

Accelerating Marine Renewable Energy

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



OneNOAA Science Seminars
September 6, 2012

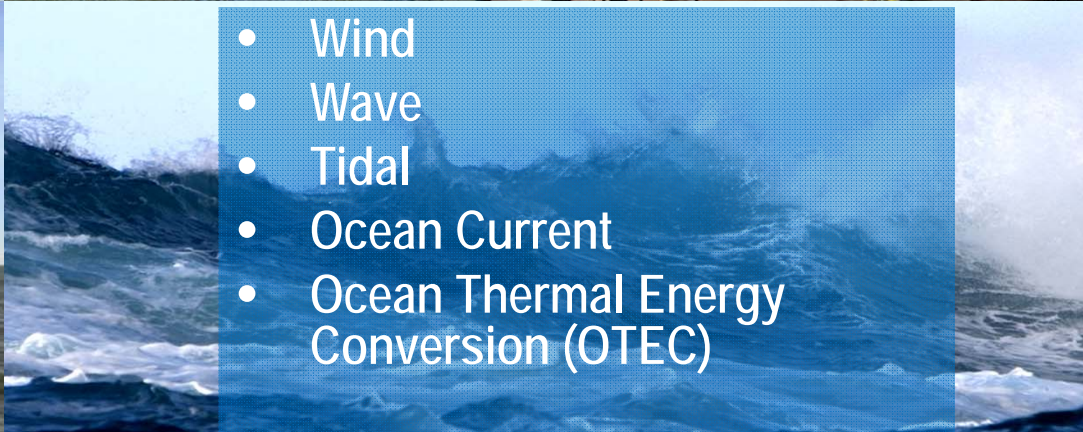
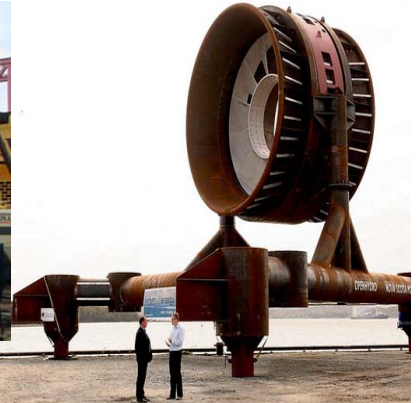
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Renewable Marine Energy Resources

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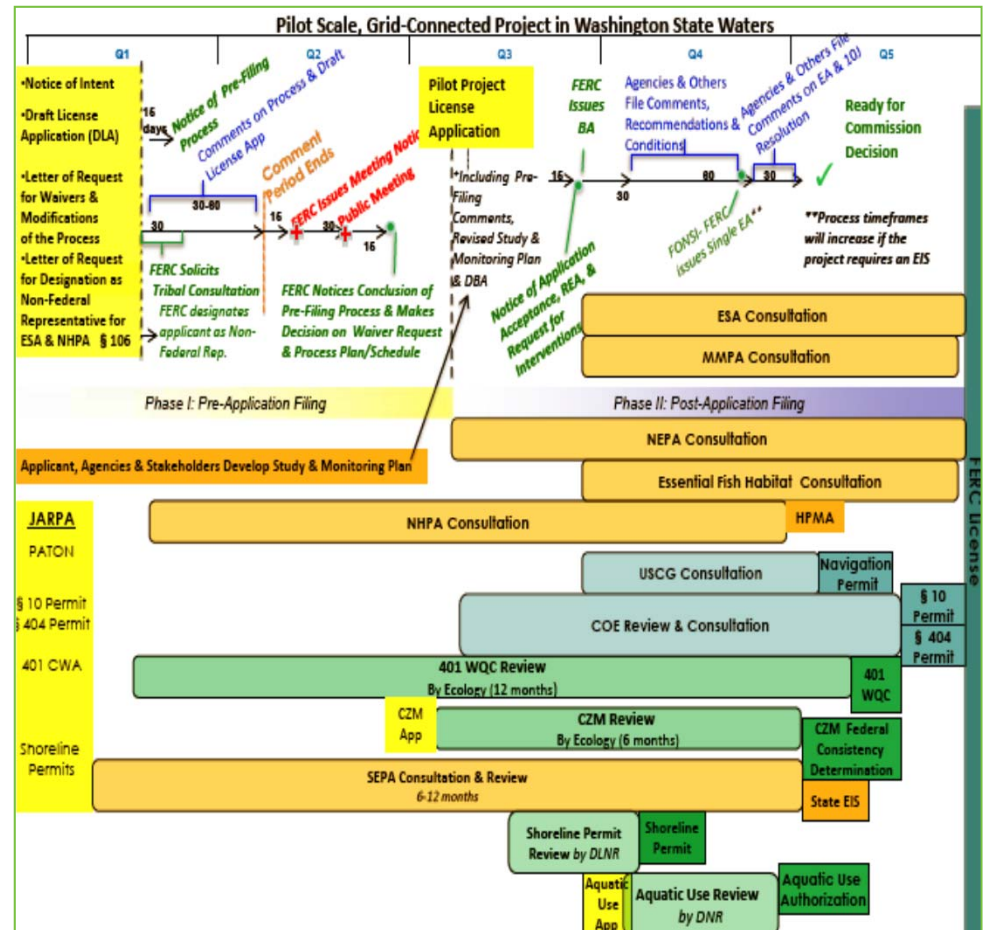


