

Marine Energy Data, Organized – PRIMRE

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DOE Data Days 2023

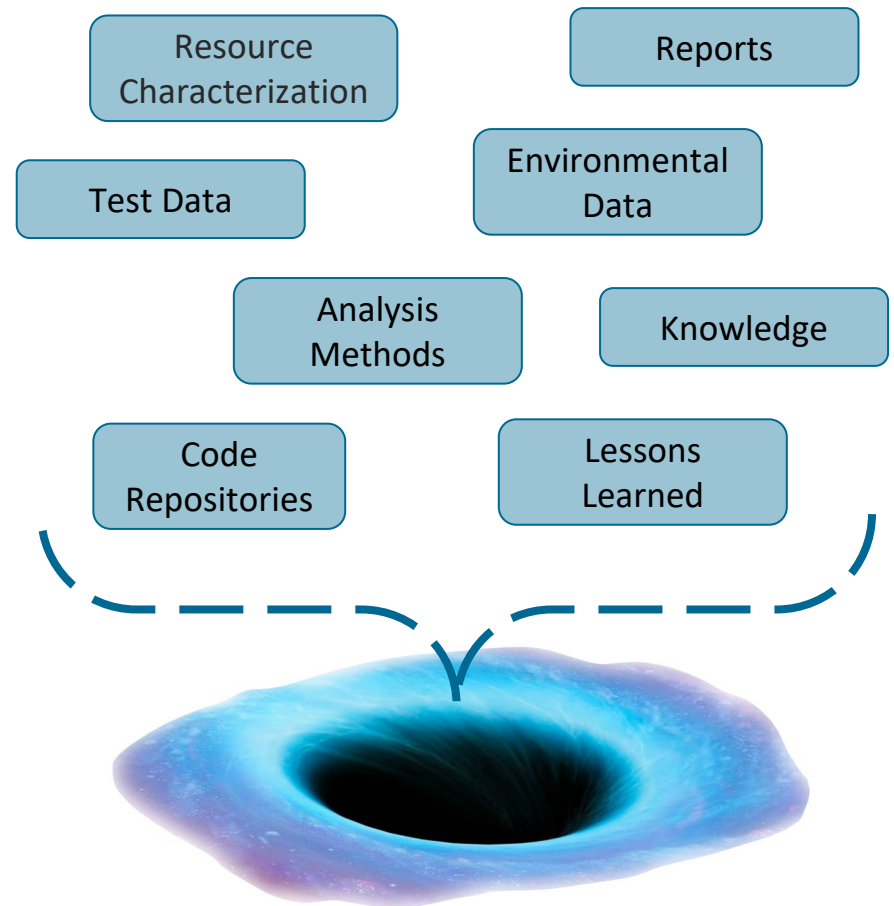
Availability of Marine Energy Knowledge

Data and information are:

- often not made public
- stored in many locations and diverse formats
- often not catalogued, described, accessible, or discoverable.

US Department of Energy developed:

Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) to overcome data and information barriers to research, development, and testing in support of the US and international marine energy communities.



