

OREGON WAVE ENERGY TRUST UTILITY MARKET INITIATIVE

TASK 3.4: BUSINESS PROTOCOLS



www.oregonwave.org



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The Utility Market Initiative was prepared by *Pacific Energy Ventures* on behalf of the Oregon Wave Energy Trust.

Task 3.4 was completed by Loren Baker Consulting.

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For information about this project, please contact Justin Klure at Pacific Energy Ventures:

Phone: (503) 475-2999

Email: jklure@peventuresllc.com

About Oregon Wave Energy Trust

The Oregon Wave Energy Trust – (OWET) - with members from fishing and environmental groups, industry and government - is a nonprofit public-private partnership funded by the Oregon Innovation Council in 2007. Its mission is to serve as a connector for all stakeholders involved in wave energy project development - from research and development to early stage community engagement and final deployment and energy generation - positioning Oregon as the North America leader in this nascent industry and delivering its full economic and environmental potential for the state. OWET's goal is to have ocean wave energy producing 2 megawatts of power - enough to power about 800 homes - by 2010 and 500 megawatts of power by 2025.

Business Model for Utility and Industry Engagement

Report Purpose

This report outlines approaches to the sale of wave energy project power to northwest electric utilities, while outlining key risks associated with the technology and provides an analysis of each power sales approach relative to the risks. This is followed by a description of information that a wave energy project developer (WEPD) should be prepared to present to the utility for use in evaluating the wave energy project. This document is arranged in the following manner:

- Attributes of Wave Energy Industry
- Primary Project Risks
- Two General Approaches to Power Sales
- Analysis of Power Sales Approaches relative to Risks
- Developer and Project Information Needed by Utilities

Attributes of Wave Energy Industry

As of the date of this report, wave energy is an emerging technology that is more expensive than other forms of renewable energy, such as wind and biomass. Studies conducted by Electric Power Research Institute (EPRI) indicate that the cost of wave energy will decline as installed capacity increases and will ultimately be cost competitive with wind energy.

The following attributes of wave energy industry frame the discussion on marketing power from wave energy projects.

- High Initial Capital Cost – much like other forms of renewable, wave energy is projected to have a relatively high capital cost even in commercial deployments.
- Uncertain Operations and Maintenance Costs – as there have been no sizable deployments of wave energy systems to date, the estimated operations and maintenance costs have not been confirmed.
- Unproven Technology – the early stage of the technology may make it difficult for projects to obtain conventional project financing. Many demonstration programs are funded with 100 percent equity or with a combination of grants and equity.
- Early Stage Developers – some of the companies developing wave energy projects may have insufficient balance sheets to provide performance guarantees to utilities or to secure debt financing.
- Non-competitive Versus Other Forms of Renewable Energy Projects – wave energy is an emerging technology and is not currently be cost competitive with other forms of utility scale renewables such as wind and biomass. Therefore, it may be difficult for wave to be cost competitive in an RFP process.

Primary Project Risks

More mature technologies have a clearer path to obtain project financing than wave energy technologies because their costs and risks are more fully understood and predictable. Typically, a project developer secures a power sales contract with terms including a price sufficient to cover project development and permitting costs, operating and maintenance costs, debt service on any outstanding loan(s) plus a reasonable return to the project developer and their equity partners for taking on project development risks. This power sales contract is used as security for any loan to build the project. At the present time, the wave energy industry has cost uncertainty and operating risks that complicate the traditional financing model. These risks include:

- **PERMITTING COSTS:** The regulatory process, the environmental and socio-economic impacts, and the potential mitigation requirements for this technology have not been fully tested. Therefore, the amount of time and costs associated with securing all necessary permits, licenses, and approvals for the rights to construct, operate, and maintain the project are not fully known.
- **CAPITAL COSTS:** WEPDs have estimates of project construction costs, however, these cost estimates will not be proven until early units are operating for a reasonable length of time. Therefore, the costs for procuring (or manufacturing) the wave energy generation equipment, constructing, and installing the project are a risk.
- **OPERATIONS AND MAINTENANCE COSTS:** WEPDs have estimates of the frequency and cost of maintaining their technology. These estimates have not yet been proven. Costs will be influenced by the impact of the marine environment on the equipment and by the access and costs of marine vessels for transport and maintenance.
- **PERFORMANCE RELATIVE TO FORECAST:** There is a risk that the project will not be able to produce the amount of energy forecast by the WEPD. This risk covers situations where:
 - the wave energy resource potential was not as expected, and/or;
 - the wave energy equipment fails to extract and produce the forecast quantity of energy, and/or;
 - the wave energy equipment is forced out of service often and is not operational consistent with WEPD forecasts.
- **ONGOING PERMIT COSTS:** Permits might be issued with the ability to modify the project requirements if impacts are different than anticipated (e.g. adaptive management) at the time of permitting. Changes might include changes in operation or new/different mitigation responsibilities which may include, decommissioning the project after its useful life.