- Support effective permitting and regulatory decision-making
 - Provide technical input & assistance to federal & state agencies
 - Applied research on key issues such as environmental impacts
 - Conduct policy and economic analysis to inform decision-makers
- Support resource planning with technical input & data
 - Gather resource data and other info required for marine planning
- Promote infrastructure development
 - Domestic manufacturing and supply chain development
 - Transmission and interconnect planning
 - RD&T on specialized vessels and IO&M technology.



Environmental Deployment Challenges

1. Siting, permitting, and mitigation require a wealth of environmental data
2. Magnitude and likelihood of potential environmental effects has not been assessed
3. Lack of pre-deployment and monitoring standards leads to regulatory uncertainty
4. Data is often scarce and expensive



Overview of Regulatory Processes

Regulatory processes for permitting MHK and Offshore Wind are complex. DOE strives to fund research to address unanswered environmental questions and help provide information for developers to navigate the process.

WWPP Market Acceleration Goal: Reduce the regulatory costs, time, and potential environmental impacts associated with developing, siting, permitting, and deploying MHK systems.

Permitting and Licensing MHK Projects

Federal Power Act



Energy Policy Act of 2005



Magnuson-Stevens Act



U.S. Coast Guard Regulations

Rivers & Harbors Act

NEPA

Clean Water Act

National Historic Preservation Act

Endangered Species Act



Marine Mammal Protection Act



Coastal Zone Management Act

Fish and Wildlife Coordination Act

FERC Licensing Options

- 1) No FERC hydropower license required
 - a) If not grid Connected
 - b) But must obtain all other approvals, e.g. ACOE permit, NEPA etc.
- 2) Pilot license
- 3) Commercial license

Projects on the Outer Continental Shelf must typically obtain a lease from BOEM

- 1) Research – allow State and Federal agencies to hold leases for research
- 2) Limited – allow for short term testing and site assessment
- 3) Commercial – competitive vs. non-competitive



