongoing activities will also support the users of PMEC.

All primary stakeholders, including the Fishermen Involved in Natural Energy (FINE), the Central Lincoln People's Utility District (PUD), Lincoln County, the Cities of Newport and Toledo, and the Ports of Newport and Toledo, have been directly involved in the preparation and approval of this proposal.

We propose a 4.5 square nautical mile ocean site approximately 6 nautical miles offshore from Yaquina Bay. This area has a sandy bottom with depth of 32 to 41 fathoms. The FINE representatives who have approved this area have said, "We're willing to give up good fishing assets because we're staunchly for natural energy research."

Six marine cable landing locations were studied and all represent easy connectivity into the PUD power grid. Three are recommended for further consideration.

We have located sites in and around Yaquina Bay for PMEC storage and staging areas, administrative office space, and a visitor center. The Cities and Ports are willing to assist in providing space and facilities to support PMEC. A sample list based on current availability is included.

A unique, cooperative, and strong education and research presence and other human resources abound in our community. Community partnerships will be possible on many levels. Our strong tourism industry also offers excellent public education opportunities.

Our team focused on cost sharing options unique to what our area has to offer for the successful development of PMEC. We identified viable cable landing sites involving public lands and rights-of-way that could be leveraged as a match, alleviating the need for NNMREC to acquire easement rights for cable infrastructure, or to construct access roads and related improvements. City, County, and /or State Parks have the potential to cost share through the provision of favorable lease terms.

The organizations in Lincoln County have a strong presence in the State of Oregon. Witness our coming together to win our bid for becoming the homeport for the National Oceanic and Atmospheric Administration's Pacific research fleet. This same presence and sense of community will be there to support the development and continuing activities of PMEC.

We request that NNMREC representatives visit Newport's proposed sites for PMEC.

INTRODUCTION: Newport, Oregon, is the leading coastal city in the Pacific Northwest and Northern California in marine and coastal science, education, and ocean industries. It represents the ideal site for the location of the Pacific Marine Energy Center (PMEC). In this proposal, we describe the ocean and land-based sites for PMEC facilities as well as the attributes of Newport and Toledo that make our site for PMEC compelling.

THE OCEAN SITE: A rigorous process was used to define an optimal ocean site for PMEC that meets approval of all stakeholders. Initially recommended by FINE based on their broad knowledge of the regional ocean, the proposed ocean location has been agreed to by all stakeholders. The site is located about 6 nautical miles off shore and is roughly 3 nautical miles in north-south dimension and about 1.5 nautical miles in the east-west dimension. This relatively flat, sandy-bottom area varies in depth from 32 to 41 fathoms. The main shipping lane into the Yaquina Bay deepwater port runs across the northern boundary of the site. This site is partially located within a Yaquina Bay tugboat lane. An expert in marine operations has stated that neither of these issues poses a problem as lanes are not strictly used once one is out on the open ocean. The boundaries are: North latitude 44 degrees, 36 minutes, and 0 seconds. South latitude 44 degrees, 33 minutes, and 0 seconds. West longitude 124 degrees, 14 minutes, and 30 seconds. East longitude 124 degrees, 11 minutes, and 30 seconds. (See map.)

Marine habitats at this site have been characterized in a number of studies, and the proximity of the Hatfield Marine Science Center (HMSC) and its sampling programs mean that the physical and ecological systems are well known, providing critical, long-term baseline environmental information. The gray whale migratory route passes generally shoreward of this area but can extend out to about 35 fathoms in depth. The users of the area are represented by FINE. They have thoroughly vetted this proposal and are represented on the Team. Port commissioners also sit on the Team to represent maritime commerce.

ON-SHORE CABLE LANDFALL OPTIONS: Six cable landfall options were initially proposed. Off-shore rock reefs, dredging activities in Yaquina Bay, landfall private property owners versus publicly owned sites, in-water and on-shore cable runs, available infrastructure, ease of access, visibility, and other issues were considered. (See addenda.)

Three Preferred Sites, the estimated Marine Cable Run, and Key Choice Factors are (in alphabetical order):

Lost Creek State Park 6.5 NM Owner: Oregon State Park (public). Mid range marine cable run, shortest PUD cable run, fewer rock reef issues. Further to the ocean site, but is the only landfall without marine cable rock reef issues.

South Beach State Park 5.5 NM Owner: Oregon State Park (public). Closest to ocean site, multiple landfalls, existing infrastructure and access, rock reef. This location would be closer but could have marine cable rock reef issues. It is closest to the PUD South Beach power substation.