The agreement(s) between the WEPD and the utility should address each of the above risks and identify the party responsible to pay in the event that the costs associated with any risks turn out higher than expected.

Two General Approaches to Power Sales

Ownership Arrangements

An ownership arrangement is an approach where the utility would ultimately own the wave energy project. Ownership could be transferred to the utility at various stages of project development and use a variety of approaches. These approaches are often driven by the type of financing that the project developer selects. Possible approaches include:

- Joint project development by the WEPD and the utility
- Project development by WEPD followed by its transfer to the utility at commercial operation
- An initial purchase of power by the utility from the project with transfer of ownership at a later time

Ownership arrangements are usually implemented through a series of definitive agreements. These may include:

- Purchase and Sales Agreement (PSA)
- Guaranty by a creditworthy affiliate of the WEPD that would guarantee the WEPD's obligations under the definitive agreements
- Power Purchase Agreement (PPA) for any power sold prior to the utility taking project ownership

The definitive agreements would include detailed exhibits showing the project's design, engineering, and construction status. These exhibits may include:

- Technical specifications
- Performance guarantees
- Major equipment and systems and vendors
- Major subcontractors
- Status of permit applications
- Status of contractors' and vendors' obligations and warranties
- Completion schedule and other related information and data

Closing the transaction would occur after receipt by the parties of all consents, authorizations and approvals, and satisfaction of conditions precedent specified in the definitive agreements. At closing, the utility would expect to purchase the project from the WEPD free and clear of all liens, charges, encumbrances, and conflicting or competing claims.

If the WEPD retains the responsibility for project completion, start-up, and commissioning, then payment to the WEPD would likely be made in predetermined installment amounts often based upon completion of certain milestones as outlined in the definitive agreements. The first such payment is often at Closing.

Power Purchase Agreements

A Power Purchase Agreement (PPA) is an approach where the WEPD retains ownership of the wave energy project. The WEPD is responsible for securing all necessary permits, licenses, and approvals for the rights to construct, operate, and maintain the wave energy project.

During the term of the PPA, the electric output from the project is sold to the utility at the point-of-delivery. The WEPD is responsible for delivery of the energy generated by the wave energy project to the point-of-delivery including all necessary electric transmission services. The WEPD is responsible for all taxes, ancillary services, and all other charges on the energy produced and sold prior to the point-of-delivery. The utility is responsible for taking the project output at the point-of-delivery and is responsible for securing electric transmission from this point to the utility's load. The utility is responsible for any taxes, ancillary services, and all other charges beyond the point-of-delivery.

The utility is normally responsible for arranging all scheduling services necessary to ensure compliance with applicable power scheduling regulations and protocols. However, it is likely that the WEPD will need to communicate the hourly forecast amounts of energy expected to be produced by the project to the utility at least daily and when there are expected material changes to hourly generation forecast within the day. The responsibility of payment of any imbalance generation charges or other costs stemming from the difference between the forecast and actual output would be part of the PPA negotiations.

As part of the PPA, the utility and the WEPD would develop written operating procedures for the project that would describe the protocols under which the parties will perform their respective obligations. These protocols and procedures will likely include:

- The method of day-to-day communications
- Key personnel lists for WEPD and the utility, including an appointed authorized representative for each party
- Forced outage reporting and planned outage planning

During the term of the PPA, the WEPD would be responsible for operating and maintaining the project in accordance with prudent engineering and operations practices. The WEPD would be required to operate the project in a lawful manner and with safety, dependability, and efficiency in accordance with any applicable practices, methods, acts, guidelines or standards and criteria of governing regulatory bodies and electric reliability councils.

Payment for energy delivered would likely be based upon:

- The amount of energy delivered, or;
- A predetermined monthly amount independent upon the amount of energy delivered, or;
- Some combination of the above.

Adjustments to the payment rates for changed regulatory conditions would be part of the PPA negotiations.

Analysis of Power Sales Approaches relative to Risks

The following analysis provides a high level overview of how risks might be allocated in the different power sales approaches described above. Each of these business models could be modified through contractual terms to change the risk arrangement. The table below outlines an initial concept of risk allocation between the utility and developer.