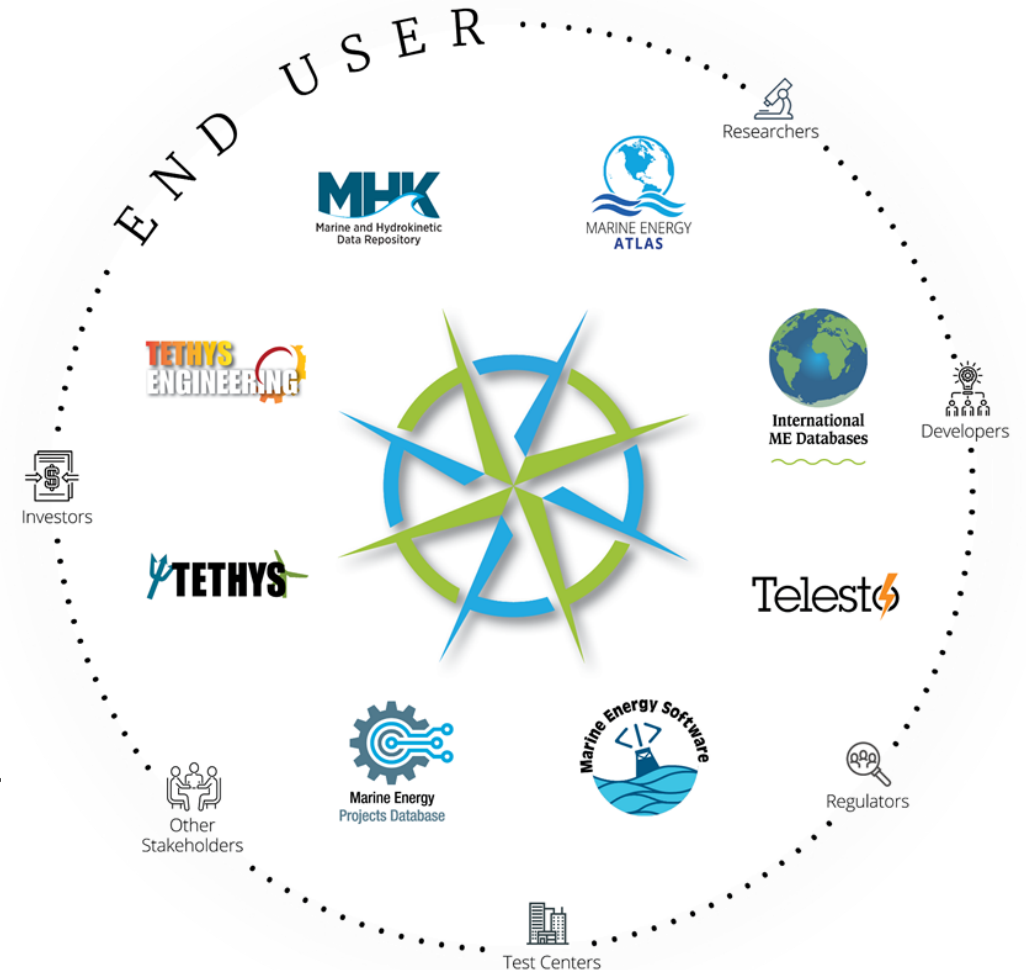


The **Portal and Repository of Information on Marine Renewable Energy (PRIMRE)** provides access to marine energy data, information, and resources to help advance the industry.

- Knowledge Hubs
- Marine Energy Basics
- Events Calendar
- Archived Webinars
- Educational Resources
- Data, Tools, & Software

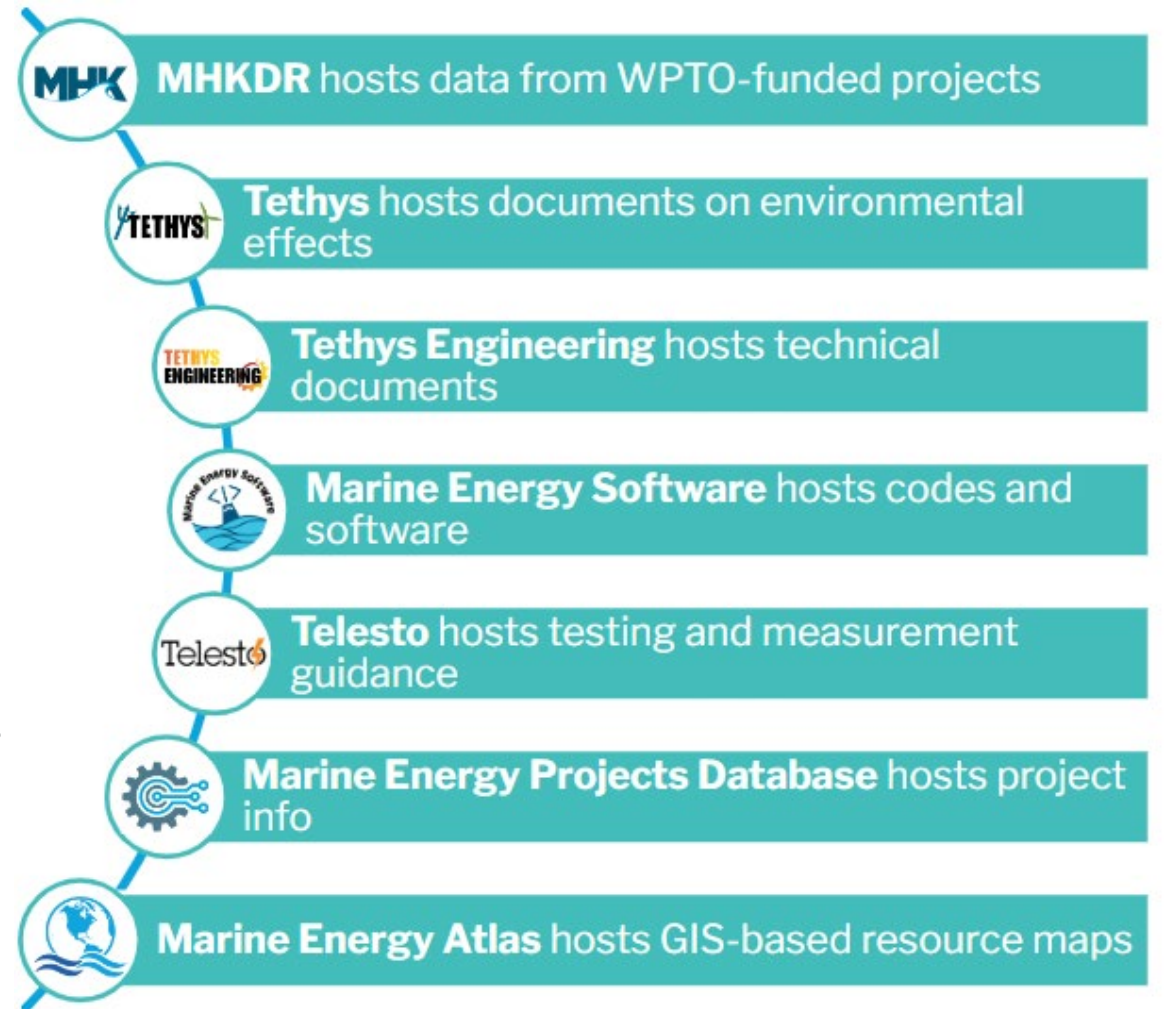
Funded by the US Department of Energy's Water Power Technologies Office and led by 3 national labs.