Pilot Process

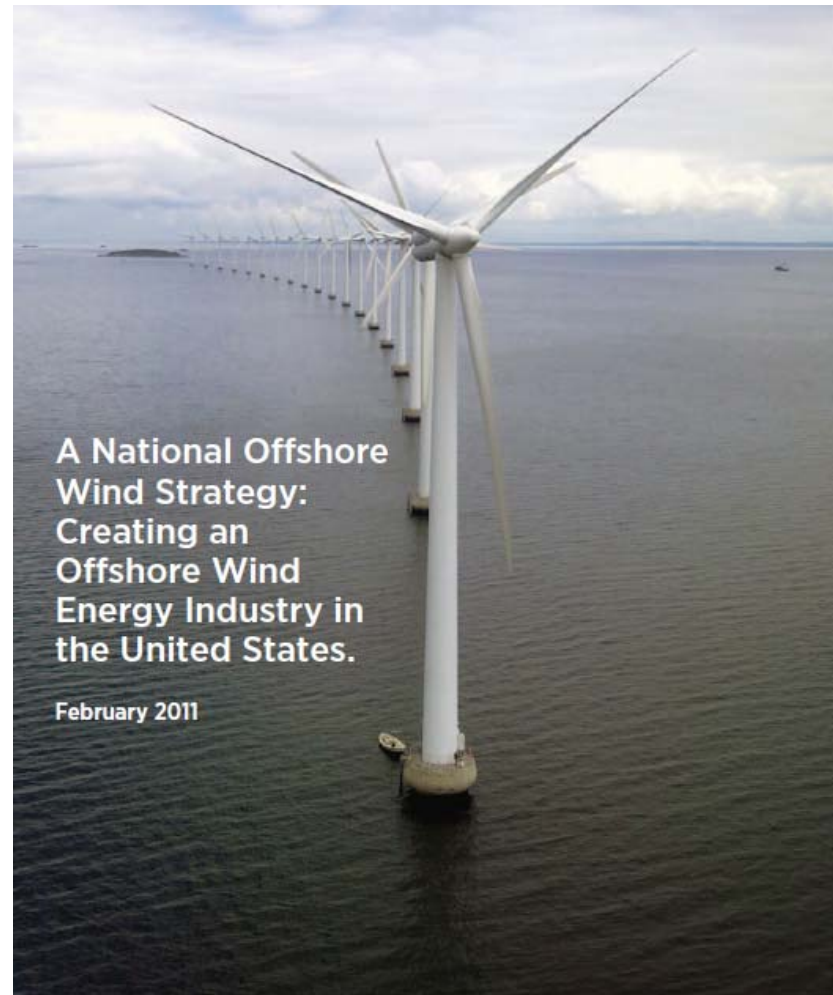
Expedited version to allow for technology testing. Fewer study requirements, intensive post-construction monitoring.

To qualify:

- 1) Small (less than 5MW)
- 2) Short term (originally 5 years, but now up to 10)
- 3) Avoid sensitive locations
- 4) Removable, able to shut down on short notice, removed post-project



Permitting and Licensing Offshore Wind Projects



Smart From the Start

DOI's Smart from the Start initiative is a strategy to facilitate offshore wind development along the Atlantic OCS. Elements of the initiative include:

1. Streamlining the approval process for individual proposed projects and eliminating unnecessary regulatory requirements.
2. Implementing a **comprehensive, expedited leasing framework** for offshore wind development by **identifying wind energy areas** along the Atlantic OCS that appear most suitable for offshore wind energy development because of **fewer user conflicts and resource issues**, organizing an **interagency process to gather information** from key agencies regarding the environmental and geophysical attributes and other uses of these wind energy areas, and assembling that data in a publicly available format to help assess the feasibility and risks associated with any potential development in the identified areas.
3. Moving aggressively on a separate but **parallel track to process any applications to build offshore transmission lines**, such as potential regional 'backbone' lines that would serve multiple future offshore wind projects along the Atlantic OCS.

A Staged Decision-Making Process

1. **Planning – Identify suitable areas** for wind energy leasing consideration through collaborative, consultative, and analytical processes
2. **Lease issuance** (Competitive and Non-competitive) – lease does not grant the lessee the right to construct any facilities; rather, the lease **grants the right to use the leased area to develop its plans** which must be approved by BOEM before the lessee can move on to the next stage of the process
3. **Approval of a Site Assessment Plan (SAP)** – contains the lessee’s detailed proposal for the construction of a **meteorological tower and/or the installation of meteorological buoys** on the leasehold and must be approved by BOEM before it “site assessment” activities are conducted
4. **Approval of a Construction and Operation Plan (COP)** – A detailed plan for the **construction and operation of a wind energy project** on the lease. BOEM must approve a COP prior to the construction of any wind energy facility on the OCS. The lessee must provide the **results of site characterization surveys** with its COP, including a **shallow hazards survey, geological, geotechnical survey, and an archaeological resource survey**

BOEM Streamlining Activities

Atlantic Coast Wind Energy Areas

RI and MA WEA

- Draft EA in process (for Leasing and SAP, not COP)

New Jersey, Delaware, Maryland and Virginia

- Final EA and FONSI (for Leasing and SAP, not COP)
- Finding of No Historic Properties Affected