	Joint Development	Development then transfer of Ownership at Commercial Operation	Power Purchase Agreement with transfer of Ownership at a Later Date	Power Purchase Agreement
Permitting	Shared risk	WEPD carries risk	WEPD carries risk	WEPD carries risk
Capital	Shared Risk	WEPD carries risk	WEPD carries risk	WEPD carries risk
O&M	Shared Risk	Utility carries risk	WEPD then Utility carries risk	WEPD carries risk
Performance	Depends on how PPA is structured - either party could take risk or it could be shared.	Utility carries risk	WEPD carries risk until ownership transfer then utility carries risk	Depends on how PPA is structured - either party could take risk or it could be shared.
Ongoing Compliance Costs	Depends on how joint venture is structured - either party could take risk or it could be shared.	Utility carries risk	WEPD carries risk until ownership transfer then utility carries risk	Depends on how PPA is structured - either party could take risk or it could be shared.

Developer and Project Information Needed by Utilities

Before a utility will enter into any serious discussion on the sale of power from a wave energy project the utility will need to fully understand the proposed project's characteristics and will also need information about the WEPD. Information in the WEPD's proposal should be presented in a readable way assuming that the reader has limited knowledge of the proposed wave energy technology and the WEPD.

It is common for utilities and project developers to enter into a confidentiality agreement before details of the project and technology are disclosed to the utility. Attached in Appendix A is a common form of a confidentiality agreement.

Described below are the key elements of a WEPD proposal to a utility.

Development Team Experience

Provide a description of the WEPD – the entity that will sign the power sales agreement with the utility. Briefly describe the legal form of the entity, its owners, the management team, and all relevant experience in developing power projects. Be prepared to present financial statements and describe the WEPD's capability and willingness to provide collateral to ensure project performance.

Describe the outside consulting team that has been retained to bring the project from concept through commissioning. Typically this team would include:

- Environmental consultants who have prepared the license and permit applications
- Key equipment manufacturers
- Specialty consultants who are addressing the unique technical aspects of constructing the project. e.g.: mooring and anchoring consultants, wave energy technology specialists, etc.
- The legal team that represents the WEPD
- If the WEPD plans on operating the project, describe the operations and maintenance team

The quality and reputation of the entire team will materially affect the enthusiasm that the utility will have towards the project. The objective of this portion of the WEPD proposal is to clearly demonstrate that the development team can bring the project into fruition as described in the balance of the proposal – on time, on budget, and capable of solving unknown issues that may arise during the development process.

Detailed Description of the Project

Describe the proposed project, including the project's:

- Site location, size, and the ocean area that it will occupy
- Wave energy technology to be employed
- Licensing status with a statement describing both completed and planned work
- Expected power output
- Proposed point-of-delivery and the interconnection to the local utility's system
- Proposed project schedule
- Risks and the plan to mitigate them

Each of these topics is further described below.

Project Location, Size, and Ocean Area

In a concise executive summary style, with maps and photographs as appropriate, describe the proposed project's:

- Location
- It's nameplate rating and average annual energy output
- The area of ocean that it will occupy
- The local utility where it will interconnect
- Any other pertinent information that the reader may need to better understand the remaining parts of the proposal

Project's Proposed Wave Energy Technology

Describe how the project's proposed wave energy device operates to convert wave energy to electrical energy. Describe the technology's characteristics needed to maximize energy conversion from the wave energy resource, and if the device can change its characteristics to match the naturally occurring changes in the wave energy spectrum. The description should include the:

- Number, type and characteristics of the proposed wave energy devices, including their efficiency curves
- Minimum, most efficient and maximum generation outputs
- Equipment required for monitoring and maintaining the project including methods, schedules, costs and preferred vendors.
- Proposed installation technique(s) for equipment placement, including anchoring systems and related designs. Describe how the project's design and installation ensures survival of equipment in severe storm conditions.

Completed and Planned Work for Project Licensing

Include a statement as to the availability of a license from the Federal Energy Regulatory Commission (FERC) and/or the Materials Management Service (MMS) at the proposed project location. Detail any license application steps that have been completed toward either a preliminary permit and/or a formal license application.

Identify the project permitting pathway, requirements, agencies, and schedule. Describe any environmental monitoring programs required by the license or to be proposed as part of the licensing process including methods, schedules, costs and preferred vendors.

Project's Expected Power Output

Identify and provide the data source used as the basis for estimating energy production at the proposed project site. Include the wave energy hourly raw data, describe how this data is translated to calculate project output, and identify the expected forecasting accuracy.

Provide a graph showing the total energy available per linear meter at the project site for each day in the dataset. Point out any gaps or other anomalies in the available data and how they are treated in calculating project output.