<https://PRIMRE.org>



PRIMRE Knowledge Hubs

- Each **Knowledge Hub** houses a different type and format of information related to marine energy
- Several Knowledge Hubs were developed under other projects, but all have been integrated and improved.
- PRIMRE has a **one-stop search** that allows users to find data and information in any part of the system



MHKDR



- Repository for all research and testing data collected funded by the U.S. DOE Marine and Hydrokinetic Power Program.
- Over 300 datasets with more than 2,000 individual data resources
- Over 30 TB of data, from research, development, deployment and analysis efforts, downloaded over a 100,000 times.

<https://mhkdr.openei.org/>



Tethys



- >8,900 Journal papers, reports, other media on environmental effects of wind and marine energy technologies
- Serves as a commons for practitioners, enhancing the connectedness of the marine energy community

Features:

- Knowledge Base & Map Viewer
- Glossary
- Events Calendar
- Broadcasts (*e.g.*, *Tethys Blasts*, *Tethys Stories*, *Webinars*)
- *Tethys Community*

The screenshot shows the Tethys website homepage. At the top is a navigation bar with links for ABOUT, CONTENT, CONNECTIONS, BROADCASTS, and HELP. Below the navigation bar is a large banner image with the TETHYS logo and the text "Environmental Effects of Wind and Marine Renewable Energy". To the right of the banner is a call to action: "If you are interested in engineering aspects of marine renewable energy, check on the new Tethys Engineering website." Below the banner are four main content tiles: MARINE ENERGY (Generating electricity from the sea), WIND ENERGY (Generating electricity from wind on land and at sea), OES-ENVIRONMENTAL (Addressing environmental effects of marine energy internationally), and WREN (Resolving conflicts between wind and wildlife internationally). On the right side of the page, there is a "GET STARTED" button, a "KNOWLEDGE BASE" section with a link to "Access thousands of publications and more, all in a searchable database.", a calendar for January 2020, and a "Recent Tethys Story" section featuring a story about Wave Swell Energy's Oscillating Water Column (OWC) Technology and 200 kW King Island Renewable Energy Integration Project.

Log in | Register

ABOUT | CONTENT | CONNECTIONS | BROADCASTS | HELP

TETHYS
Environmental Effects of Wind and Marine Renewable Energy

If you are interested in engineering aspects of marine renewable energy, check on the new Tethys Engineering website.

U.S. DEPARTMENT OF ENERGY | EES | IOWA STATE UNIVERSITY | IOWA STATE UNIVERSITY | IOWA STATE UNIVERSITY

GET STARTED

If you are new to Tethys, start here to learn more.

KNOWLEDGE BASE

Access thousands of publications and more, all in a searchable database.

Jan 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

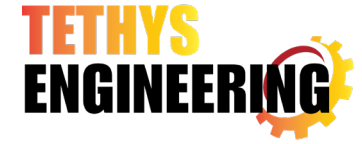
Recent Tethys Story

Wave Swell Energy's Oscillating Water Column (OWC) Technology and 200 kW King Island Renewable Energy Integration Project

Global renewable energy usage is on a steep upward trajectory, much of which is being driven by wind and solar. However, because of the variability of these sources, renewables are best implemented across as a diverse combination of resources and geography as possible. Therefore, utilizing a new renewable resource that is completely uncorrelated with wind and solar is clearly of benefit. Wave... [Read More](#)

<https://tethys.pnnl.gov/>

Tethys Engineering



- >7,700 journal papers, reports, other media on marine energy engineering and technologies

Features:

- Knowledge Base & Map Viewer
- Glossary
- Events Calendar
- Photo Library (>650 device images)
- *Tethys Engineering* Blasts
- *Tethys Engineering* Community

The screenshot displays the Tethys Engineering website interface. At the top, there's a navigation bar with links: ABOUT, CONTENT, CONNECTIONS, BROADCASTS, and HELP. Below this, a banner image shows a wave energy device with the Tethys Engineering logo. A text box on the banner states: "The Tethys Engineering Photo Library contains hundreds of photos of marine energy devices, contributed by developers around the world for free, third-party use." Below the banner, there are two main sections: "CURRENT" (Power from tidal, ocean current, and river flows) and "NEW USER" (If you are new to Tethys, start here to learn more). The "KNOWLEDGE BASE" section is highlighted, showing a search bar and a table of results.