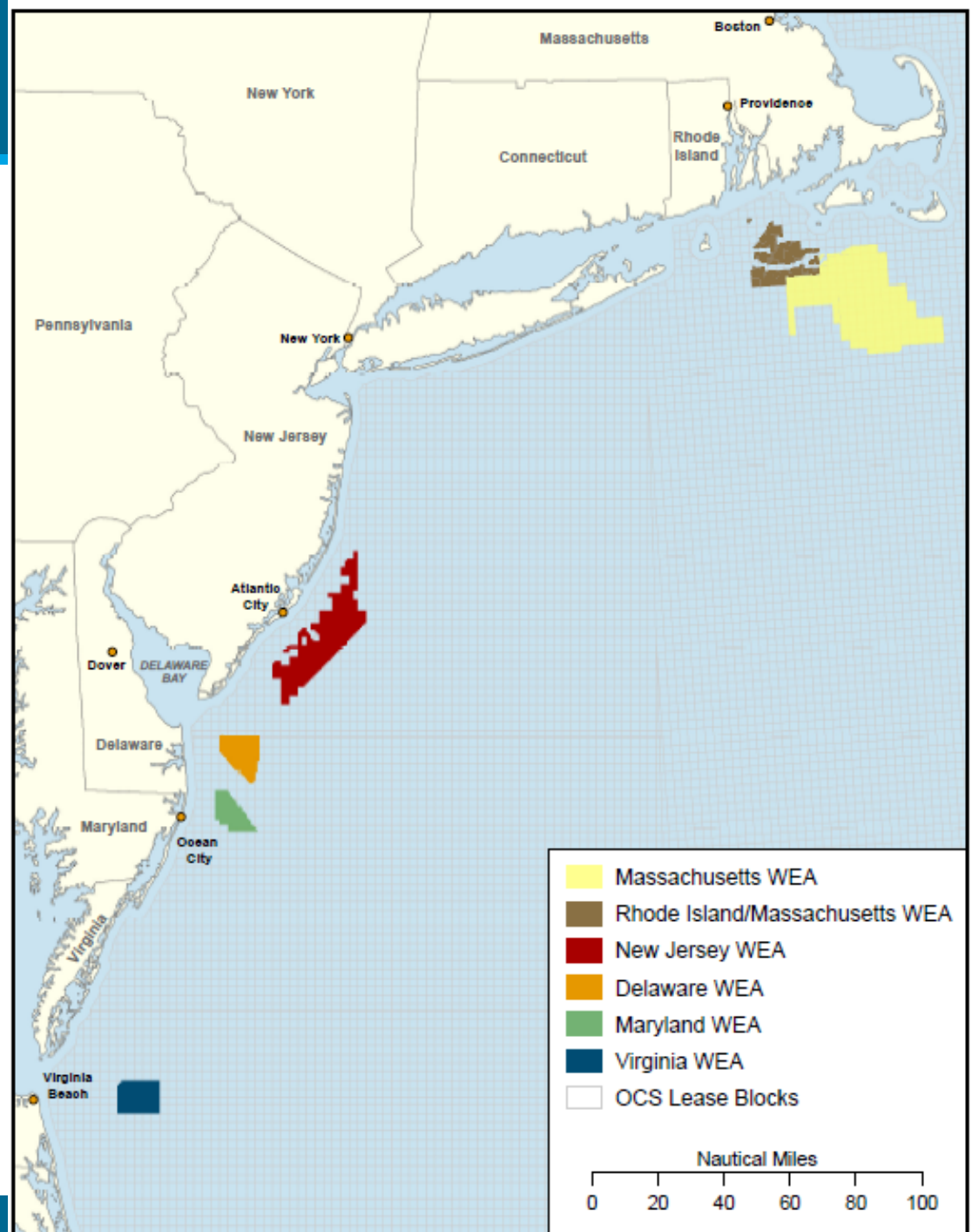
Other State Activities

Maine

- Intent to prepare EIS and Request for Interest for:
 - **Potential Commercial Leasing for Wind Power on the Outer Continental Shelf (OCS)**

West Coast

- State Task Forces forming



Help developers navigate the complex regulatory processes by funding research for deployments, and by producing guidance and information for both regulators and industry

Regulatory and stakeholder outreach and coordination

- Produce tools that allow developers to understand stakeholder views and effectively incorporate input into the process.
- Development of environmental baseline data collection and monitoring protocols

Coordination with agency partners

- Through MOUs, interagency working groups, and joint interagency funding opportunities.