Provide the project's estimated annual and monthly power duration curves as well as hourly output for a typical, extreme, and low volatility week. Examples of this information are shown in Appendix B.

Proposed Point-of-Delivery and the Interconnection with the Local Utility's System

Identify the local electric service provider and the location of where the project output will interconnect to the existing utility grid. Describe the equipment required for project interconnection and describe any power conditioning that is planned to be incorporated into the project. Describe planned and completed steps to secure an interconnection agreement with the local utility. Discuss any expected special project equipment or operating procedures required by the local interconnection utility.

Proposed Project Schedule

List all major project development milestones through project commissioning. List manufacturer's rated "expected life" of all equipment, including turbines, pumps, generators, switching mechanisms, etc.

Project Risks

Describe any known or possible conditions that could impact the successful deployment and operation of the proposed wave energy project. These may include competing uses of the location such as shipping lanes, submarine cables and pipelines, ocean disposal sites, military exclusion areas, commercial and sport fishing grounds, environmentally sensitive areas, and existing national parks or marine sanctuaries. Describe the plan to mitigate the identified risks.

Appendix A

A COMMON FORM OF CONFIDENTIALITY AGREEMENT

THIS CONFIDENTIALITY AGREEMENT (the "Agreement"), entered into and made effective as of the ____ day of _____, is by and among _____ with its principal offices at _____ and _____ with its principal offices at _____ and _____ may be referred to herein individually as "Party" and collectively as "Parties".

WITNESSETH:

WHEREAS, the Parties intend to enter into confidential discussions concerning power generation project development in the state of _____, transactions related to said development activities and due diligence thereto which the Parties wish to discuss on a confidential basis (collectively, the "Purpose");

WHEREAS, the Parties have entered into this Agreement in order to assure the confidentiality of all such information and the confidentiality of the discussions between the Parties to prevent the disclosure of same to third parties except as permitted herein;

NOW, THEREFORE, in consideration of the mutual promises and covenants made herein, and with the intent to be legally bound hereby, the Parties agree as follows:

1. Confidential Information

a. The term "Confidential Information" as used in this Agreement shall mean any and all information of a Party, whether written or oral, regardless of form, disclosed in the discussions among the Parties concerning the Purpose, except to the extent such information is excluded from Confidential Information as provided in paragraph 1(b) or to the extent such information becomes available to the general public as a result of the process in paragraph 3.

b. Confidential Information shall not include the following:

i. information which at the time of disclosure by a Party (the "Disclosing Party") is publicly available, or information which later becomes publicly available through no act or omission of the recipient (the "Receiving Party");

ii. information which is, prior to disclosure hereunder, already in the possession of the Receiving Party and the Receiving Party can demonstrate that it has not previously received said information from the Disclosing Party or from a third party who is under a confidentiality obligation to the Disclosing Party;

iii. information received by the Receiving Party from a third party who, to the best of the Receiving Party's knowledge, did not acquire such information on a confidential basis either directly or indirectly from the Disclosing Party; or

iv. information that the Receiving Party can demonstrate was independently developed by it or for it prior to the signing of this Agreement and which was not obtained, in whole or in part, from the Disclosing Party.

2. Obligations of the Parties

a. The Receiving Party agrees that the Confidential Information is to be considered confidential and proprietary to the Disclosing Party, and Receiving Party shall hold the same in confidence, shall not use the Confidential Information contrary to this Agreement and for other than the Purpose, and during the Term as defined in paragraph 5 hereof, shall not disclose such Confidential Information to any third party, except as otherwise permitted in this Agreement.

b. Notwithstanding the above, the Receiving Party may disclose such Confidential Information to its representatives ("Representatives"), provided that such person(s) have a need to know such information, have been informed of the confidential nature of such information and the restrictions contained in this Agreement, and will use such information only for the purpose of evaluating and/or furthering the scope of the Purpose. The Receiving Party shall limit the disclosure of the Confidential Information to its Representatives reasonably necessary for them to evaluate the Purpose or to perform their duties thereto. For the purposes of this Agreement, Representatives shall mean "the representatives, employees, officers, directors, financial advisors, technical advisors, legal counsel, equity investors, bankers, lenders, and auditors of any such person or their affiliates, permanently employed or temporarily engaged to aid, advise, or otherwise participate in the Purpose." Each Party agrees to be responsible for any breach of this Agreement by its respective Representatives.

c. Receiving Party agrees that, in complying with its confidentiality obligations under this Agreement, such Party shall use the same means it uses to protect its own confidential proprietary information, but in any event not less than reasonable means, to prevent the disclosure and to protect the confidentiality of the Confidential Information received from the Disclosing Party.