Knowledge Base

The Knowledge Base provides access to information about technical and engineering aspects of marine renewable energy. Relevant documents from around the world are compiled into a user-friendly table that displays all content available in Tethys Engineering. Results can be narrowed using the keyword filters on the right, or with search terms entered in the text box. Content may also be sorted alphabetically by clicking on column headers. Some entries will appear on the next page.

As an alternative to the Knowledge Base, check out the **Map Viewer** to access geotagged content in a spatial view.

Search All: Enter Search Term(s) Enter terms to search for in all text fields

Clear All Filters

Current Search

• 7068 results found

Title	Author	Date	Content Type	Technology	Collection Method	Application
Heat transfer mechanism of cold-water pipe in ocean thermal energy conversion system	Mao, L.; Wei, C.; Zeng, S.; et al.	April 2023	Journal Article	OTEC	Modeling	Performance
Performance variations of wave energy converters due to global long-term wave period change (1900–2010)	Ullazia, A.; Saenz-Aguirre, A.; Ibarra-Berastegui, G.; et al.	April 2023	Journal Article	Wave, Point Absorber, Oscillating Water Column	Modeling	Hydrodynamics
Co-enhancements of several design parameters of an archimedes spiral turbine for hydrokinetic energy conversion	Badawy, Y.; Nawar, M.; Attai, Y.; et al.	April 2023	Journal Article	Current, Axial Flow Turbine, Archimedes Screw, Riverine	Modeling	Performance, Structural
Hydrodynamic independence and passive control application of twist and flapwise deformations of tidal turbine blades	Zilic de Arcos, F.; Vogel, C.; Wilden, R.	April 2023	Journal Article	Current, Axial Flow Turbine	Modeling	Hydrodynamics
Performance investigations of hybrid hydrokinetic turbine rotor with different system and operating parameters	Kamal, M.; Saini, R.	March 2023	Journal Article	Current, Cross Flow Turbine	Modeling	Hydrodynamics, Performance, Structural

Content Type

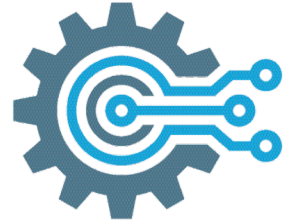
- ☐ Journal Article (4499)
- ☐ Conference Paper (1621)
- ☐ Report (469)
- ☐ Thesis (170)
- ☐ Book Chapter (145)
- ☐ Presentation (100)
- ☐ Book (29)
- ☐ Guidance (20)
- ☐ Workshop Article (6)
- ☐ Summary (4)
- ☐ Magazine Article (2)
- ☐ Website (1)

Technology Type

- ☐ Wave (3997)
- ☐ Point Absorber (715)
- ☐ Oscillating Water Column (646)
- ☐ Oscillating Wave Surge Converter (184)
- ☐ Overtopping (94)
- ☐ Attenuator (89)
- ☐ Pressure Differential (44)
- ☐ Current (2680)
- ☐ Tidal (1641)
- ☐ Axial Flow Turbine (403)
- ☐ Cross Flow Turbine (229)

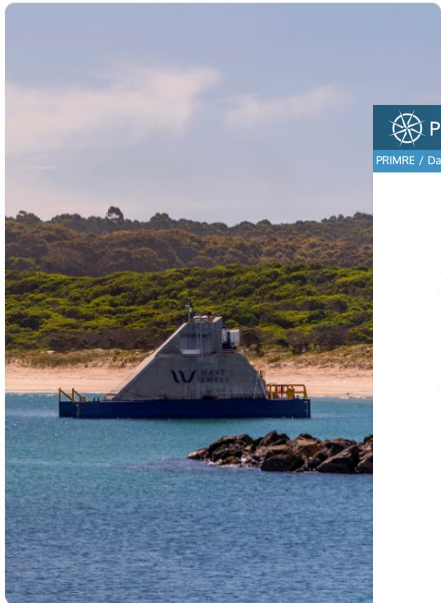
<https://tethys-engineering.pnnl.gov/>

Marine Energy Projects Database



King Island Wave Swell Project

The unit was installed at Grassy, King Island, on January 10, 2021. It has since been commissioned, exporting its first power into the King Island grid on June 18, 2021. These are significant events for WSE's shareholders and stakeholders. WSE has worked with Hydro Tasmania, the island's energy and network provider, to connect the unit to the local grid, and is now delivering energy from the project into the existing network. Hydro Tasmania will separately monitor the energy produced by the unit to ensure it meets the requirements of the King Island grid. The wave energy produced will complement Hydro Tasmania's existing hybrid grid, further diversifying the renewable sources and reducing diesel consumption on King Island.



