Ocean Renewable Energy Industry Needs Input

The State of Oregon, through the Oregon Innovation Council, competitively selected wave energy as Oregon's next emerging industry. Ocean energy was viewed as a viable source of renewable energy and a tremendous job creator compatible with protecting our important marine environment. The Oregon State Legislature formed the Oregon Wave Energy Trust (OWET) and invested $10,000,000 to date over three biennium budgets to pursue the goal of 2MW of ocean renewable energy by 2015 and 500 MW by 2025.

OWET and the ocean renewable energy power industry are focused on the responsible development of projects off the coast of Oregon that will benefit the State, benefit the local communities, prove to be commercially viable and result in dependable renewable energy and sustainable jobs. The OWET Board of Directors initiated the Industry Advisory Group (IAG) to seek input from private industry stakeholders and to encourage the goals of responsible development, investment, and job creation in Oregon.

The IAG is a diverse group of ocean renewable energy industry stakeholders that represents companies involved in wave energy, offshore wind energy and hybrid wave-wind energy conversion, and potentially tidal and river current energy conversion. The IAG appreciates working with an equally diverse group of stakeholders including appointed and elected officials, local, state and federal agencies, members of other stakeholder groups and the public. The IAG supports the Territorial Sea Plan (TSP) process, participated in the meetings to-date and will continue to participate.

The Territorial Sea Plan Working Group (TSPWG) invited ocean energy industry stakeholder input. The Oregon Land Conservation and Development Commission appointed ocean renewable energy industry representatives on the Territorial Sea Plan Advisory Committee (TSPAC). The IAG sought input from a wide range of stakeholders and coordinated a consensus statement of industry needs and interests in order to prepare timely private industry input to the TSPWG and TSPAC.

Executive Summary:

Ocean renewable energy industry stakeholders have determined that, in the near term, a small number of areas are suitable for focused study. Considering economic constraints on the emerging industry, such as logistics factors like distance from grid connections and ports, the number of "practical areas" is limited and the number of "favorable sites" for early-stage, grid-connected projects is even more limited.

"Favorable sites" for ocean renewable energy constitute valuable and limited marine resources for the State of Oregon and merit consideration, and balance during the TSPWG and TSPAC deliberations, on par with Statewide Goal 19 protection.

Ocean energy was not envisioned when Goal 19 was adopted in 1976 and amended in 1984 and 2001. As we work together to interpret the decision making guidelines in TSP Chapter 5, and the intent of Goal 19, the IAG requests that the needs of the wave energy industry be considered in parallel with other ocean stakeholder interests and resource protection requirements. We believe this approach will yield the most transparent process and enhance public understanding of the ocean energy industry stakeholder needs in the context of the Governor's Executive Order 08-07 task of **"identifying sites for ocean energy that minimize adverse impacts"** and TSP Chapter 5 guidelines for "making decisions concerning the development of renewable energy facilities".

The IAG recommends a **near-term approach** with charts that identify "**Suitability Study Areas"** for focused due diligence to determine which locations are "practical" and designate those as **"Candidate Areas".** Candidate Areas that meet the selection criteria for "favorable sites" could be designated as "**Renewable Energy Development Zones (OreDZs)"** that are permitted for periods long enough to justify the large investments in cables and sufficient for 500 MW of ocean renewable energy by 2025.

The key issues the IAG would like to emphasize are:

(1) IAG recommends undertaking the analysis of Goal 19 and industry needs concurrently — reconciling the needs to find suitable areas for wave energy development while balancing protection of other stakeholder's needs . This represents the most straightforward and efficient means to arrive at TSP plan outcomes that will work for all users of the ocean (present and future). IAG recommends designating locations that are a priority for focused due diligence as **Suitability Study Areas**, describing their actual shape and coordinates and not constrained by grid coordinates.

(2) In addition, we propose that the TSP process seek to identify sites that minimize adverse impacts and that are practical for both early-stage and long-term commercial or utility-scale development. These "practical" locations might be referred to as **Candidate Areas** near each deep water port and consider shallow, mid-depth and deep-depth requirements.

(3) The logistical considerations of time and distance to sites are crucial for this young industry when the total life-cycle of projects is considered. Distance translates to expenses and further influence site selection. Acknowledgement of the impact of distance from grid connections with adequate capacity and from ports on the pre-revenue realities of the emerging industry would result in identification of favorable sites for early stage projects. These "favorable" renewable ocean energy sites should be recognized as being a limited and valuable asset for the State of Oregon and could be identified as **Ocean Renewable Energy Development Zones (OreDZs)** relatively near each deep water port and consider shallow, mid-depth and deep-depth requirements.