3. Required Disclosure and Other Limitations of the Agreement

a. Confidential Information may be disclosed to any governmental, judicial or regulatory authority requiring such information provided that: (1) such Confidential Information is submitted under any applicable provisions for confidential treatment by such government, judicial, or regulatory authority; and (2) prior to such disclosure, the Disclosing Party is given prompt notice of such disclosure requirement(s) so that it may take whatever action it deems appropriate, including intervention in any proceeding and the seeking of an injunction or a protective order to prohibit such disclosure.

b. If, in the absence of an injunction, a protective order or the receipt of a waiver hereunder, any Party is nonetheless, in the opinion of its counsel, legally required to disclose Confidential Information received pursuant to this Agreement, then, in such event the Party so required may disclose such information without liability hereunder, provided that the other Party has been given a reasonable opportunity to review their own Confidential Information imbedded in the text of such disclosure of Confidential Information before it is made.

4. Return of Confidential Information.

a. Disclosing Party may elect at any time to terminate further access to the Confidential Information to which it has title and/or proprietary rights. Upon written request of Disclosing Party, the Receiving Party agrees to promptly return, or at their option, promptly destroy any and all Confidential Information as well as any other information disclosed to it and its Representatives, including all originals, copies, translations, notes, or any other form of said material, without retaining any copy or duplicate thereof.

b. Subsequent to the return of Confidential Information, the Parties, agree that they will not make any use and will cause their Representatives not to make use of Confidential Information received pursuant to or developed under this Agreement without the express prior written consent of the Disclosing Party.

5. Term.

Regardless of any termination of any communication between the Parties, the obligations and commitments established by this Agreement shall remain in full force and effect for a period of _____ years from the date first written above (the "Term").

6. Nature of Information.

a. The Parties each hereby accept the representations of the Disclosing Party that its Confidential Information is of a special, unique, proprietary, extraordinary, and intellectual character and that money damages would not be a sufficient remedy for any breach of this Agreement by Receiving Party or its Representatives and that specific performance and injunctive or other equitable remedies for any breach or threatened breach shall be available to it.

b. The Parties further acknowledge that the interests of the Disclosing Party in such Confidential Information may be irreparably injured by Receiving Party's disclosure of such Confidential Information. The remedy stated above may be pursued in addition to any other remedies applicable at law or equity for breach of this Agreement.

7. Expenses during the Term of the Agreement

The Parties recognize that during the Term of this Agreement, they may incur expenses while investigating the commercial, financial, technical and regulatory aspects of the Purpose. Expenses incurred by any Party shall be for its own account, and no Party shall have any right of reimbursement from the other Party unless such Parties have otherwise specifically agreed in writing.

8. Governing Law.

The validity and interpretation of this Agreement and the legal relations of the Parties to it shall be governed by the laws of the State of _____, without regard to choice of law provisions.

9. No Representation or Warranties.

a. With respect to any information, including but not limited to Confidential Information, which Disclosing Party furnishes or otherwise discloses to Receiving Party hereunder, it is understood and agreed that the Disclosing Party does not make any representations or warranties as to the accuracy, completeness or fitness for a particular purpose thereof and no liability shall derive from the use of any such information.

b. Neither this Agreement, nor the disclosure of Confidential Information hereunder, shall be construed as granting or conferring any license or rights to any information or data now or hereafter owned or controlled by the Disclosing Party to the Receiving Party and all such Confidential Information shall remain the property of the Disclosing Party.

10. Final Agreement

This Agreement contains the entire agreement and understanding between the Parties as to the subject matter of this Agreement, supersedes in their entirety any and all previous communications between the Parties relating to the subject matter of this Agreement (including all previous versions of this Agreement); and shall only be modified in writing by the Parties.

11. No Assignment

No Party may assign this Agreement or any interest herein without the prior written consent of the other Parties, which consent shall not be unreasonable withheld.

12. Severability and Counterparts.

a. If any provision of this Agreement is held by a court of competent jurisdiction to be invalid or unenforceable, then this Agreement, including all of the remaining terms, will remain in full force and effect as if such invalid or unenforceable term had never been included.

b. This Agreement may be executed in one or more counterparts, each of which will be deemed to be an original of this Agreement, and all of which when taken together, shall be deemed to constitute one and the same agreement.

IN WITNESS WHEREOF, the Parties hereto have entered into this Agreement on the day and year first herein above written.

ACCEPTED AND AGREED: