

Humboldt Working Group
Freshwater Tissue Plant
Samoa, CA

November 2, 2009

Meeting Summary

Introductions

Roundtable introductions were led by Anna West, Kearns & West (K&W) Facilitator.

Updates

Led by Anna West, K&W Facilitator

- PG&E conducted a site visit to the potential onshore landing sites on October 12 and 13.
- PG&E met with the Redwood Sciences Lab on November 2nd (today) to discuss use of their transect data. This is unpublished data that is very promising. PG&E is working through ways to help publish this data which would make it available for this project.

Update on WEC structures & anchoring systems

Presented by Rick Williams, SAIC

Rick presented information about the 14 wave energy converter (WEC) technologies that manufacturers submitted to PG&E in response to a Request for Information (RFI). PG&E distributed the RFI to 53 WEC manufacturers which have ocean-tested at least scale versions of their technologies.

The information and graphic representations for these 14 technologies can be found in the presentation, available at <http://www.pge.com/waveconnect/projects.shtml>. Rick clarified that all of the technologies use multi-point mooring systems.

A subsequent Request for Proposal (RFP) will be sent to many of the RFI respondents (those that are far enough along in development and appropriate for the water depths of this site) for the Humboldt WaveConnect Pilot Project. The RFP will be the opportunity for the WEC manufacturers to both show that their technologies will be ready for deployment by 2013 and explain how their technologies will be well suited to the ocean environment in the specific ocean site for this project. PG&E will be looking to select three to four primary technologies and two alternate technologies.

The HWG asked a number of questions about the technologies, device selection, and the appropriateness of the technologies in the specific Humboldt WaveConnect site marine environment:

Q: Why was the Pelamis device in Portugal taken out of the water?

A: Our understanding is that the system was removed from the water for financial reasons.

Q: One of the devices requires pilings to be installed. How would that be handled here?

A: Near-shore pilings would not be necessary for the Humboldt WaveConnect Pilot Project.

Q: Why are some WECs more appropriate for deeper waters?

A: Some WECs are designed to tap the full energy of a wave that occurs at a depth of 100 meters or greater. The energy of a wave is reduced as it hits the seafloor at shallower depths.

Q: Can you tell us what the footprint would be per megawatt for each of the 14 devices?

A: The footprint per megawatt ratio does not translate directly for this pilot project because there are many different types of devices that will need to be arranged in a unique fashion. Given this, there is information available on the manufacturers' web sites that describe the footprint to megawatt ratio for an array of their specific device. We believe that we can still fit four different WEC arrays into a one square nautical mile area (1/2 nautical mile by 2 nautical miles).

Q: A few of the devices pump water ashore – is that envisioned for this project?

A: We do not anticipate using water pumps for this project.

Q: Why is PG&E looking at siting the WECs in the 40-44 meter depth range? Why not site the project in deeper water?

A: When the permit application was developed there was regulatory uncertainty about siting a project outside of state waters (beyond 3 nautical miles). Also, it is preferable to operate a pilot project closer to shore for monitoring and maintenance purposes.

Q: Is there greater regulatory certainty now to allow PG&E to consider siting further offshore? Is siting farther offshore feasible?

A: It is likely that the regulatory process will be clearer over the next few years. PG&E might consider siting a project further offshore, depending on the experiences from the Humboldt WaveConnect Pilot Project. If PG&E were to site a project further offshore, there would be completely separate permitting and public involvement processes.

Q: Is PG&E prioritizing the size of the footprint per megawatt required for these technologies?

A: At this point we are not using footprint as a metric for success because these technologies are still at an early stage of development. This pilot will help the device manufacturers to further scale and optimize their designs.

Q: Do you know what types of fluids will be required for these technologies and whether they will be hazardous?

A: The device manufacturers are building into their design safeguards against fluid leakage. They understand that their WECs will not be viable if fluids leak into the water. The common fluids used in these devices are relatively benign biodegradable hydraulic oils such as mineral oil. The WECs will also be housing batteries and other materials used on a standard ocean vessel of similar scale.

Q: Are any of the WECs made by manufacturers from the United States?

A: Yes: Columbia Power Technologies, WaveBerg, Ocean Power Technologies, Resolute, and SEADOG are all manufactured in the United States.

Q: Why does each WEC technology require separate power conditioning?

A: Each of the technologies would be “conditioned” separately because they produce energy at different rates. Also, some technologies have a power conditioning specific to their system already built into the design. We are proposing different circuits at a power conditioning pad on land because attempting to do the power conditioning at sea (under water) causes an engineering problem.

Q: Have environmental studies been conducted for all the WECs and does PG&E have access to that information?

A: The RFI required that all technologies had been subject to ocean testing. Therefore, there is some information available. Some environmental studies have been done overseas and the types of information gathered may not be relevant to the U.S. environmental review process. There is environmental information available on the U.K. Wave Hub website, which we can distribute.