(4) Sufficient sites are needed for 500 MW of ocean renewable energy by 2025.

(5) Regulatory certainty is needed to justify the time and large expense to pursue development.

Background

The Governor's Executive Order 08-07 directed the task of **"identifying sites for ocean energy that minimize adverse impacts."** The Territorial Sea Plan, Chapter 5 was adopted with consistent wording with guiding principles that consider multiple factors, including: 2.a.1. "Avoid adverse effects…"; 2.a.2. "Minimize effects…; 2.a.3 "Rectify or mitigate…."; 2.e. "Encourage the research and responsible development…" Neither document suggests a requirement for absolutely "no impact" or to "avoid any conflict" with Statewide Goal 19 resources. Neither document mandates the exclusion of large portions of the Territorial Sea from consideration for renewable energy development. Neither document prohibits local stakeholders and local governments from seeking mutually-beneficial solutions.

TSPWG and TSPAC are working to interpret the guidelines of TSP Chapter 5, Goal 19, and stakeholder needs. The TSP guidelines for "making decisions concerning the development of renewable energy facilities" require balancing multiple factors. However, most of the options presented by DLCD Staff in the TSPWG meetings have stressed strictly avoiding any conflict with Goal 19 resources. As the Staff recommendations are currently structured, the anticipated "Opportunity Areas" may be impractical or unaffordable for the industry stakeholders. In addition, the options using areas described by large grid blocks are not precise and that Red/Yellow color codes will discourage investment in Oregon's renewable energy sector. Our federal partners have also indicated that these options could also be inconsistent with development on the Outer Continental Shelf (OCS).

Several formats of ocean renewable energy industry stakeholder needs are being provided:

A. The IAG statement of needs
B. OWET-funded Geo-spatially-explicit industry input using GIS data layers
C. OWET-funded Cumulative Effects analysis tool

1. **Focus on "facts", such as permitted areas, and "factual data", such as actual coordinates to describe the purpose and shapes of permitted areas and study areas.**
    a. The TSPWG can most accurately show areas that are not intended for ocean renewable energy industry development by charting the actual coordinates and labeling the area. The use of one square nautical mile blocks unnecessarily expands the areas beyond the factual size and eliminates useful locations that already have precedent as being permitted.
    b. Examples of permitted areas for the ocean renewable energy to avoid or setback from:
        i. Permitted Marine Reserves
        ii. Permitted Dredge Disposal Sites
        iii. Permitted Submarine Telecommunications Cables
        iv. Permitted Oceanographic Research Cables
        v. Published USCG Navigation Channels
    c. Examples of areas that require collaboration, may have potential for compatible uses, and are not appropriate "keep out zones"
        i. Existing Tug and Tow Lanes. These can be negotiated and mitigated.
        ii. Proposed Goal 19 resource areas. These can be negotiated and mitigated.
        iii. Proposed Goal 19 fishing areas. These can be negotiated and mitigated.
        iv. Proposed Goal 19 existing use areas. These can be negotiated and mitigated.

2. **Describe the actual shapes of study areas and development sites with actual coordinates and use "Shades of Blue" to "identify sites for ocean energy that minimize adverse impacts".**
    a. Realistic areas are most likely irregular shapes, not in one square nautical mile rectangles.
    b. "Shades of Blue" have no implied meanings. Light blue can show general areas that may be suitable for further study. Medium blue can show the best estimates of specific areas that might be practical for development, and best estimates of the sites that may be favorable in the economically-constrained case. Darker blue can indicate areas that have been reviewed and meet selection criteria.
    c. Red reflects "stop" or "stay out". Yellow reflects "caution". The message of those colors is the State is not open to Industry investment.
    d. Green reflects "go" or "all clear". The message seems that the area is available and this message is premature. Much due diligence is needed to qualify an area for development.

3. **Resolve conflicting language in the states administrative rules to provide regulatory certainty that developmental grid-connected projects can be paid for power produced and operate long enough to justify the large investment.**
    a. The terms "pilot," "demonstration," "temporary", "commercial", and "phased development" were included in various documents in good faith to distinguish between different phases and purposes of projects. In practice, the terms create uncertainty in the permitting process and seem to have had unintended effects on complicating development.
    b. Grid connection with adequate capacity to enable Power Purchase Agreements is required to prove commercial viability and must be long enough to justify the large investment in project infrastructure required by the first 500 MW of ocean energy.
    c. Financial analysis of the large investment for permitting, submarine power cables, grid connection indicates a minimum payback period of ten (10) years is required.