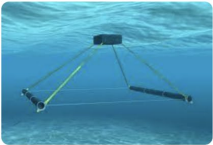
Project Manager	Wave Swell Energy Ltd
Additional Information	Project Website
Project Status	Active
Project Life Cycle	Operational
Start Year	2021

PRIMRE About Knowledge Hubs Basics Events Prizes Signature Projects STEM

PRIMRE / Databases / Projects Database / Devices / 40 South Energy R115

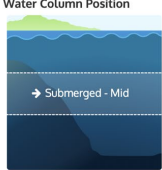
40 South Energy R115

The radical design of our wave energy converters lets you reap the benefits of commercial wave energy while avoiding the drawbacks of conventional installations. The 40South Energy wave energy converters are formed by three sub-systems. Using our innovative (and patented) transmission system, the relative motion of the Lower and Upper members is converted directly into electricity on the machine



Technology Developer	40 South Energy
Device Status	Inactive
Technology Type	Point Absorber
Power Take-Off	Alternative PTO
Max Rated Power Capacity	400 KW
Surface Expression	False
Estimated TRL TRL Last updated: 31 January 2014	4
Energy Resource	Wave

Water Column Position



→ Submerged - Mid

- >1,000 international marine energy projects, devices, test sites, and organizations
- Historic record of past deployments
- Database pages are linked to data, other parts of PRIMRE
- Allows for exploration of the relationships between organizations, projects deployments, and devices

https://primre.org/Databases/Projects_Database

Marine Energy Software



- Driven by user needs and input
- Catalogues codes and software relevant to marine energy
- Including commercial and open access software

<https://software.primre.org/>

Marine Energy Software U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

> Home | Search Software | Register Software | Resources | About | Contact Us

A collection of software for marine energy applications

Search Software
Q marine energy software

Browse Software Register Software

New Open Source Releases

- BEMRosetta June_2023**
Hydrodynamic coefficients viewer and converter for Boundary Element Method Solver formats
View Code View Documentation
- SAM 2022.11.21.r3.asc.280**
System Advisor Model (SAM)
View Code View Documentation
- tsdat v0.6.1**
Time series data utilities for declaratively applying standardization, Q/C, and transformations to datastreams
View Code View Documentation

More Marine Renewable Energy resources

PRIMRE
MRE Portal

MPX Data Repository TETHYS Environmental Documents TETHYS ENGINEERING Technical Documents Projects Database Telesio Development Guidance Geospatial Data

Marine Energy Software U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Home | > Search Software | Register Software | Resources | About | Contact Us

Search Software
Q marine energy software

Sort by: Most Recently Updated Clear Filters 4 records

Technology select all
Wave 10
Current 9

Language select all
MATLAB 10
PYTHON 10
FORTRAN 9
C++ 6
C 7
JavaScript 15
Roff 15
Coc 15
HTML 15
OpenEdge ABL 15
PostScript 15
PowerBuilder 15
SCSS 15
Shell 15
TCL 15
TeX 15
Turing 15

License deselect all
Open-Source 86
GNU General P... 10
Apache License... 9
Not Specified 9
Other 6
BSD 3-Clause "... 7
MIT License 15
Commercial 2

\$ Cost deselect all
Free 10
Paid 9

TRL deselect all
1-3 10
4-6 10
7-9 9

Collection method select all
Modeling 10
Laboratory 9
Field 10

Lifecycle select all
Design 10
Manufacturing 9
Deployment 10
Condition Monitoring 10
Operations & Maintenance 10
Decommissioning 10

TITLE OF SOFTWARE by SUPPORT_LINK®
Primary Use: Marine Renewable Energy
MIT License (Open-Source) WPTD Funded \$ Free 4-6
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Python JavaScript Deployment Laboratory
Site Characterization Marine Spatial Planning Current

Activity Updated 21 hours ago
Issues 4 ✓ 28 Pull Requests 7 ✓ 97 Contributors 19
Releases v1.4.2 (10/3/23) 12 ✓ 47 Forks 3 37 228 Downloads
Past Year of Commits
Downloads 100 Forks 100

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ANSYS CFX License (Commercial) \$ Paid 7-9
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Python JavaScript Condition Monitoring Modeling
Hydrodynamics Computational Fluid Dynamics (CFD) Wave

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MIT License (Open-Source) WPTD Funded \$ Free 4-6
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Python JavaScript Deployment Laboratory
Site Characterization Marine Spatial Planning

Activity Updated 21 hours ago
Issues 4 ✓ 28 Pull Requests 7 ✓ 97 Contributors 19
Releases v1.4.2 (10/3/23) 12 ✓ 47 Forks 3 37 228 Downloads
Past Year of Commits
Downloads 100 Forks 100