Q: How will you do the environmental analysis if the specific WECs are not known yet?

A: The concept is to start the environmental impact analysis with a composite worst case envelope, and then get more specific once the final devices are selected. We'll look across the WEC respondents to the RFI and take the “worst” features/the most environmentally significant looking across all of them to do our analysis based on the worst case scenario. Then when we know the specific selected devices we can review and revise the analysis, as appropriate. This way we will have a complete analysis that can be refined.

Q: Do all the devices have a three-point mooring system? Can the WECs share anchors?

A: Yes, it appears as though of the likely nine WEC manufacturers suitable for this site all have a three-point mooring system. Yes, we expect that we would have a mooring matrix with shared anchors between the WECs within an array.

Q: Is PG&E considering accessibility to these devices in case they break down in the winter?

A: Yes, PG&E is definitely considering accessibility during the winter months.

Q: Has PG&E considered the deflection of energy when devices are sited close together?

A: Yes, this is something the manufacturers consider in their device testing.

Q: What kinds of anchors are used for these devices?

A: There are many anchors that could be used for the devices, including: drag anchors, embedment anchors, and threaded anchors. A short-term project like this would likely use a drag or gravity anchor since these are capable of being removed.

Q: How many of each WEC technology will be in an array?

A: As few as one or two of each WEC type could be deployed. The number of devices per technology deployed depends on the size and the energy output of the device.

Q: Can we look at the anchoring systems from where these devices have been tested before?

A: The anchoring would most likely be different from what was used before because the anchoring is very specific to the ocean conditions and the seafloor substrate of the specific site.

Q: Is the intent to leave the anchors in place?

A: At this point, the anchoring systems must be designed to be removed because the Federal Energy Regulatory Commission (FERC) requires that the entire system and all the related hardware be removed at the end of the pilot project. However, there are outstanding questions amongst the resource agencies regarding whether or not pulling an anchor out is a good idea because the anchors could create habitat for marine species.

Q: Why is it difficult to remove an embedment anchor?

A: This is a really heavy anchor that will have a suction effect, making the anchor really difficult to remove.

Q: Will the manufacturer anchor the WECs?

A: Yes, the manufacturer will anchor the WECs, but PG&E will do all of the permitting for the anchoring systems that the manufacturers use.

Q: Will the manufacturer of the WECs be installing and maintaining their own devices?

A: Yes, the manufacturer/vendor will be responsible for installing the WECs in the water. Each WEC's assembly and maintenance requirements are different. Several are assembled on land and several have assembly steps in the water, at dockside, etc. It is PG&E's responsibility to determine the viability and the economics of the project.

Q: Is the depth of Humboldt Bay sufficient to build these WECs and transport them to sea?

A: Yes, this is considered a deep channel harbor and the depth and size of the harbor are sufficient.

Project Description Update

Presented by Doug Davy, CH2M HILL, and Rick William, SAIC

Doug and Rick presented an updated project description that incorporated new information since the previous HWG meeting. The complete presentation, including maps and diagrams, is available at www.pge.com/waveconnect.

Doug and Rick reviewed the HWG-selected site and its anticipated onshore and offshore infrastructure. The offshore components of the system will include the WECs, environmental buoys (that measure various metrics), and marker buoys (required per international navigation standards). The land-based components of the system include cables from the surf zone to the monitoring station, the monitoring station (likely behind the water tower, requiring a fenced 100ft-by-100ft space), power poles with cables (to transport power from the monitoring station to the substation), the existing substation, the existing host facility (to set up the components of the wave energy system), and sites for marine subcontractor work.

Rick clarified that there will be five sub-sea cables. Four will be trenched/buried individually with a 100 foot separation between the cables. The fifth will be surface lay and will serve as a spare cable in case there's an issue with one of the other cables. The cables will be routed from the offshore site south, parallel to shore (at a depth of 20 fathoms or greater) until due west of the Freshwater Tissue plant, and then make a sharp turn directly toward shore. The cables would be brought onshore individually in the vicinity of the Freshwater Tissue "stacks". The cables will fan inwards in the approach to the beach landing and then four will be trenched or horizontal directional drilled ashore at an approximate separation of 10 feet. The fifth could use the Freshwater Tissue outfall or also go to the other land site.

Rick also clarified that the offshore cables will most likely need to be trenched because there is no guarantee that the cables will self bury and it would be very expensive to first surface lay, and then determine later that they need to be buried. For evaluation and monitoring purposes, PG&E proposes having 1 cable surface lay on the seafloor to the 20-fathom curve, buried to the outfall, and then carried onshore through the outfall. Rick also clarified that the core of the cables would contain fiber optics.

The HWG raised the following questions about the project description and updates:

Q: What is the purpose of the spare cable?

