MHK Environmental Permitting and Compliance Cost Reduction Strategies Workshop Meeting Summary

May 2, 2018 1:00 PM – 2:30 PM ET
South American Room, Capital Hilton
1001 16th Street NW, Washington, D.C.

Workshop Objectives

- Provide cost comparisons of environmental studies for similarly categorized MHK projects (e.g. wave or tidal, commercial development or test deployment or test site, etc.) for both the permitting/licensing and monitoring/compliance phases.
- Discuss qualitative findings and lessons learned from other industries analysis, including implications for marine and hydrokinetic (MHK) projects.
- Gain feedback from participants on how to strengthen the project going forward.

Project Purpose and Overview

This three-year effort started in FY17 with the primary objective of detailing the environmental compliance costs and lessons learned from U.S. based MHK projects that have gone through the permitting and compliance process. The project goal is to find ways to improve the efficiency and effectiveness of the permitting and compliance process that reduce deployment uncertainties and associated risks/costs; ultimately encouraging investment in MHK projects. The project team is composed of Sandia National Laboratories, H. T. Harvey & Associates, Integral Consulting, and Kearns & West. Step one of the project process, collect data to determine permitting and compliance costs, was a focus during 2017, but is an ongoing process to ensure the project team is working with the most recent and accurate data as possible. Currently, the project team is focusing on step two of the project process, identify cost reduction pathways. Step three, develop cost reduction strategies, will follow during Fall 2018 and Winter 2019. Each step is envisioned as an iterative approach working with industry and regulators to best meet the project goal.

The data collected for MHK licensing and compliance activities includes costs associated with environmental studies, stakeholder outreach, background studies, mitigation and adaptive management measures, and decommissioning. Further, the team has captured qualitative lessons learned and recommendations/best practices from both industry and regulators. All data are aggregated to ensure confidentiality and protection of proprietary information as deemed necessary by the participating developers. The project team is working with industry and Federal/State regulatory agencies to obtain the data (both direct costs, as well as time and resources associated with permitting) and are looking to understand regional perspectives and varying experiences in the permitting/licensing process. Cost data and general information collection is ongoing and preliminary results presented during the workshop include a range of projects that are undergoing or have undergone the permitting/licensing and compliance process.

Updated Quantitative and Qualitative Findings Presented at the Workshop

To date, the project team has collected and is analyzing data from 17 projects around the United States. Projects have been categorized by project type (test site, test deployment, or commercial deployment), project phase (completed, active, on hold, or cancelled), type of resource (wave, current, or tidal), geography (east vs west coast), grid connected or not, early project versus recent project, nearshore state waters versus Federal waters, permitting type (Federal Energy Regulatory Commission (FERC), United States Army Corps of Engineers (USACE), FERC/Bureau of Ocean Energy Management (BOEM), or state), and project stage (permitting/licensing vs monitoring/compliance). This categorization helps to understand the differences or similarities in costs in order to allow for proper comparison of projects. Data analysis, so far, has compared wave test deployments, wave test sites and commercial tidal deployments (permitting/licensing study costs and monitoring & compliance costs), as well as the timeline for project permitting and environmental studies. Planned analysis includes looking at outreach costs and permitting activity length.

The first quantitative analysis discussed at the workshop considered permitting of wave test deployments. Because wave test deployments are relatively short term, the costs are also relatively low in comparison to commercial deployments and test site development. Of particular interest, only noise studies were required and conducted as part of the licensing activities for wave test deployments. The next topic considered was the costs of environmental studies to permit the three U.S. commercial tidal deployments. The types of studies performed for each project depended on the technology deployed and site specifics biological species at the deployment location. Among all the environmental studies, fish and fisheries and noise studies had the highest pre-deployment costs. It should be noted that costs varied dramatically for some environmental studies. In some instances, this can be attributed to the need for an individual project to pioneer monitoring technologies and measurement methods to proceed through the licensing process.

The workshop continued with a look into the studies performed in support of permitting four U.S. wave test sites. The highest study costs are associated with fish and fisheries and marine habitat characterization, which may be associated with the size of the project footprint and distance offshore, which requires more effort to characterize and implement the site study plan. Next, environmental study costs for all wave and tidal projects with like field studies were presented. This included seven wave and four tidal projects, where wave included test site and test deployment project types and tidal included commercial and test deployments. Study costs for tidal projects were generally more expensive than wave, which may be due to environmental risks and uncertainties being more of a concern for tidal projects. Further, the tidal projects presented are mostly all commercial deployments (3 out of 4), which likely also increased costs compared to the wave test sites and test deployments (there are no U.S. wave energy commercial deployments).