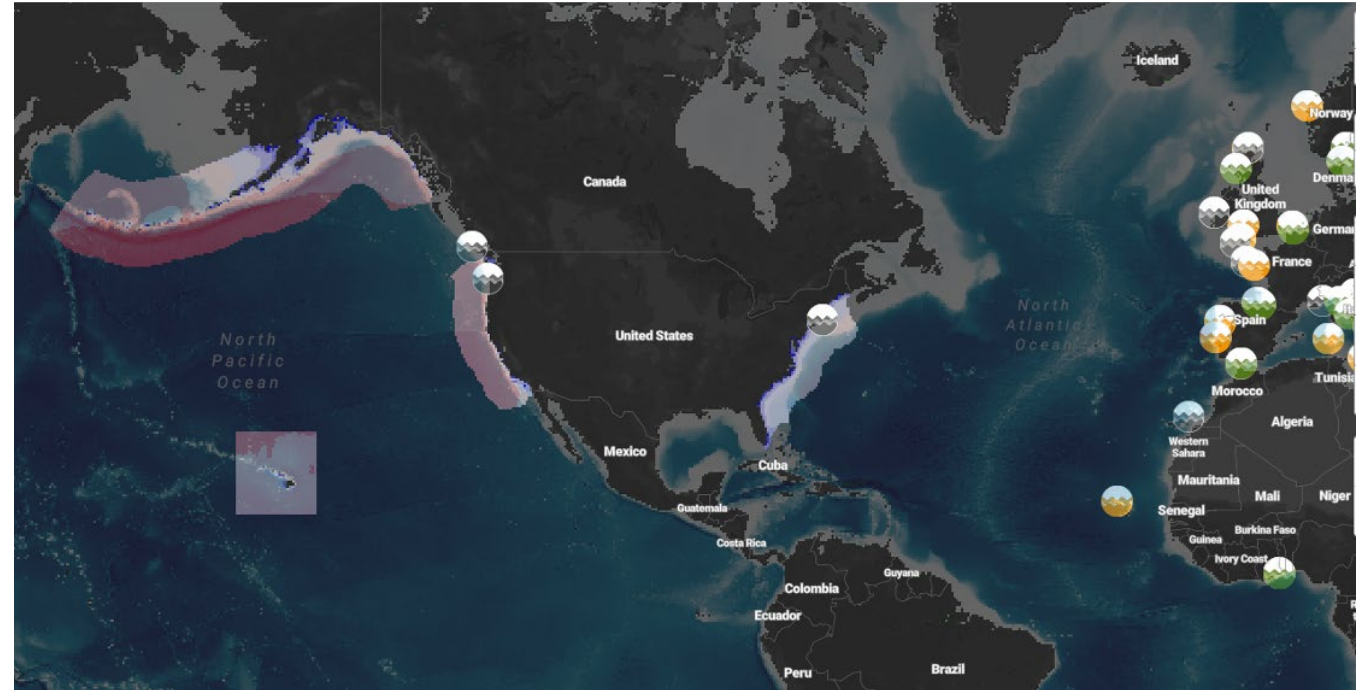
ANSYS CFX by ANSYS Inc.®
Primary Use: Marine Renewable Energy
ANSYS CFX License (Commercial) \$ Paid 7-9
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Python JavaScript Condition Monitoring Modeling
Hydrodynamics Computational Fluid Dynamics (CFD)

Marine Energy Atlas



- Geographic Information System that houses marine energy resource characterization data
- Open-access, interactive mapping tool for marine energy
- Includes data layers on U.S. wave, tidal, riverine current, ocean current, and ocean thermal resources