Cross-industry Stakeholders Needs:

Given the range of technologies that are under consideration by industry, the IAG reached consensus on criteria that need to be balanced to identify **Suitability Study Areas**. Relatively few areas are suitable, especially for early-stage, economically-constrained projects, so focusing study efforts will optimize the efforts by all stakeholders.

Integration of ocean renewable energy industry stakeholder criteria for "practical" areas, in parallel with other stakeholders and Goal 19 requirements would result in designating **Candidate Areas**.

Economic limitations of an emerging, pre-revenue, industry need to be recognized. Proximity to grid connections with adequate capacity and ports drives installation and operating expenses. The industry requests identification of "favorable" sites as **Ocean Renewable Energy Development Zones (OreDZs)**.

IAG consensus recommends the following "criteria for favorable ocean renewable energy sites".

Cross-Industry Criteria for Favorable Ocean Renewable Energy Sites include the following:

i. Optimization of ocean energy resource (wave and/or wind), range of bottom depth, and bottom type for anchoring and cable/piping burial.

ii. Proximity to accessible grid connection with adequate capacity (determines if additional shore infrastructure is required).

iii. Proximity to appropriate cable/piping corridor and cable/piping landing (determines required equipment and crane service).

iv. Proximity to deep water port (one day tow, more than 5 meters at low tide, crane services).

v. Proximity to marinas capable of supporting a crew and/or monitoring boat port (12 hour charter is less expensive than an overnight charter).

vi. Optimization of community and public benefit associated with distributed renewable energy utility-scale power projects (estimated at 10MW near term, 30MW mid-term, 50 to 100 MW longer-term, for an estimated total of 500MW for the foreseeable future)

vii. Reduce, remove conflict or mitigate impacts with ecological resource areas

viii. Reduce, remove conflict or mitigate impacts with highest value fishing grounds

ix. Reduce, remove conflict or mitigate impacts with highest value view shed

x. Reduce, remove conflict or mitigate impacts with current and future tug & tow lanes, shipping routes and other existing uses including recreational, USCG operations and US Navy training (collaboration can adjust current procedures to minimize conflicts with existing uses and maximize cumulative positive effects).

"Proximity" recognizes a sliding scale of distance from port versus cost versus benefit. It implies that beyond a certain geographic point the law of diminishing returns makes proposed development sites impractical or uneconomical. The proximity impact is greater for early stage projects which cannot absorb the costs associated with greater distances from the grid or ports.

"Conflict Mitigation" underscores the reality that while the ocean planning process will strenuously seek to minimize adverse effects; some conflicting uses are bound to result. The IAG believes the concept of highest and best use of an area of the Territorial Sea, including sites that will accommodate multiple stakeholders, is a logical goal of the guidelines in Part 5 of the Territorial Sea Plan. Analysis of compatible and complimentary uses could result in optimized locations of ocean energy projects.

Marine Energy Converter (MEC) categories:

MECs can be viewed in many ways. Two accepted ways are depth and technology. A number of site selection criteria need to be balanced to identify a candidate site for a particular technology. .

Examples: Depth

i. Shallow Depth: 10 to 15 meters
ii. Mid-Depth: 15 to 50 meters
iii. Deep Water: greater than 50 meters

Examples: Technology

i. Bottom mounted
   a. Near-shore surge devices, including jetty and dike mounted
   b. Mid-water devices
   c. Deep-water devices

ii. Floating
   a. Deep water point absorber (buoy)
   b. Deep water linear attenuator
   c. Deep water front hinged pivot
   d. Deep water over topping
   e. Deep water oscillating water column
   f. Deep water wind
   g. Deep water wave-and-wind hybrid

Technology and Project-Specific Needs

As reflected in the diversity of MECs described, the specific needs will vary by vendor and/or developer, and are driven by the marine energy converter category and development stages described below.

In most cases, the discussion will start with a resource assessment, then consider depth and bottom type

Development Stages:

One of the most important reasons ocean energy companies have been attracted to Oregon is we saw a regulatory framework that would enable investors a reasonable assurance that, if done the right way, with a reasonable investment of time and money, there is a path to "yes" for an economically attractive site.

In order for the State to achieve the goal of responsible development of an ocean renewable energy industry, with all of its attendant economic and environmental benefits, the TSP should allow for sites for ocean energy that are certain enough (both in the short-term and long-term), large enough, and attractive enough (depth, capacity, bathymetry, etc.) to induce private investors to invest the millions and billions necessary for Oregon to capture the economic opportunity of commercial-scale ocean energy development, as quantified in the ECONorthwest report "Economic Impacts of Wave Energy to Oregon's Economy: A Report to the Oregon Wave Energy Trust, (Sept 7,2009)".economic analysis.