Yaquina Bay South Jetty 6 NM County/State Park ownership. Zoning is P-2/"Public Recreation" and is subject to the South Beach State Park Master Plan. HMSC user, existing infrastructure and access, PMEC cables must be routed up ship channel. This is highest cost and has issues with rock reefs, but has existing equipment connections with HMSC and NNMREC.

POWER GRID CONNECTION: Central Lincoln PUD has existing high capacity 12.5kV distribution lines along Highway 101 and close to potential cable landing sites from Newport to Seal Rock. PUD representatives state that grid interconnection for the wave energy test facility is viable for these locations with minimal interconnection facilities required. The PUD has existing telemetering with BPA's Toledo substation which will allow metering as required to meet federal interconnection requirements. In

addition, the PUD has experience installing and operating SCADA, ION metering, Distribution Automation, Smart Grid technologies, and fiber optic communications that will facilitate a successful test facility operation.

OFFICE, VISITOR, AND STORAGE SPACE

Port of Newport: The Port of Newport has land on either side of Yaquina Bay for siting offices and a visitor center. The Port is investigating the development of an Ocean Technology Center building to be located adjacent to the NOAA site. This site will also house tenants in related ocean research and operations for up to 30,000 total square feet. Potential tenants include academic and business institutions involved in the National Science Foundation's Ocean Observatories Initiative, marine technology firms, and federal and state agencies. This will provide an excellent collaborative environment where tenants can get to know one another and form connections. The Port of Newport Business Plan will be available March 2013. Near its International Terminal is waterfront acreage (owner: W. Hall) suitable for storage.

Hatfield Marine Science Center: Possibilities also exist for the co-location of the PMEC Visitor Center with the HMSC Visitor Center. This facility, which focuses on interpreting marine science to the public and conducts research on how people learn in informal environments, already has several displays that emphasize marine renewable energy. The HMSC Visitor Center recently opened a wave tank display with computerized, user-operated wave tanks and the opportunity to test "mini-wave energy converters". While this development would require negotiations and agreements between PMEC and OSU, the synergies of co-location are evident.

An additional option for the administrative offices and staging area for PMEC could exist on the HMSC campus. While there is no existing space available for such activities, OSU has considered preliminary concepts for an "Ocean Observing Initiative Support Building" between OSU Ship Support and the HMSC Visitor Center. This project would provide a facility supporting the broad ocean observing initiative at OSU and the University of Washington. OSU is a national leader in this area, and has significant research funds through the National Science Foundation already secured to conduct the research. If built, this 21,600 sq. ft. facility would serve as an adjunct to OSU Ship Support Facility at the north end of the HMSC Campus. It will allow staging for cruises, buoy repair and maintenance, and instrument development for OSU and several supporting institutions. It is possible that this facility, if built, could also house PMEC's administrative needs, subject to negotiations with OSU.

The City of Newport has invested millions into the streets, paths, lighting and related utilities in South Beach so that in the event a suitable "build to suit" option can be identified on Port property or the HMSC campus those costs will not have to be borne by NNMREC (as is typically the case with new development).

Other Existing Office: West Coast Bank building, 222 NE Hwy 20, Toledo. Owner: West Coast Bank. Zoned commercial. This former bank would provide first-class office space for PMEC and has dense wiring for data.
Western Title Building ground floor, 255 SW Coast Hwy, Newport. Owner: Western Title (Slape Investment). Zoned commercial. This space is a former dispatch center and is densely wired for communications. Of 24,000 square feet, about half is or will become available.
Cardinal Building, 914 SW Coast Hwy, Newport. Owner: Richmond family. Zoned commercial. Office building has 3 floors of mostly empty offices near the bridge and has ocean view.

The Port and City of Toledo have land available to construct build-to-suit office and storage facilities to meet identified PMEC space needs.

MARINE INFRASTRUCTURE

The Port of Toledo operates a boatyard in Toledo, which is classified as an open boatyard. The Port operates a 25-ton and 85-ton mobile boat lifts, a 200-ton floating dry dock, a 15-ton hydro-crane, and has man-lifts and forklifts available. As an open boatyard, outside marine service vendors are licensed to work through the boatyard. It has marine electricians, welders, fitters, hydraulic specialists, sandblasting and painting services available. All aspects of vessel maintenance can be performed at the boatyard either through boatyard staff, or local service providers. These capabilities and experience will serve wave energy developers. This includes land and buildings for assembly of wave energy devices, maintenance work in a protected environment, fully functioning docks for equipment deployment and haul out. The Port worked closely with OSU staff of NNMREC, having staged, help outfit, and launch the Ocean Sentinel. They also worked with Pacific Energy Ventures to launch their prototype wave energy device, the WETNZ.