Siting Methodologies for Hydrokinetics *Navigating the Regulatory Framework*

Prepared by Pacific Energy Ventures, LLC on behalf of the U.S. Department of Energy
December 2009



Environmental Impacts

With a variety of new technologies in a new market, environmental impacts are an area of uncertainty. Industry must collect the necessary data, which is both lacking and difficult to obtain. This leads to increases in both cost and length of pre-deployment environmental studies

WWPP Market Acceleration Goal: Reduce the regulatory costs, time, and potential environmental impacts associated with developing, siting, permitting, and deploying MHK systems.

Environmental Impacts & Siting

Barrier	Strategy	Examples of Research
Lack of data leads to expensive and uncertain regulatory process	<ol style="list-style-type: none"> 1) Assist pioneer projects with cost of environmental studies 2) Site and species specific research to answer key questions 	<ol style="list-style-type: none"> 1) Funds to TRL 7-8 projects with associated data sharing agreements 2) Industry funded projects such as OPRC beluga monitoring research in AK
Minimal monitoring data available from in-water projects	<ol style="list-style-type: none"> 1) Develop and improve monitoring technologies and techniques 2) Aggregate and distribute data to minimize duplicative research 	<ol style="list-style-type: none"> 1) Development of the Marine Mammal Alert System 2) International environmental data sharing agreement and development of environmental database
Some basic science questions on potential impacts remain unanswered	<ol style="list-style-type: none"> 1) Develop predictive tools and risk assessment efforts to evaluate potential magnitude of effects 2) Basic research on topics that may affect multiple projects 	<ol style="list-style-type: none"> 1) Development of hydrodynamic modeling tools and conceptual models 2) Research on the effects of acoustics and EMF on marine and freshwater species

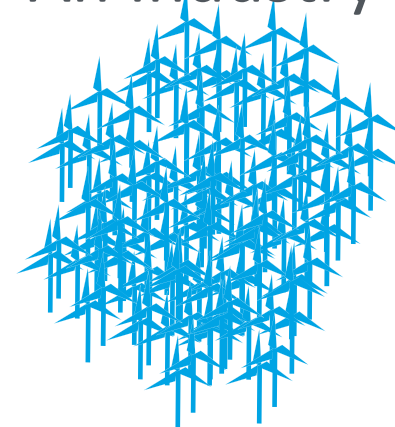
Ones

->

Tens

->

An Industry



1. Develop baseline environmental data and derived products to accelerate planning and permitting of 1st generation projects
2. Develop the necessary technologies and methods to assess and monitor environmental impacts
3. Monitor 1st generation projects from site assessment through operations to identify specific impacts
4. Identify and evaluate mitigation measures
5. Evaluate cumulative effects

Physical Interactions with Devices

- Evaluating potential for fish attraction and avoidance
- Modeling and experimentation to evaluate strike risk to fish



Electromagnetic Fields

- Experimentation to evaluate potential effects of EMF on fresh water fish and invertebrates

Acoustics

- Evaluating effects on MHK noise by increasing knowledge of noise in riverine environments. Planned device noise measurements and net-pen studies.



Toxicity

- Experimentation to measure the effects of antifouling coatings on aquatic organisms

Benthic Habitat Alteration

- Development of measurement methodology to evaluate effects of MHK devices on benthic habitat. planned measurements around devices.
- Development of monitoring protocols



Conceptual Model Development

- Development of conceptual models to increase understanding of the ecological relationships between MHK stressors and biological receptors and the cumulative impacts of development