- In order to begin attracting and growing the industry at this early stage, and encouraging investors to put their capital at risk now for long-term return, a process must be put in place that anticipates the research and development (R&D) stages the industry must go through to get to commercial scale desired in the future. The terms "commercial" and "R&D" have many different meanings.
- These developmental stages include wave tank testing, single-device ocean testing (which may or may not be grid connected), small array ocean testing (which may or may not be grid connected), and arrays built in several phases pursuant to a long-term Power Purchase Agreement. It is critical to attracting investment at the earliest stages that each subsequent phase builds upon both the assets put in place and the data collected at each earlier phase.

Development Stages are building-blocks, with each one building on the one before it. The stages can be sequential (series) or concurrent (parallel) and they will certainly overlap, with different companies at different levels of technical readiness, and may be interrelated. These are not mutually exclusive alternatives. All of them are necessary to get to the State's end goal.

<u>Protected Waters Test Site "Nursery" Site"</u>

Requirements: Close-in locations to test single MEC system operations and water tight integrity.

Examples:

- Recent testing near Newport, Oregon
- Recent one-seventh scale testing in Puget Sound.
- One-quarter scale waves in Galway Bay, Ireland.
- Checkout site near port in Orkney, Scotland

<u>Open Ocean Test Site</u>

Requirements: Close-in location to test developmental devices for weeks or months. Installation of test site infrastructure such as anchor arrays and cables would be permitted that can accommodate a range of devices. Devices would be individually permitted for testing. A test site that starts as non-grid connected could later establish a grid connection at the same or an associated test site.

Examples:

- Proposed NNMREC Site, Newport, Oregon
- Proposed NNMREC grid-connected site (location to be determined).
- Recent one-seventh scale testing in Puget Sound.
- One-quarter scale waves in Galway Bay, Ireland.
- Checkout site near port in Orkney, Scotland

Sequential (Series) Development

Requirement: Development Zone near port for initial grid-connected commercial deployment. A number of individual development projects could be accomplished in a development zone with separate licensing efforts that leverage documentation from early applicants.

Examples:

- Phased deployment from single MEC, to small array to moderate array over several years. After a period of successful operation, identify a permanent site, initiate application for transition.
- Some technologies designed for other wave climates will need to be adapted for Pacific Ocean off Oregon and taken through a progressive validation (series) process.

Concurrent/ (Parallel) Development

Requirement: Development Zone near port for grid-connected R&D and/or commercial deployments to demonstrate commercial viability and reliable extended operation. An integrated program for multiple projects could be accomplished, beginning with a small number of MECs and building out in a phased development. The goal would be to amend initial phases for later phases vice starting new applications.

Examples:

- Phased deployment from single MEC, to small array to moderate array over several years.
- In parallel, initiate application and transition site to longer term license.
- Includes potential to expand at a site after successful operations through relicensing.
- Includes potential to decommission a site and extend the cabled infrastructure to a different site.

The total life cycle of the project must be considered from the earliest concept stage. If developers are required to unconditionally remove their assets after a testing or pilot phase, and are prohibited from selling any power produced, and start the permitting and required to start each new phase of licensing processes from the beginning, projects will not be economically viable since they will not provide a fair return to investors. "Temporary" is impractical for a large investment. Planning and permitting for the next phase can be done during the operating period of each phase, using the new data gained from that operation. Reuse of assets, or decommissioning in-place, or removal of assets are all viable alternatives that require analysis.

Coastal and Marine Spatial Planning (CSMP)

As we work together to interpret the guidelines of TSP Chapter 5 and Goal 19, we believe the better approach is to identify the relatively few areas that meet the technical requirements of the industry stakeholders and to focus study where those areas pose the least impact on Goal 19 resources and other stakeholders. The IAG recommends that the TSPWG resist expanding this first step into what could become rigid zoning of the ocean based on inadequate data. Experience gained in early stage projects will provide needed data for these important deliberations. In the longer-term approach, more comprehensive charts can be prepared with data-driven decisions. As noted by the Oregon Coastal Zone management Association (OCZMA) Report on the Origins of CSMP in Oregon, Statewide Goal 19 was written several decades ago within the context of offshore oil and gas development. Ocean renewable energy was not envisioned in Goal 19. More recently, Oregon Governor Ted Kulongoski made wave energy a top economic development priority for his administration and his successor, Governor John Kitzhaber has been equally supportive. The intent is clear in Governor Kulongoski's press release dated Oct 2006:

"I want Oregon to launch a new wave of alternative energy development, and I mean that literally. By tapping the energy of ocean waves, we can move Oregon toward national leadership in renewable energy technology. Oregon's investment in energy security will mean a healthier environment, a more reliable supply of home-grown energy, and good jobs for our state."