Capturing Lessons Learned as the U.S. Marine Energy Industry Advances

Hayley Farr, Thushara Gunda, Andrea Copping, Lysel Garavelli, Cesar Castillo, Kelley Ruehl, Deborah Rose, and Alec Carruthers

September 13, 2022
UMERC+METS
The **Portal and Repository for Information on Marine Renewable Energy (PRIMRE)** provides access to:

- Datasets
- Documents
- Software
- Guidance
- Project info.

- STEM resources
- Events calendar
- Archived webinars
- Photo library

PRIMRE is funded by the Department of Energy’s Water Power Technologies Office and led by a multi-lab team.
Capture lessons learned by the marine energy industry to ensure that:

- Hard-won achievements are recognized and available
- Missteps and unfortunate outcomes are prevented in future
- Efficiencies and useful resources are publicized and used as the industry advances
Data Collection

• 15 semi-structured interviews with marine energy subject matter experts (SMEs) held between November 2020 and December 2021

• Interviews and data analysis conducted in accordance with the Department of Energy Institutional Review Board’s requirements for human subjects research
Example Questions

• Who was involved in the project? What were the project goals?
• What worked well/did not work well for the project or project team?
• Were there any issues or project circumstances that were not anticipated?
• Were there any impacts to the project’s timeline?
• Were there financial or legal impacts? Impacts to safety?
• Were changes in system or subsystem design necessary? Were any data lost?
• What lessons did you learn that might/might not be applicable to other projects?
• What recommendations would you make to other MRE developers and researchers?
Broke all transcribed content into discrete quotes and tagged each with 1-2 corresponding themes

Synthesized and summarized content within individual themes

Developed recommendations for WPTO, the industry, and future work
Overall Theme Breakdown

Quotes per Theme

- Design, Build, & Test
- Funding
- Contracting
- Business Management
- Market Focus
- Siting & Permitting
- Stakeholder Engagement
- Offshore Marine Operations
- Skills, Experience, & Competencies
- Foundations, Moorings, & Anchors
- Data Collection, Analysis, & Reporting
- Supply Chain
- Environmental Monitoring
- Intellectual Property
- Resource Assessment & Site Characterization
- Manufacturing & Assembly

Number of Quotes

Theme
Connections between Themes

Theme Relationship Network

Connections between Themes:
- Biz Mgmt.
- Market
- Collaborations
- Contracting
- Funding
- DBT
- Characterizations
- Manufacturing
- Data
- Env Monit.
- Experience
- Logistics
- IP
- FMA
- Supp Chain
- Stakeholders
- Permitting

PRIMRE
NREL
Pacific Northwest National Laboratories
Sandia National Laboratories
Discussions primarily focused on technical approach, economic assessment, and testing and deployment

SMEs highlighted the value and importance of:

- Developing systems based on market feedback and cost
- Techno-economic reviews during iterative design cycles
- Simplified systems (e.g., less materials, fewer moving parts)
- Detailed resource assessments and high-fidelity load predictions
- Using advanced numerical tools
Discussions highlighted that developers often underestimate the level of effort (time and cost)

SMEs noted challenges servicing instrumentation

Several SMEs highlighted successes associated with:

- Frequent and early communication directly with small groups of regulators
- Applying an adaptive monitoring approach
- Considering proportionality (applying proportional effort to the level of risk)
Discussions highlighted the pros and cons of different funding sources and mechanisms.

General recognition that managing a DOE grant is a lot of work, so having a dedicated staff was key to project success (for proposals, contracting, reporting, etc.).

Challenges associated with cost share were frequently highlighted, especially for smaller companies and at later stages of development.

“DOE SBIR is a great tool that allows companies to be able to take a product towards market and there’s more funding available for it.”

“There’s a real problem relying on prizes to generate innovation. Prizes are a great way to come up with ideas and not a good way to push technology forth.”
SM Es noted key aspects of their general business strategies, including:

- Growth rate
- Market clarity
- Core competencies
- Creating flexibility

Discussions highlighted the importance of managing long-term relationships and understanding collaborators’ timelines

Many marine energy companies have had to act as technology and project developers.
Future Work

Interactive Webpage

International Interviews
Thank You!

Hayley Farr
hayley.farr@pnnl.gov

Thushara Gunda, Andrea Copping, Lysel Garavelli, Cesar Castillo, Kelley Ruehl, Deborah Rose, and Alec Carruthers

Visit PRIMRE:
https://primre.org