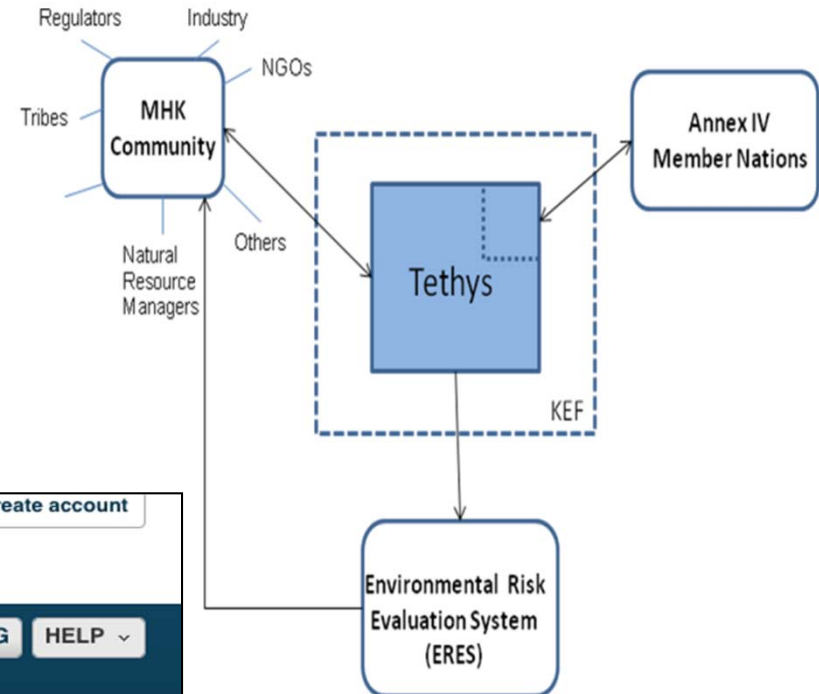


Environmental Research Knowledge Management System

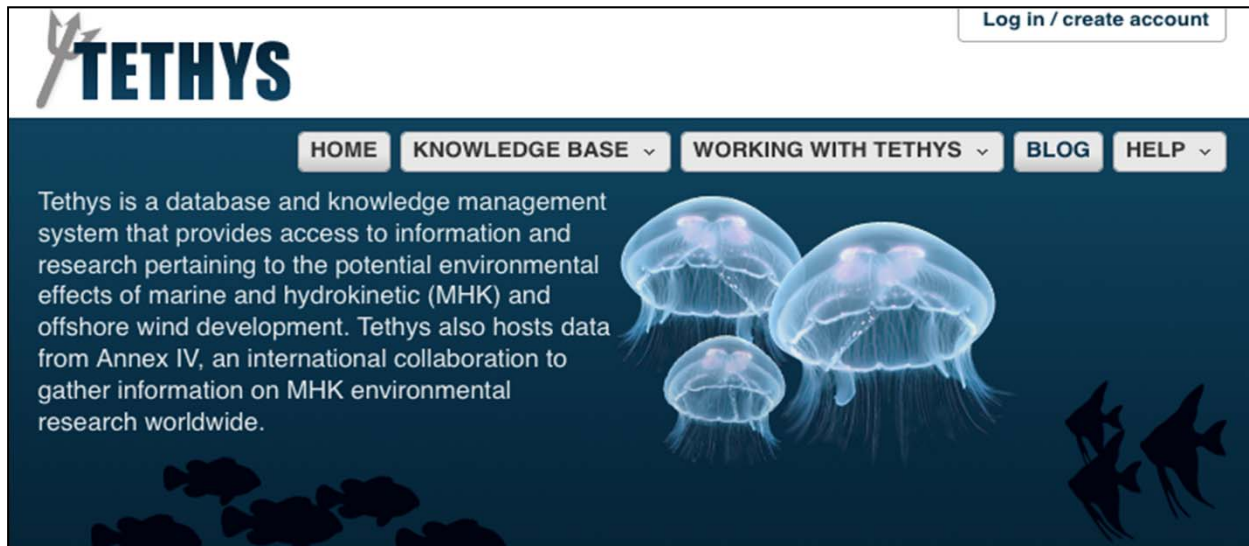
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- ▶ **Challenge:** Organize & make available information on environmental effects of MHK development
- ▶ **Approach:** Knowledge Management System, publically available & easily accessible
- ▶ **Outcome:** Shared knowledge to accelerate siting & permitting



http://mhk.pnnl.gov/wiki/index.php/Tethys_Home



Schematic of *Tethys* relationship with analysis tools (represented by ERES) & stakeholders

Annex IV: International Ocean Energy Environmental Data Sharing Effort

Objectives:

1. Expand knowledge of environmental effects and monitoring methods, and research occurring around the world
2. Increase accessibility of information
3. Make available any prove/successful mitigation strategies
4. Foster efficient and timely government oversight and public acceptance

United States – Operating Agent



Cooperating U.S. Agencies

- FERC
- BOEM
- NOAA



BOEM
BUREAU OF OCEAN ENERGY MANAGEMENT

Supporting Institutions

- Wave Energy Centre (Portugal)
- University of Plymouth (U.K.)
- Pacific Northwest National Lab (U.S.)