A: The spare cable will be an experiment monitored year-round to determine whether or not a cable would self bury. This spare cable would not carry any electricity; it would be a spare back-up cable. If it were problematic for any reason, it would be removed. The cable would likely need to be removed after the five year pilot project, unless we had an agreement about re-use.

Q: What is the difference between burying cables and having them self-bury?

A: From an engineering perspective, we would like to surface lay the cables and let them self bury. However, there is no proof that the cables would self bury. It would be very cost intensive to have to go back and trench the cables after they have already been surface laid.

Q: Why can the cables be close together as they come ashore, but require more separation offshore?

A: It is okay for the cables to be closer together as they come onshore because there is hard separation between the cables, reducing electrical interference.

Q: If there was only one type of WEC technology used in the arrays, could a single cable be used?

A: Yes.

Agency Update

Presented by Doug Davy, CH2M HILL

The group was provided with printouts of the integrated agency timeline that was created from the October 5th HWG Permitting Authority Subcommittee meeting. Doug explained that FERC and the California State Lands Commission are close to signing a letter of

agreement that allows them to coordinate on preparation of a document that satisfies both NEPA and CEQA. PG&E is preparing a project description so that the State Lands Commission can get approval from their board to hire a consultant to prepare the CEQA document. Doug clarified that there are circumstances where a joint NEPA/CEQA document can have an Environmental Assessment (EA) to address NEPA and an Environmental Impact Report (EIR) to address CEQA.

Wave Energy 101

Presented by Rick Williams, SAIC

Rick gave an overview of wave energy and the science behind how energy can be harnessed from ocean waves. To view the wave energy 101 in its entirety, go to: <http://www.oregonwave.org/templates/owet/stuart%20joe%20-%20wave%20101.pdf>. The following clarifying questions were addressed:

Q: Would the WECs survive a tsunami?

A: A tsunami would likely not affect the WECs since the effects of a tsunami are only felt once the wave reaches the shore/shallow waters, but it could impact the power conditioning station. Potential impacts of tsunamis will be considered in the environmental analysis.

Q: How do the WECs survive a rogue wave?

A: The WEC manufacturers take rogue waves into consideration when determining appropriate anchoring and mooring systems for the devices.

Next Steps

Presented by Anna West, K&W Facilitator

The upcoming schedule includes the following meetings:

- November 9th - PG&E and the HWG fishing representatives are meeting to further discuss impacts from the project to the commercial and recreational fishing community.
- November 9th – HWG Biological Resources Subcommittee is meeting to discuss species of concern and baseline information needs for the project.
- Kearns & West will be meeting with a handful of HWG members to touch base on the process and potential additional community outreach needs.

Action Items

| Action Item | Who | When |
|---|---|---------------------------------------|
| 1. Distribute environmental review information located on the UK WaveHub website. | 1. Doug Davy (<i>or Rick?</i>), CH2M HILL | 1. ASAP |
| 2. Continue the "Wave Energy 101" presentation, parts 2-4. | 2. Rick Williams, SAIC | 2. December 2, 2009 HWG Meeting, etc. |

Attendees

Primary:

- Vicki Frey, California Department of Fish & Game
- Michael Van Hattem, California Department of Fish & Game
- Paul Hagen, City of Arcata
- Jeff Leonard, City of Eureka
- Julie Fulkerson, City of Trinidad
- Kevin Pinto, Commercial Fisherman
- Larry DeRidder, Humboldt Area Saltwater Anglers
- Maggy Herbelin, Humboldt Bay Stewards
- Mark Lovelace, Humboldt County
- Dave White, National Marine Fisheries Service
- David Boyd, Redwood Coast Energy Authority
- Rob Cozens, Resighini Rancheria
- Jim Zoellick, Schatz Energy Research Center
- Bill Lydgate, Surfrider Foundation, Humboldt Chapter
- Bob Simpson, Freshwater Tissue
- David Ammerman, U.S. Army Corps of Engineers
- Robert Starr, U.S. Coast Guard
- Bill McIver, U.S. Fish and Wildlife Service
- Dave Meserve – Former Arcata City Councilmember

Alternates:

- Milton Boyd, Humboldt State University
- Colin Sheppard, Schatz Energy Research Center
- Scott Willits, Surfrider Foundation, Humboldt Chapter
- Iya Erin Mahan, Community-at-Large
- Dana Boudreau, Redwood Coast Energy Authority

PG&E:

- Bill Toman, PG&E (by phone)
- Ian Caliendo, PG&E
- Alison Talbott, PG&E

PG&E WaveConnect Consultants:

- Aarty Joshi, CH2M HILL
- Doug Davy, CH2M HILL
- Rick Williams, SAIC
- Pat Kaspari, Winzler & Kelly of Eureka
- Travis Schneider, Pacific Affiliates

Facilitators:

- Briana Moseley, Kearns & West
- Anna West, Kearns & West