The ensuing quantitative analysis focused on costs of environmental studies done for monitoring and compliance purposes for the three wave and three tidal projects with such costs. It’s important to note that wave and tidal projects did not always conduct the same environmental studies. In fact, only noise, adaptive management, and marine habitat had overlapping wave and tidal studies. Collision study costs, only incurred by the three tidal studies, showed the highest average and variability. The high variability in these costs was due in part to an outlier that had high research and development costs for development of pioneering study methods and technologies. These costs were born by the developer, but also research conducted by labs and academia that should contribute to reduced costs in the future. Certain areas (e.g., recreation and avian) had low costs. When removing the outlier tidal project, the three highest costs for tidal projects were fish and fisheries, collision, and noise. The three highest

environmental study costs for wave projects were electromagnetic fields (EMF), terrestrial, and marine habitat.

The final quantitative analysis focused on comparing permitting and licensing versus monitoring and compliance environmental study costs for all MHK projects. Analysis of nine wave and four tidal projects with qualifying costs indicated that permitting and licensing study costs are lower than for monitoring and compliance study costs. Collison study costs are high for monitoring and compliance of tidal projects due to the difficulty of working in high velocity tidal environments, lack of understanding of collision risks, and the need to develop and test technology to accomplish study objectives. Some of the current high study costs associated with monitoring and compliance may help reduce monitoring costs for future projects. Removing the highest, outlier collision data point brings costs down for collision and makes fish and fisheries studies the highest monitoring and compliance cost on average.

The final graphic presented was a timeline depicting the environmental studies conducted for each project and project progression through the permitting and compliance process. The timeline data and graphic are still under development, but may allow for data gaps to be more easily identified and help understand costs differences between different projects. Because the projects span a range of stages in the environmental permitting and compliance process and are subject to differing interpretations of the regulations, some projects have generated more data than others over a longer time period. Assessing project costs based on the timeline does not necessarily translate to level of effort (e.g., boat time vs lab time vs pioneering technology), but the project team is working on ways to depict this within the timeline graphic. Comparing the timeline of studies is difficult because of the level of detail provided in available documentation, but the project team will work to fill gaps (e.g., specific cruise dates vs. a range for study duration, study costs where types of surveys are combined, and cost of ship vs. land-based studies).

Initial conclusions from quantitative analysis

Of the 17 MHK projects studies so far, they differ widely in their location, type of environment, project type, progression through the permitting and compliance process, etc. Further, there are only a few MHK projects deployed. All of this leads to a low sample size of “like” projects. Studies needed for permitting/licensing or for monitoring and compliance appear to translate into higher costs for early projects, but the results, lessons learned, and developments from early projects can help inform and decrease environmental uncertainties and risks for later projects. Initial conclusions include:

- Variability in study costs is strongly associated with project type, design, and siting, which determine what environmental impacts are a concern and what environmental studies are needed for permitting/licensing and monitoring and compliance.
    - There are a limited number of projects at the monitoring and compliance stage.
- There is a need to find ways to reduce the high costs of studies.
- Pioneering technologies and study methodologies increase individual project costs, but may reduce costs for later projects.
- Most projects involve developer and federal/state funding (13 out of 17 projects).
- Geographic location (East vs West) is hard to compare because of differing project phases and deployment types.

Qualitative Findings from Other Industries Report

The project team reviewed other energy and marine industries (offshore oil and gas, offshore and onshore wind, onshore solar, and subsea power and data cables) for permitting and regulatory lessons learned in the marine space. The project team examined changes in levelized cost of electricity (LCOE) over time, permitting pathways, potential environmental effects and types of monitoring on other industries experiences, and factors contributing to easing environmental permitting. Discussions with regulatory agencies are underway. Lessons learned from other industries include:

- Use of existing baseline studies and effects analyses from analogous projects has proved beneficial.
- Apply permitting and regulatory solutions developed for other industries to MHK.
- Form partnerships among industry, agencies, and scientists, and conduct collaborative research to address important concerns and get answers to bigger questions. For example, consider collaborative research to address retiring risk where possible.
- Develop and implement guidance, protocols, and siting tools.
- Continue to hone technology and installation technologies.

Discussion

During the workshop, participants were encouraged to ask questions and provide feedback. Each question was addressed by the workshop panelist and broadly discussed by all attendees. Each question and the general discussion was recorded by notetakers. The group discussion highlights are summarized below.

Data and Studies

- Not all tidal projects needed marine mammal studies for permitting and licensing. Agencies have different requirements, based on biological assessments and species of concern, depending on location.
- Reviewing the categorization, collision risk most likely stems from risk to marine mammals. There was a question regarding how marine mammal and fish studies were defined. These studies were field based, looking at what is at the site and when. The collision study was more specific, especially post-deployment.
- Collecting and reviewing data on navigation and safety is also something for the project team to consider as it may affect which environmental studies are required.

Costs

- It would be helpful to have the costs go down as time goes on. Finding ways to reduces costs is something the project team is looking at and will continue to refine.
- Costs are lower for wave projects because we better understand the impacts. The main focus of study for wave projects is site characterization, what is out there, species variability, and timing. Fish studies depend on location. The project team is looking at differences between studied sites and when risks might be retired.
- One developer shared they had to collect data regarding fish around all six turbines of their array. The increased monitoring for an array demonstration vs. single devices suggests there are cost differences between a single turbine and an array.
- The high costs of tidal projects could be a perception issue because they are usually located nearshore and around human centers.

