

Deployment Readiness Framework for Marine Energy

Marine Energy Development in Island and Remote Coastal Communities

Supporting Community- Led Clean Energy Transitions

As electricity prices continue to rise and extreme weather events related to climate change become more frequent, many island and remote coastal communities are prioritizing their energy future. Isolated locations and coastal environments pose challenges for energy costs and grid resilience, but the ocean can be a key solution. Marine energy could provide these communities with clean, affordable, and reliable power.

Deployment Readiness Framework (DRF)

The U.S. Department of Energy's (DOE) National Renewable Energy Laboratory and Pacific Northwest National Laboratory are developing the Deployment Readiness Framework (DRF) to support remote, coastal, and island community-driven energy transitions. This framework can be used to better understand the readiness of communities for marine energy technology demonstration projects and their operation. The DRF builds on the Energy Transitions Initiative Partnership Project (ETIPP) supported in part by DOE's Water Power Technologies Office.



Early morning light falls on Jennette's Pier in North Carolina's Outer Banks.

Photo by Werner Slocum, NREL

Cultivating a Holistic Approach

The DRF is being developed in close collaboration with communities, stakeholders, and end users, such as sponsors of DOE's technical assistance programs and researchers at national labs. This approach will identify where tools will have the most impact on community-driven energy transitions and test and improve the framework during development.

The team will develop the DRF in three phases:

1. **Learning Phase:** Collaborate with and interview stakeholders and communities to build a critical knowledge base for understanding community readiness for a clean energy transition.
2. **Design Phase:** Define and develop the specific approaches and tools in the DRF that will help decision makers better understand a community's readiness for energy transition.
3. **Implementation Phase:** Create the DRF applications and user interfaces needed for researchers and decision makers.

1



Interview

Interviews were held virtually with one entity at a time with one or more representatives from each group present.

2



Record

All video interviews were recorded and transcribed by Microsoft Teams and lasted approximately 40 to 60 minutes.

3



Secure Data

After every interview, the analysis team would access the video and transcripts from the secure data repository.

4



Quality Control

The transcripts were then de-identified and checked for errors.

5



Analysis

Interviews were distilled so that responses were matched with questions within a spreadsheet to facilitate thematic analysis.

Completing the Learning Phase

In the Pacific Northwest National Laboratory’s report, the DRF team first identified metrics for understanding community readiness, like technical capacity, environmental factors, and social implications. The team then used these metrics to inform and implement the second step of the learning phase: interviews and synthesis.

To better understand how technical assistance informs community-driven energy transitions, the National Renewable Energy Laboratory team led an outreach and engagement campaign, which surveyed and interviewed key people involved in DOE’s technical assistance programs.

Over eight months, the DRF team completed four main steps:

1. Developed research questions for the surveys and interviews
2. Identified, invited, and interviewed participants
3. Developed a data management system
4. Conducted the thematic analysis and synthesized results.

Scan to view PNNL’s report



Marine energy technologies could provide energy security to island communities, like Hawaii. Photo by Deb Lastowka, NREL

The graphic shows the five steps followed by the team to complete the interview process. Graphic by NREL

13	04	07	06	07	15
ETIPP Technical Leads	ETIPP Regional Leads	ETIPP Regional Partners	ETIPP Cohort 1 Communities	Technical Assistance Program Leads	DOE Technical Assistance Sponsors
National Renewable Energy Laboratory Pacific Northwest National Laboratory Sandia National Laboratories Lawrence Berkeley National Laboratory	Northeast Southeast Pacific Alaska	Island Institute Renewable Energy Alaska Project Hawaii Natural Energy Institute Coastal Studies Institute	Eastport, ME Sitka, AK Wainwright, AK Alaska Longline Fishermen's Association Dillingham, AK Ocracoke, NC Islesboro, ME Kauai, HI Nags Head, NC	Indian Energy Technical Assistance Communities Local Energy Action Program LA100 Equity Strategies Energy Storage for Social Equity Initiative SolSmart Clean Cities	Water Power Technologies Office Office of Energy Efficiency & Renewable Energy Office of Policy Office of Electricity Wind Energy Technologies Office Geothermal Technologies Office

The table shows the number of interview participants, the interviewee stakeholder group, and the organizations/regions represented in each group.

Gathering Feedback From Community Readiness Stakeholders

The outreach and engagement effort gathered responses from 52 participants over 43 semi-structured interviews. The interviewees represented various geographical regions across the United States.

Participants had the opportunity to share unique perspectives and experiences with renewable energy technical assistance projects, uncovering the priorities and challenges that each community experiences when transitioning to clean energy. Through interview responses, the team identified themes that set the foundation for the DRF.

Key Themes and Findings

To support a community-driven, ecologically sustainable design that seeks to co-optimize energy resilience, ecosystem resilience, and community development goals, the DRF team recommends:

- **Sustained, consistent, and iterative collaboration** among communities, national laboratories, and DOE within an adaptive management framework
- **Sustained and consistent funding**, which is key for communities to build their own capacity
- **Community-centered plain language** to meet a community where it is in its energy transition with the appropriate technical assistance
- **A peer-to-peer process that connects communities** to share lessons learned in technology education, as well as technical and demonstration support
- **Support beyond the life span of technical assistance projects** that focuses on capacity and funding.

The DRF considers technology innovation, technical readiness, and demonstration holistically. This approach and framework support the country's decarbonization, climate resilience, and energy justice goals by helping DOE and the national laboratories enable realistic and scalable marine energy solutions for communities embarking on a clean energy transition.

Building Up Ocean-Powered Communities

Now that the learning phase has concluded and the groundwork for the DRF has been laid, the team will focus on the design and implementation phases to continue supporting marine-energy-focused, community-led clean energy transitions.

Read the National Renewable Energy Laboratory's full outreach report to learn more about the DRF, interview process, and key findings. ■

Scan to view
NREL's report



Technologies like the National Renewable Energy Laboratory's wave-powered desalination device could help communities build greater resilience through reliable, locally sourced energy that is more affordable and sustainable.

Photo from Coastal Studies Institute

Kerry Strout Grantham

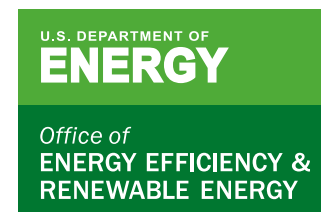
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