The Port of Toledo has just completed and adopted a Strategic Business Plan that highlights its Boatyard Build-Out Plan. The permits for the in-water portion of the project are being filed this month, with construction planned to start in November 2013. With the proposed expansion of the boatyard to include a 300-ton mobile lift and a covered high-bay work area, the boatyard could easily support existing and future PMEC service and storage needs.

Toledo is served by rail that loops through the city and serves several places, connecting inland along the Yaquina River toward Corvallis. Dredging maintains the channel for barging or towing out to sea.

The Port of Newport also has assets being completed at their International Terminal site. As a shipping dock, there will be ample opportunity for inbound and outbound freight for wave energy developers. Yaquina Bay has one of the easiest and safest channels for navigation on the west coast. It is served by Land – Sea – Air – Rail. There is an on-site customs agent for the international firms. The community is interested in investigating a Foreign Trade Zone.

Newport has a municipal airport that can handle jet traffic and has a sophisticated navigation system for its users. Fed Ex has a hub for daily air shipping.

The PUD: The final piece of infrastructure we want to draw attention to is the reliable grid and the fiber optic backbone. Outage history shows that the PUD operates a highly reliable system; history can be provided upon request. Lincoln County was a pioneer in buried fiber optic loops that undergo continual expansion. There is a high degree of available (dark) fiber.

HUMAN RESOURCES

The workforce of Lincoln County has a high percentage of people employed both directly and indirectly in a marine-related enterprise. The skills and knowledge of some of our local people were built over a lifetime. There are specialists in boat maintenance and fabrication, marine technology, and a highly advanced fishing industry. Vessel owners are branching into scientific purposes through partnerships at HMSC and have increased their crew knowledge and capabilities. The addition of large NOAA vessels will only increase the human resource pool over time. Due to the HMSC campus, the human resource in marine science is of the highest caliber and is doing cutting-edge research that would fit well with the goals of PMEC. Schools, the community college campus, and amenities such as the arts are superb for a place of its size.

COMMUNITY PARTNERSHIPS

There is a valuable partnership in place with a technologically advanced fishing industry. This has contributed to the success of current scientific endeavors and has a strong tourism component. Newport is known for its working waterfront and Toledo for its wooden boat show.

Newport is a unique community where partnerships and collaboration are particularly strong in research and education. The South Beach Peninsula is a highly focused center for marine research and education, and many elements are directly pertinent to the success of PMEC. With a combined budget of over $70 million per year and employment of more than 500, this activity has been embraced as an economic development cluster by the City of Newport, the Economic Development Alliance of Lincoln County, and the Yaquina Bay Economic Foundation.

Newport has capability in all levels of education around marine sciences. The Lincoln County School District has an objective for its students to become the most ocean literate in the nation. Its collaborations with HMSC and the Oregon Coast Aquarium (OCA) create great opportunities for local youth and for training teachers to learn about and incorporate marine science and PMEC renewable energy in their curricula. The Oregon Museum of Science and Industry has purchased property and is developing a field camp that will accommodate some 200 youth for field camps in marine and coastal science. This presents an opportunity for significant outreach to educate young students about PMEC and marine renewable energy because most of these students come from larger Oregon metropolitan areas. Along with some 600,000 public visitors per year to the OCA and HMSC Visitor Center combined, this represents a tremendous outreach capability difficult to duplicate in other locations.

Higher education is similarly well developed. The Oregon Coast Community College has developed a new main campus in South Beach, which houses the unique Aquarium Science Program, a two-year degree program that creates trained specialists for the aquarium and aquaculture industry. This program was developed in partnership with the OCA and HMSC, with funding from the National Science Foundation. Preliminary discussions have been held about a similar program in technical education for renewable energy at OCCC focused on marine renewables, potentially in collaboration with Columbia Gorge Community College (wind energy) and the Oregon Institute of Technology (geothermal). Siting of PMEC in Newport could serve to jumpstart this collaborative program, fostering efforts that would produce trained employees for marine renewable energy development. HMSC brings many activities from OSU to the coast, and these have the potential to increase understanding of marine renewables should PMEC locate in Newport. If PMEC needs undergraduate or graduate students for internships, HMSC has the facilities and infrastructure to provide both students and the student support. It also provides the linkage to the larger OSU that can provide needed specialists directly to developers associated with PMEC.

The research enterprise on the South Beach Peninsula complements the educational program and will also serve as a valuable resource for PMEC. HMSC includes diverse research programs in many facets of marine science, including marine biology and ecology, oceanography, fisheries, aquaculture, marine geology and biogeochemistry, acoustics, marine mammals, ocean health, and marine resource economics. From the academic programs at OSU to the diverse research portfolio of the eight state and federal agency activities at HMSC (ODFW, three in NOAA, US EPA, US Fish & Wildlife Service, USDA-ARS, and USGS), a good deal of research on the environmental effects of marine renewable energy is conducted out of Newport. Several of the agencies serve regulatory functions and are asked to comment on permits related to ocean activities, including marine renewables. The research community has been augmented by NOAA's Marine Operations Center of the Pacific, and those elements of infrastructure support that are beneficial to our fishing industry and for research vessels and the marine research enterprise will similarly benefit PMEC. PMEC staff as well as developers deploying wave energy

devices will have access to experienced scientists who can advise on questions related to marine renewable energy – from environmental effects to permitting questions.

Finally, the vast volumes of data collected about the ocean and marine habitats off Newport can serve as valuable baseline data against which environmental effects can be evaluated. All of these benefits will be difficult or impossible to duplicate elsewhere on the Oregon Coast.

Recreational users of the ocean are another potential for community partnerships, as well as the conservation groups that value the beach and ocean resources.

COST SHARING IDEAS FOR PMEC

LOCAL GOVERNMENT: Ports of Newport, Toledo (i.e., sources available to them); Lincoln County lottery sources; Bonding/ Financing /Debt servicing; City of Newport, lower costs of siting; City of Newport, urban renewal; City of Newport, room tax; City and County in-kind opportunities; Corvallis and Benton County.

NONPROFIT SECTOR: OSU Foundation; Foundations interested in renewables; Grand Ronde Tribal Charitable Fund; Siletz Tribal Charitable Fund; Three Rivers Tribal Charitable Fund; School District; Oregon Coast Aquarium; OMSI; Conservation groups; Gates Foundation; Bullit Foundation; Ford Family Foundation; Environmental Defense Fund; Oregon Community Foundation.

PRIVATE SECTOR: Banks; Cascades West Financial Services; ShoreBank Cascadia or other community development banks; renewable energy companies; Georgia Pacific grant program; PMEC users.

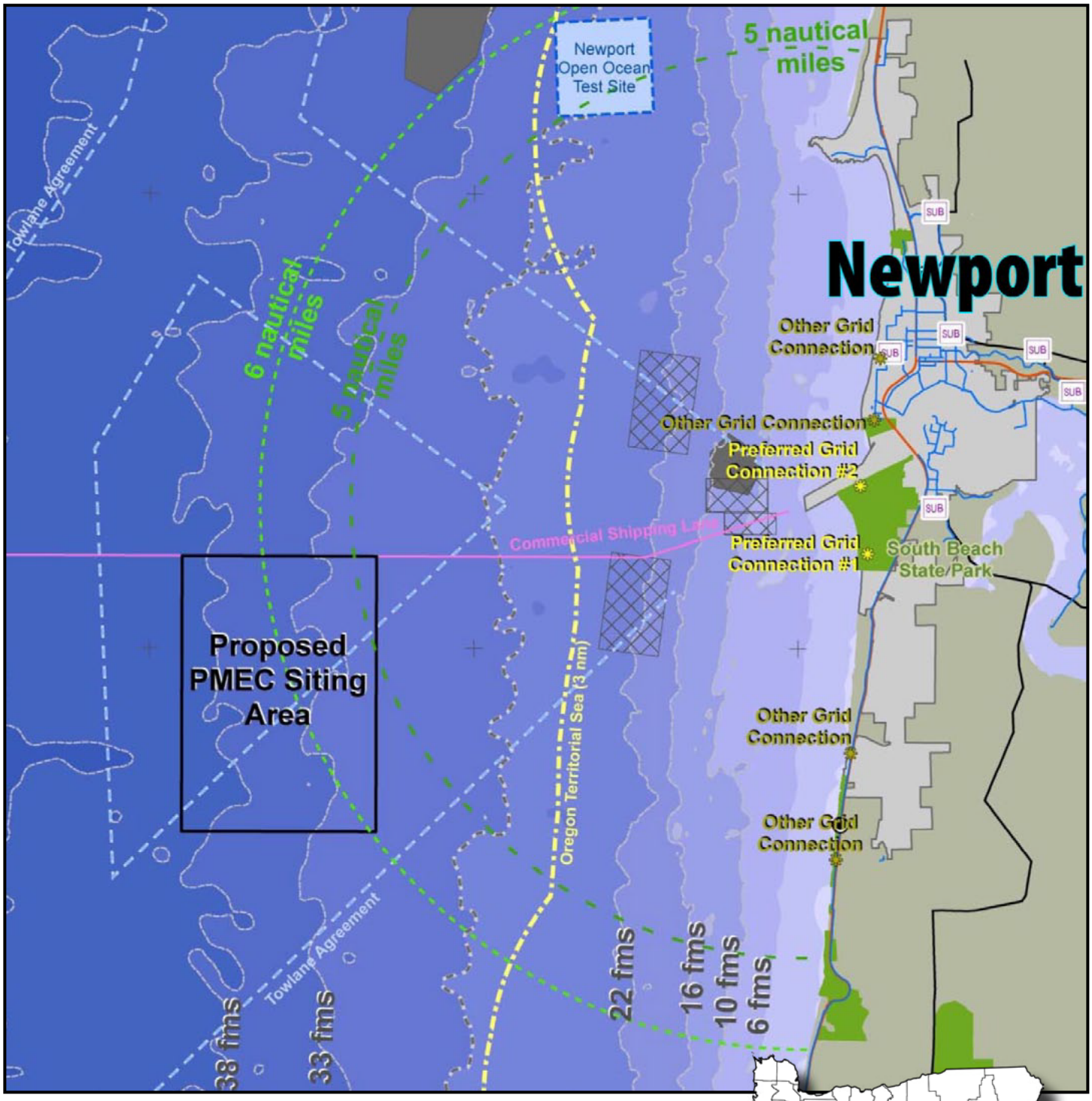
STATE OF OREGON: We have identified at least five state agencies that may have an interest.

NEWPORT COMMUNITY SITE SELECTION TEAM

David Allen	Public at Large	Paul Amundson	Chair, Public at Large
Tracy Bailey	Tribes /Econ. Devel.	Caroline Bauman	Economic Development
George Boehlert	Economic Devel.	Walter Chuck	Port of Newport
Jack Craven	Charter Fishing	Ralph Grutzmacher	Local Government
Doug Hunt	Local Government	John Lavrakas	Marine Infrastructure
Bruce Lovelin	Central Lincoln PUD	Paul Stannard	Commercial Fishing
Derrick Tokos	Local Government	Fred Sickler	Ocean Recreation

Technical Advisors:
Bud Shoemake, Port of Toledo Manager.
John Schaad, Customer Services, Bonneville Power Administration.

Proposed PMEC Siting Area



Newport, Oregon

Build To Suit:
Port Property or HMSC Campus

Characteristics:

- Existing marine research and education area
- Partnering opportunity with HMSC visitor center
- Infrastructure available (water, sewer, streets, etc.)
- Size: 6,000 sq. ft. (office, visitor center, warehouse)
- Cost: $1.65 million
- Financing: Port, State, others

Hildenbrand, Kaety

Subject: FW: PMEC

From: info@portoftoledo.org [mailto:info@portoftoledo.org]
Sent: Thursday, December 06, 2012 2:41 PM
To: 'John Lavrakas'
Cc: 'Ralph'; Hildenbrand, Kaety
Subject: PMEC

The Port of Toledo Commission and Staff fully supports the effort to locate PMEC off of Newport.

As you may be aware, the Port of Toledo operates a boatyard in Toledo. We have worked closely with OSU staff of NNMREC, having staged, help outfit, and launch the Ocean Sentinel. We also worked with Pacific Energy Ventures to launch their prototype wave energy device, the WETNZ.

Through our boatyard facility we helped to assemble the devices. We have provided support and heavy equipment such as travel lift, crane, and forklifts which were necessary for launching and retrieving the devices, as well as access to the Yaquina Bay's world class marine service industry.

The Port of Toledo has just completed its' Strategic Business Plan which includes a focus on its' Boatyard Build-Out Plan. This plan was adopted by the Port Commission at our November 2012 meeting. The permits for the in-water portion of the project are being filed this month, with construction planned to start in November 2013. With the proposed expansion of the yard to include 300-tons mobile lift and covered, high bay, work area, the Boatyard could easily support the existing and future PMEC's service and storage needs.