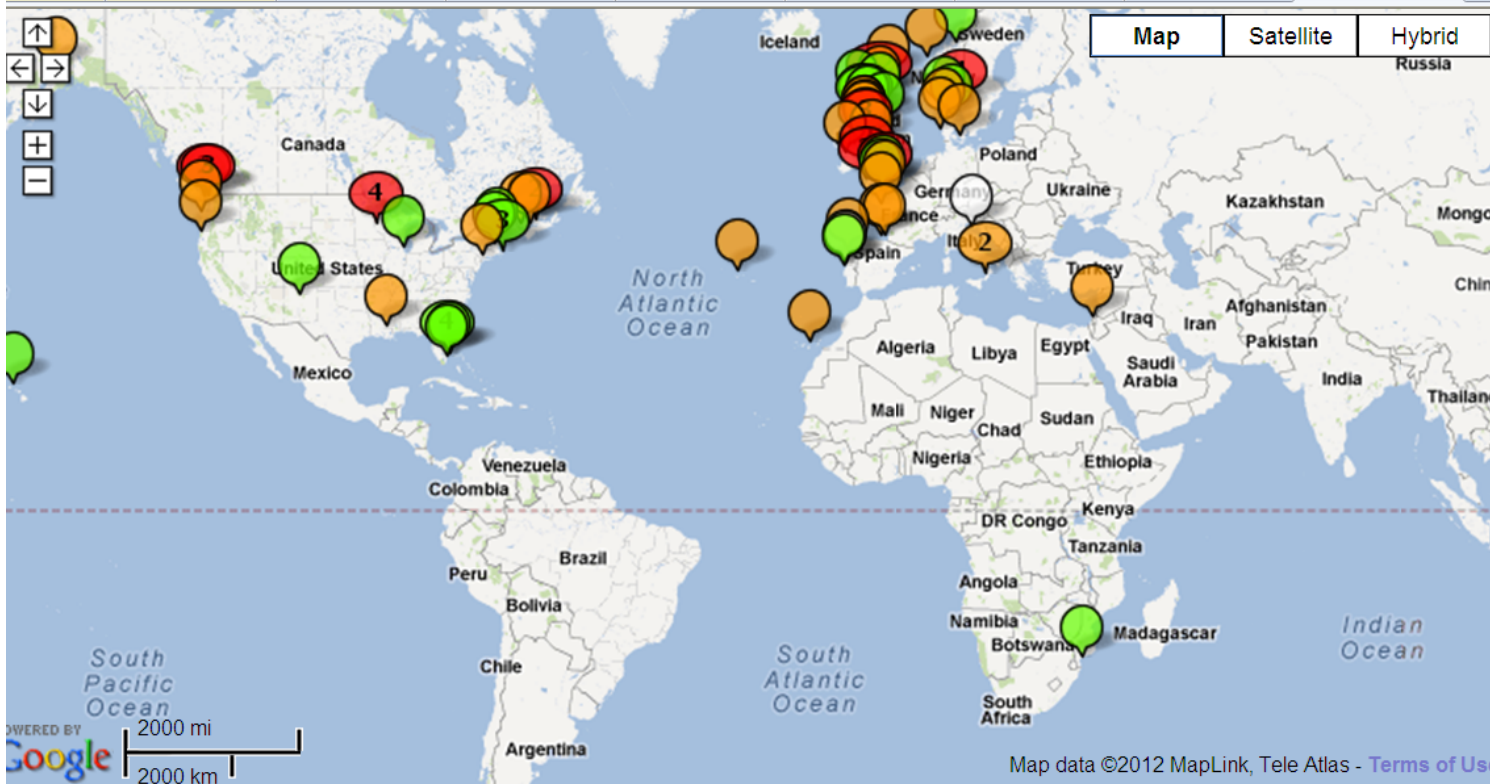
Partner Nations

- Ireland
- Canada
- New Zealand
- Spain
- Norway
- South Korea



Annex IV Database

Title	Author or Developer	Date	Document Type	Technology Type	Stressor	Receptor
Far-Field Effects of Tidal Energy	Hasegawa, D., et al.	Oct, 2011	Journal Article	MHK (tidal)	Physical	Farfield environment