- While a comparison of U.S. study costs to European costs is not a part of this study, it may be useful to see how costs compare and if there are trends.
- Terrestrial study costs for trenching and cable laying vary based on the substation connection location on shore.
- There is a difference in project costs depending on project type. Test centers are more expensive to develop, but the individual device deployments are easier to permit and less experience to permit overall.
- There are fixed costs for staffing and outreach and variable costs depending on size and length of the project. However, it may be too early to draw conclusions.
- The commercial tidal projects studied were all different in terms of array design and energy conversion technology. However, the field may be getting closer to convergence, which may reduce costs in the future.
- There are differences in grid vs non-grid connected project costs (non-grid connected projects are less expensive).

Risk

- EMF is not a retired risk, but it may be headed there. Some projects did not have to study EMF, but this is not universal.
- Perception of risk plays a large role in associated costs. As risk goes down, so does cost. However, when a regulator requires a study, costs go up again. Even if the trend line is heading down, an outlier could cause it to go back up.
- One developer suggested that timing plays a role in investor confidence. In the U.K., the trend is to consider little up front surveying or study, but to proceed with deployment on the assumption of a small project having a small impact. This increases investor confidence that a permit will be issued. Delays with permitting reduces investor confidence because of increased sunk, up-front costs. The sooner a project gets in the water, the quicker learning by experience occurs. Others suggested this might not be a wise strategy in the U.S. as monitoring and compliance costs could be excessive.
- Studies to retire risk are more expensive than studies for permitting only. If data from permitting studies are not used to reduce risk, costs become flattened, but risks are not retired and therefore costs are not significantly reduced. The Federal government could and should continue to invest in studies to reduce risk. The challenge lies in how best to do this; through generic studies not linked to a specific project or focused efforts that support an ongoing specific project permitting and compliance effort. It could be a combination of both.
- Education plays a role in retiring risk. There is a perception among regulators that interactions for MHK are not the same as for other industries. Getting regulators to see the broader body of knowledge and how it can be applied to MHK will help reduce risks and associated costs.
- The size of a project increases the costs (on average) for permitting and licensing processes and increases risk for investors. The project team should compare the permitting and licensing required efforts to the size of the project to review the impact of that increased cost on risk for investors size.

Suggested Analysis

- Logically, costs should be reduced for permitting and licensing MHK projects over time. The project team should analyze if costs are being reduced over time.

- Consider a quantitative comparison of the European MHK and other similar marine industries to the U.S. MHK industry.
- Many MHK projects are attempting to answer environmental impact questions from regulators. A comparison of methodologies used for monitoring, their costs and their success in meeting regulators requirements may provide the industry with an efficient methodology for environmental compliance requirements.
- Consider analyzing navigation and safety studies and monitoring costs.

Other

- MHK development is coming at a time of intense environmental scrutiny, unlike the beginning of oil and gas development, where concerns for the environment were not as prevalent. Drawing analogies from oil and gas experiences, a number of which were permitted pre-NEPA, may not be helpful.

Next Steps

The project team will continue to improve the quantitative analysis with data from state and federal permitting; outreach costs; state and federal funding contributions; separated costs for commercial deployments, test deployments, and test sites; and regional effects on costs (east vs west and north vs south). The project and environmental studies timeline will be updated to include new data and connections to costed studies which were not previously reported. A list of additional analysis planned is below.

Planned Analysis:

- State and federal permitting costs
- Outreach
- State and federal funding contributions
- Cost comparison of commercial and test deployments
- Regional effects on costs
- Project timeline data and analysis

Further, the team will identify additional US MHK projects that have not been included in this study and will look to capture those costs and increase the overall project sample size. The project team will also develop an updated discussion guide to support subsequent rounds of outreach during FY18 and continue to assess environmental compliance progression with other industries (regulatory agency discussions and refining lessons learned that can be applied to the MHK industry).

Meeting Participation

Name	Organization
M. Laura Beninati	Bucknell University
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Kaelin Chancey	University of New Hampshire
Grace Chang	Integral Consulting
Andrea Copping	Pacific Northwest National Laboratory
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Dan Hellin	Oregon State University
Scott James	Baylor University
Justin Klure	P.E. Ventures, LLC
Peter Kobos	Sandia National Laboratories
Mike Lawson	NREL
Reenst Lesemann	Columbia Power
Ian Masters	Swansea University
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Autumn Obomsawin	Ocean Renewable Power Company
Brian Polagye	University of Washington
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Matt Sanders	POET
Walter Schurtenberger	Hydrokinetic Energy Corp.
Ron Smith	Verdant Power
Heath Spence	Department of Energy
Bill Staby	Resolute Marine
Vassos Vamvas	Enorasy LLC
Corey Vezina	WPTO/Department of Energy
Rick Williams	Oregon Applied Research, LLC
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Sharon Kramer	Harvey & Associates
Will Peplinski	Sandia National Laboratories
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TOTAL STAFF: 6	