Bud Shoemake
Port Manager

Port of Toledo
P.O. Box 428
496 NE Hwy 20, Unit 1
Toledo Oregon 97391
541.336.5207
www.portoftoledo.org
info@portoftoledo.org

Board of Commissioners

Courthouse, Room 110
225 W. Olive Street
Newport, Oregon 97365
(541) 265-4100
FAX (541) 265-4176

November 26, 2012

Governor John Kitzhaber, MD
900 Court St., NE
Salem, OR 97310

Dear Governor Kitzhaber:

On November 20, 2012 the Fishermen Interested in Renewable Energy (FINE) Committee unanimously voted to recommend to the Lincoln County Board of Commissioners that a 6 to 7 mile square mile area of ocean, west of Newport, become the site of the Pacific Marine Energy Center (PMEC). PMEC would be a grid-connected offshore energy research facility. The Oregon Wave Energy Trust (OWET) has identified development of PMEC as their highest priority. Laying the groundwork for PMEC has now also become a high priority for the Lincoln County fishing community and other key community stakeholders.

The area of ocean off Lincoln County selected by FINE poses fewer conflicts with recreational/commercial fishing activities and other existing uses of the ocean than other sites off the Central Coast. Dr. Belinda Batten, Director of Oregon State University's (OSU) Northwest National Marine Renewable Energy Center (NNMREC), attended the FINE meeting. Dr. Batten, working collaboratively with fishing industry representatives, provided valuable input that enabled FINE to delineate a site for PMEC that meets the key logistical features OSU needs to optimize their research program.

The membership of FINE has always been supportive of ocean energy ***technology and environmental impacts*** research. Since 2006, FINE has worked closely with OSU Sea Grant Extension and the faculty of NNMREC. For example, FINE worked with OSU to identify the existing one-square mile NNMREC wave energy research site off Yaquina Head. In addition, on an ongoing basis, FINE provides technical and practical advice to OSU and wave energy technology companies utilizing NNMREC on the logistics of marine operations at NNMREC. NNMREC and the wave energy companies will tell you that leveraging the collective experience of local fishermen, who understand the realities of working in a harsh marine environment, is a key ingredient of success.

Not surprisingly, with the growing cluster of world-class oceanographic research activities taking place in Newport, the members of FINE and other leaders in Lincoln County believe that ***research*** on ocean energy is a natural fit for our community.

However, the members of FINE also strongly oppose the identification of ocean areas adjacent to and near the Central Coast (***especially*** within Oregon's Territorial Sea) for future utility-scale/commercial ocean energy projects.

The members of FINE are deeply concerned about the potential future loss of ocean space. The State of Oregon's marine reserve designation process and the siting of NNMREC consumed approximately 19% of Lincoln County's Territorial Sea. No other sub-region of the Oregon Coast was asked to absorb that level of reduced fishing effort.

Over the last few years the members of FINE developed a good understanding of the status of the wave energy industry. In a larger sense, they ***don't*** believe it is necessary, at this time, especially ***in Oregon's Territorial Sea***, to establish very many sites for commercial-scale wave energy operations. Wave energy is a nascent industry. They are nowhere close to producing electricity at price points that are competitive with other renewable energy technologies (in particular, the terrestrial wind industry). The exception to that rule may be in niche markets, in particular, remote island communities where energy costs are prohibitive.

More than anything, the members of FINE believe a focus on research makes sense for both industries. Together, those industries can develop the most efficient and effective technologies for energy production. We all have a stake in the development of efficient wave energy technologies. That will help us concentrate and pinpoint the appropriate locations of commercial scale sites based on proven technologies. It follows, then, with highly efficient/effective ocean energy devices, ocean energy projects can have minimal impacts on the marine environment and the other sustainable/beneficial uses of the ocean.

In closing, please know the members of FINE believe that the vote they took on November 20, 2012 ***(to identify an optimal site for PMEC)*** may rank among the most important/pragmatic steps ever taken to keep Oregon in forefront of the development of these emerging technologies.