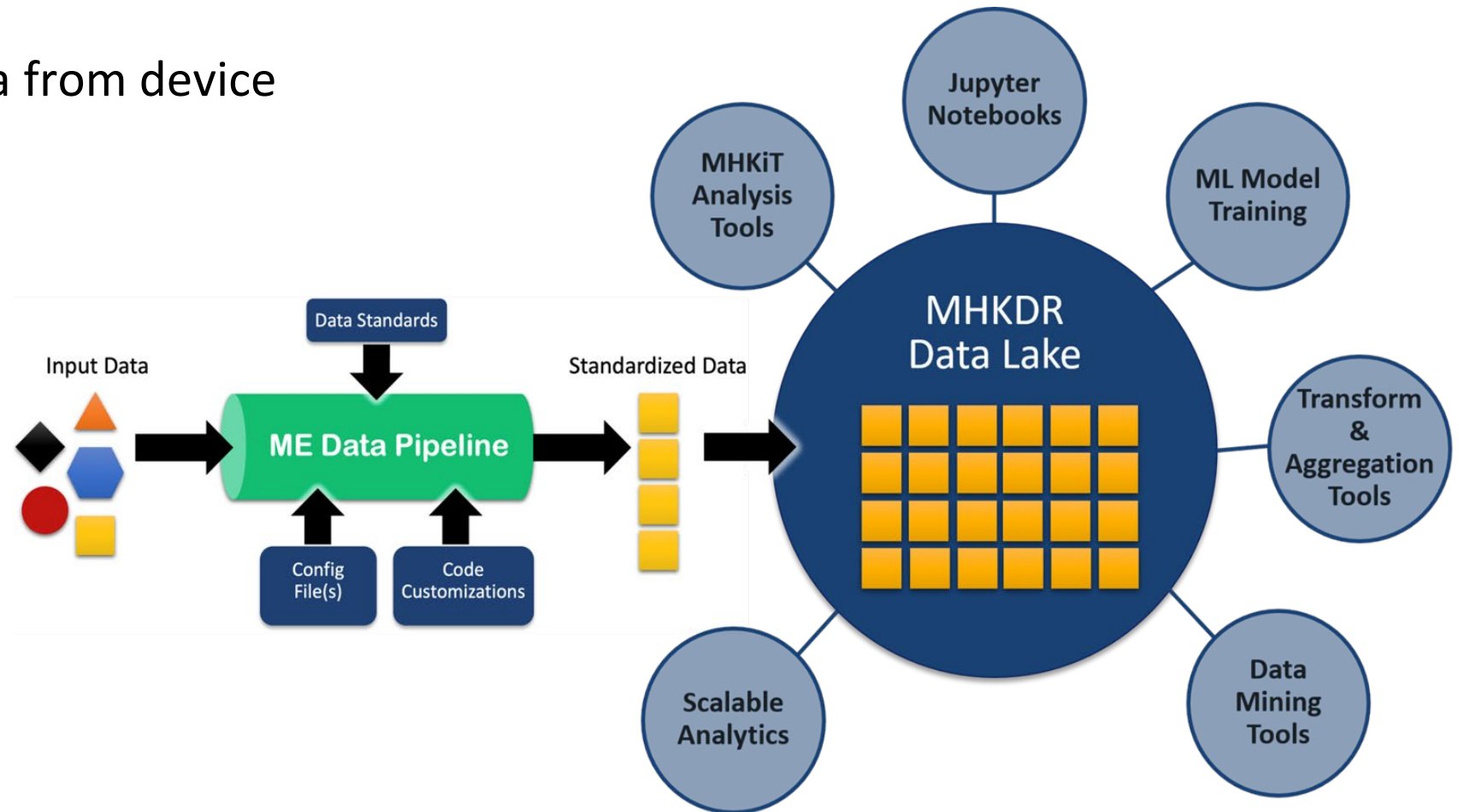


Significant wave height in US EEZs, wave project locations, bathymetry

<https://maps.nrel.gov/marine-energy-atlas/>

Marine Energy Data Pipeline

- Standardizing data from device to dissemination
- Automating data standardization



Marine Energy Data Lakes

Universal Access to Marine Energy Data

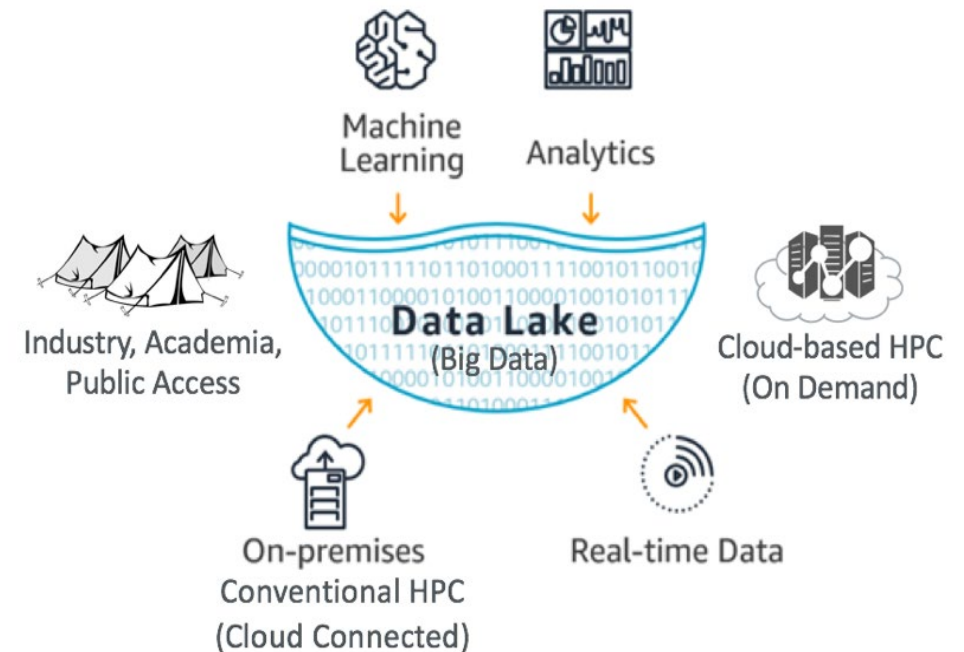
- Data available to anyone with an internet connection
- Access no longer limited to national labs, large universities and organizations with HPCs

➔ Enabling collaboration with communities of all sizes

- Including smaller universities, high schools, startup companies, and other innovators