Map Satellite Hybrid

Country

- 6 Australia
- 1 Austria
- 5 Canada
- 5 China
- 4 Denmark
- 3 France

Developer

- 1 Alderney Renewable Energy
- 2 Aquamarine Power
- 2 Atlantis Resources Corporation
- 1 Carnegie Wave

Technology Type

- 12 MHK
- 5 MHK (in-stream)

○ Document ● Project Site ● Research Study ● Mixed

Multiple Use Planning

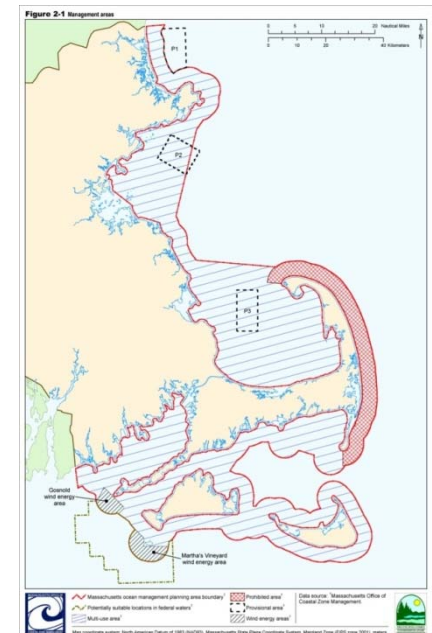
With a multitude of existing uses already in play in our oceans, Marine Renewable Energy is the new kid on the block. Ensuring that energy variables are considered in the planning process is a critical role that DOE plays.

Collaboration and coordination between **regulators, industry, and researchers** is needed to ensure environmental study requirements are **achievable** and **research is targeted** and **effective**.

Approach – Interagency and Stakeholder Outreach and Coordination:

- Tools that allow developers to understand **stakeholder views** and effectively incorporate input into the process.
- Participation in policy formulation efforts and stakeholder outreach to ensure that **renewable energy equities** are represented in **coastal and marine spatial planning efforts**.
- **Coordination with agency partners** through MOUs, interagency working groups, and joint interagency funding opportunities.
 - Interagency Working Group on Ocean Partnerships
 - Coordinate the Federal Renewable Ocean Energy Working Group
 - Interagency Coordination Committee - Acoustics

Marine spatial
planning for offshore
energy in
Massachusetts



DOE-DOI & DOE-NOAA Memorandums of Understanding



June 2010: DOE & DOI MOU to further development of offshore renewable energy technologies on U.S. Outer Continental Shelf

January 2011: DOE & NOAA (DOC) MOU to further Renewable Energy Modeling & Resource Forecasting

DOE and DOI MOU = emphasis for collaboration on four task group areas:

1. Siting and permitting
2. Standards and technical collaboration
3. Resource assessments and design conditions
4. Stakeholder engagement and information dissemination

DOE and NOAA MOU = emphasis for collaboration in action plan to:

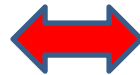
1. Advance meteorological and oceanic forecasting technologies, models & monitoring systems
2. Create renewable resource characterization models for optimal system performance
3. Institute plan to integrate renewable energy into the electrical grid
4. Predict climate effects on renewable energy resources

DOE Engagement with National Oceans Council



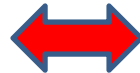
NOC Principal: Secretary Steven Chu
NOC Deputy: Assistant Secretary David Sandalow

Regional Ocean Planning



Regional Planning Bodies; National Workshop Planning and Participation; NOP Implementation Plan Development

Interagency Coordination and Collaboration



Ocean Resource Management IPC; Ocean Science and Technology IPC; Interagency Working Group on Ocean Partnerships and subgroups

Opportunity for Involvement: Upcoming BAAs

DOE Proposed: Funding Partnership Opportunity for MHK Environmental Effects Assessment and Monitoring Technology Development

Potential Research Topics

- Fish behavior and mortality
- Environmental monitoring at deployed devices
- Development of monitoring technologies (e.g. device noise, blade strike, EMF)
- Field measurement of EMF

BOEM Proposed: Real-time Opportunity for Development of Environmental Observations (RODEO)



Monitoring of Environmental Effects and Mitigation Measures using DOE Funded Offshore Wind Demonstration Projects

Potential Research Topics:

- Air Quality
- Sound
- Seafloor Disturbance
- Visual Impacts
- Monitoring Protocols
- Coastal Impacts
- Education and Outreach



Questions?

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