Sincerely,

LINCOLN COUNTY BOARD OF COMMISSIONERS

BILL HALL, Chair

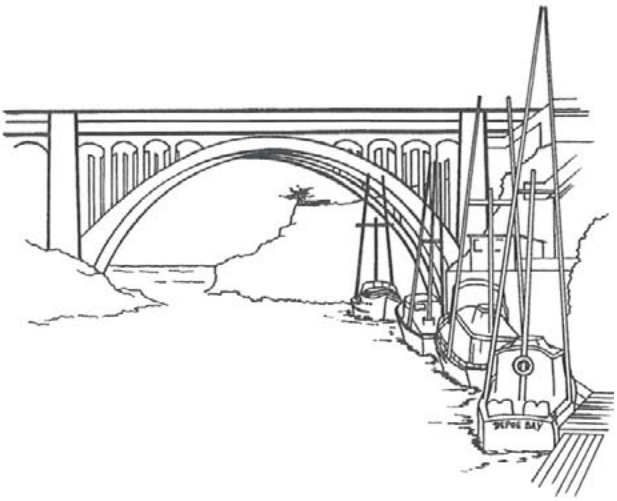
TERRY N. THOMPSON, Commissioner

DOUG HUNT, Commissioner

CC:
Bob Jacobson, Chair FINE
FINE Members
Belinda Batten, NMREC and PMEC
PMEC Siting Committee
The Coastal Caucus
Ocean Policy Advisory Council
The Oregon Congressional Delegation
Julie Kiel, Oregon Wave Energy Trust President
Stephen Chu, Secretary, U.S. Department of Energy
Ken Salazar, Secretary, U.S. Department of Interior
Jane Lubchenco, Administrator, NOAA

CITY of DEPOE BAY

Post Office Box 8 + Depoe Bay, Oregon 97341
Phone (541) 765-2361 + Fax (541) 765-2129
TDD# 1-800-735-2900



December 3, 2012

Scott McMullen, Chairman
Ocean Policy Advisory Council
635 Capitol Street N.E., Suite 150.
Salem, Oregon 97301-2540

Dear Chairman McMullen:

The City of Depoe Bay, Oregon and the Depoe Bay Near Shore Action Team (NSAT) continue to support the position of the Fishermen Involved in Natural Energy (FINE) group regarding wave energy in the Oregon Territorial Sea. We completely agree with the position they took at their Nov 20th meeting, namely that the proposed PMEC wave energy site off the Lincoln County coast be designated for research only and that wave energy development sites not be located in the Oregon Territorial Sea within the boundaries of Lincoln County. The people of Depoe Bay and Lincoln County have already had significant portions of the Oregon Territorial Sea off the coast of Lincoln County carved out for Marine Reserves. Additionally, we whole heartedly agree with the position on wave energy stated by the Lincoln County Commissioners in their November 26, 2012 letter to Governor Kitzhaber.

At this very early stage in the wave energy development, we do not believe it is in the best interest of the state of Oregon and communities and businesses which depend on the bounty of the waters of Oregon's territorial sea to commit to large parcels within the Oregon Territorial Sea to future commercial ocean energy projects. Further, we are of the position that not only should the PMEC and NNMREC sites be designated for research but they should be counted as part of the total number of sites selected by the State of Oregon.

Sincerely yours,

Carol Connors

Carol Connors, Mayor
City of DepoeBay

cc: Lincoln County Commissioners

FOR BOC REVIEW

Date Rec'd 12-5-12
Comm. Hall BH
Comm. Thompson
Comm. Hunt
Requires
BOC Approval: ☐

Copy to:

_____
_____
_____
_____
_____
_____

CITY OF NEWPORT
169 SW COAST HWY
NEWPORT, OREGON 97365

COAST GUARD CITY, USA

phone: 541.574.0629
fax: 541.574.0644
http://newportoregon.gov

mombetsu, japan, sister city

December 17, 2012

Scott McMullen, Chair
Ocean Policy Advisory Council
635 Capitol St. NE, Suite 150
Salem 97301-2540

Dear Chair McMullen,

We understand that you will soon be considering amendments to the Territorial Sea Plan to identify suitable locations and siting criteria for offshore wave energy development. The City Council recognizes that this is the culmination of many years of hard work by the Department of Land Conservation and Development, key stakeholders, and citizens and we would like to express our deep appreciation for all of their efforts.

As you may be aware, Oregon State University's Northwest National Marine Renewable Energy Center (NNMREC) has identified Newport and Reedsport as finalists for the proposed Pacific Marine Energy Center (PMEC) grid-connected wave energy test facility. The City is working with its community partners in Newport and Toledo on developing a proposal to NNMREC and it is our sincerest hope that we will be successful in this endeavor.