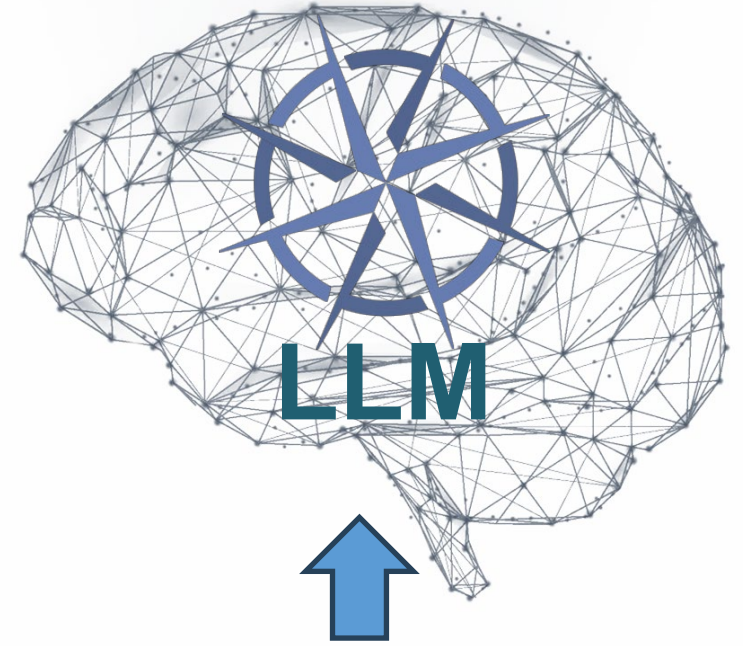
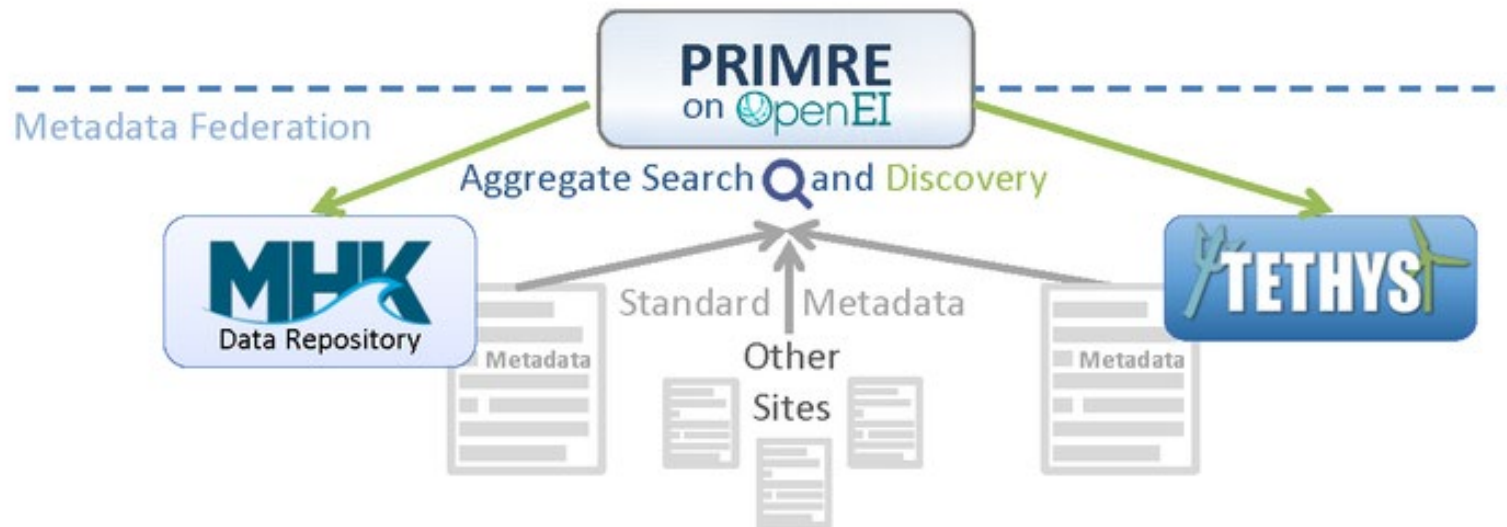


The Open Energy Data Initiative (OEDI) improves access to high-value data sets.



PRIMRE Centralized Search

- Search across all PRIMRE platforms and partners
- Data sharing across U.S. and international databases
 - Standard metadata units/formatting = data can be shared seamlessly between platform
- Uses a PRIMRE metadata schema based on DCAT + marine energy terms



- AI-powered search coming soon!
- Building a prototype LLM based on extensive library and metadata

<https://primre.org/Search>

Thank You! Questions?

PRIMRE Principal Investigators:

- Andrea Copping (andrea.copping@pnnl.gov)
- Jon Weers (jon.weers@nrel.gov)
- Cesar Castillo (cesar.castillo@sandia.gov)

PRIMRE Team:

- PNNL: Jonathan Whiting, Lysel Garavelli, Hayley Farr, and Fadia Ticona Rollano
- NREL: Lisa Temple, Katie Peterson, Hanna Fields, Erika Curry-Elrod, and Sean Morris
- Sandia: Kelley Ruehl, Will Peplinski, and Megan Anderson

PRIMRE Help

PRIMREHelp@groups.nrel.gov