On November 26, 2012 the Lincoln County Board of Commissioners wrote a letter to the governor, on behalf of the Fisherman Involved in Natural Energy (FINE) Committee, which expressed a similar view with respect to the value of the PMEC development to our community. The letter further notes that the fishing community has always stepped forward to assist Oregon State University in its efforts to research and develop wave energy technology and that the growing cluster of marine research activities in Newport makes this type of project a natural fit for our community.

This isn't without its risks though, and as the Board of Commissioner's points out there is growing concern within the fishing community about the potential future loss of ocean space should commercial-scale wave energy development projects seek to occupy our coastal waters in addition to sites reserved for research purposes.

Commercial fishing and fish processing contribute substantially to our local economy and in many ways define the character of our community. With that in mind, the City of Newport fully supports Lincoln County and FINE in their effort to limit future deployments off the County's coastline to non-commercial wave energy operations. This approach promotes wave energy research while at the same time protecting the critical needs of our fishing industry.

Thank you for your time and consideration.

Sincerely,

Mark McConnell

Mark McConnell, Mayor
On Behalf of the Newport City Council

Yaquina Bay Ocean Observing Initiative
Establishing Newport Oregon as a hub for ocean observing in the Pacific Northwest

Supplier Listing

This document provides a listing of suppliers on the Oregon Coast and in other parts of Oregon that provide critical services needed to support ocean observation, research, and deployment. If your company is not in this list, and you would like to add it, please let us know on the comment form. While every effort has been made to ensure the information is complete and up to date, you should contact the supplier directly to obtain the most current information. If you wish to update a listing or provide us any other comments on this site, please notify us on our Comment Page.

Companies who are qualified to do work with the government are identified with the words "Government Contractor Ready". If you are not currently a government contractor, but are interested in becoming one, visit the BuyLocalLincolnCounty website to learn more.

Categories:

Commercial Diving
Marine Construction & Repair
Marine Engineers
Marine Services
Marine Suppliers
Metal Fabricators
Plastic Fabricators
Research & Development
Riggers and Rigging Supply
Stevedores
Towing & Barge Companies
Underwater Housings

Commercial Diving

Advanced American Construction

AAC provides full service diving services on a 24-hour, seven days a week, emergency and non-emergency response basis.
Website: www.callaac.com
8444 NW St. Helens Road
Portland, Oregon 97231
Telephone: 503-445-9000

REFERENCES:

1. Wave Energy Infrastructure Assessment in Oregon. This report was prepared for the Oregon Wave Energy Trust by the Advanced Research Corporation of Newport. John Lavrakas and Jed Smith, Dec. 1, 2009.
2. Port of Newport Business Plan, in process and finalized March 2013.
3. Port of Toledo Strategic Investment & Capital Investment, adopted Nov. 20, 2012.
4. Newport Travel Impacts, 1991-2011. Dean Runyan Associates. June 2012.
5. Non-consumptive Ocean Recreation in Oregon: Human Uses, Economic Impacts, & Spatial Data. Surfrider Foundation et al., March 3, 2011.
6. Supplier Listing, Yaquina Bay Ocean Observing Initiative. June 2012.

ADDENDA:

Other On-Shore Cable Landfall Options (northernmost site first):

Don Davis Park/Nye Beach, 7.5 NM distance from site, City ownership, existing access and infrastructure, extensive reefs.

Lighthouse State Park, 7 NM distance from site, City ownership, marine cables must cross dredging channel.

Thiel Creek, 6 NM distance from site, lowest PUD costs, private property and access issues, infrastructure costs, special zoning exception needed, rock reefs.

Notes on Recreational Use (references 4 & 5):

In a statewide survey generated by Surfrider Foundation et al., "Non-consumptive Ocean Recreation in Oregon," Lincoln County was ranked by far the most visited county. In 2010 Oregon residents took an estimated 27 million trips to the coast, 88% for recreation. A random sample of 4,000 residents found that over 80% had visited the Oregon Coast at least once in the past 12 months. The most popular activities were shore-based. Wildlife viewing activities such as tide pooling and whale watching were popular with nearly a third of respondents indicating participation. Ocean based activities such as surfing, kayaking and boating captured between 2-8% of the survey sample. These activities are trending upward.

Yaquina Bay is ranked by www.bestfishinginamerica.com as one of Oregon's most popular all around recreational bays, safe for new boaters with plenty of crabbing supplies and boats to rent. ODFW has a link to Yaquina Bay for good clamming and crabbing areas.

APPENDIX G: EXAMPLES OF WEC DEVICE TECHNOLOGIES