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Annex IV Meeting of Country Analysts

online meetings

January 12th 2017

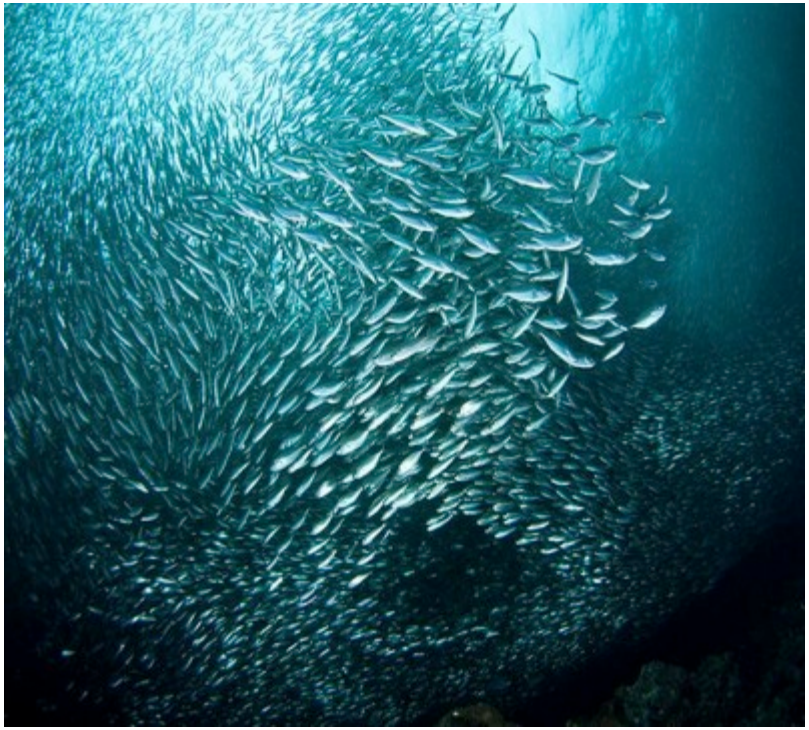
OES OCEAN ENERGY SYSTEMS
An IEA Technology Initiative

ANNEX IV

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

Today…

- Phase 3 Annex IV work plan, including schedule
- Management Measures Workshop
- Conferences in 2017
- Webinars
- *Tethys* Stories
- Peer review of *Tethys*



Phase 3 Annex IV Thematic Work Plan

- Purpose:
  - To plan for and implement Annex IV Phase 3 (2016-2020) activities, so that the sum of activities will optimally facilitate siting and permitting for the MRE industry.
- Additional Annex IV Activities (not covered in themes):
  - Updates and collection of Annex IV metadata forms.
  - Collection, expansion, and curation of the *Tethys* knowledge base, as well as ongoing maintenance of Tethys.
  - Outreach and engagement activities, including:
    - *Tethys* Blasts
    - *Tethys* Stories
    - Interactive events calendar
    - Archiving of webinars, expert forums, and related presentations and material.
  - Review of *Tethys* collection content and functionality.
  - Working with Annex IV country analysts, and consulting with OES.

Themes

Three themes have been identified as priorities for Annex IV Phase 3:

- Collision Risk
  - Risk of marine animals colliding with turbines
- Reducing Risk and Uncertainty
  - Retiring perceived risks and ensuring proportional monitoring and mitigation of environmental effects, where needed.
- Social and Economic Aspects of MRE
  - Evaluate and disseminate information on social and economic issues of MRE development.

Rationale and Expected Outcomes of Thematic Activities

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Theme	Rationale	Outcome
Collision Risk	• Uncertainty around collision risk is slowing permitting worldwide, and remains the most important environmental issue for tidal turbine development. This will become increasingly the case as we move towards arrays. • Annex IV is in a unique position to build on the work of the 2016 State of the Science, previous workshops, and connections in key MRE countries, especially the UK and Canada.	• Activities will promote: • Increased understanding of risk to marine animals from turbine collision • Coalescence of strategic research directions to retire collision risk • Broad dissemination to regulators and other MRE members • Scaling of collision risk to arrays • The collision risk theme will simplify and facilitate permitting, and ensure proportionality of monitoring and mitigation, to facilitate the development and expansion of the industry.

Reducing Risk and Uncertainty	• There are a broad range of risks and ongoing levels of uncertainty that continue to act as barriers to efficient permitting of wave and tidal devices, as defined by the 2016 State of the Science report. Many of these issues will become increasingly important as we move toward deployment of arrays.
	• Annex IV is well placed to continue broad dissemination of information, with a particular focus on underserved audiences such as regulators and developers.
		• Activities will promote:
		  • Increased understanding among regulators of proportional risk and targeted data collection efforts
		  • Input elicited from regulators on necessary research outcomes to inform regulatory needs
		  • Regulatory outlook toward permitting arrays informed
		• The reducing risk and uncertainty theme will assist regulators to simplify and facilitate permitting, and promote targeted and proportional monitoring and mitigation requirements, to facilitate the development and expansion of the industry.

Social and Economic Issues	• Interactions, potential conflicts, and benefits that affect, and are affected by, MRE development are not exclusively environmental; many fall in the social and economic space. • Annex IV member nations have consistently expressed a strong interest in addressing social and economic topics.	• Activities will promote: • Increased understanding of social and economic risks and benefits • Identification of strategic social and economic research • Broad engagement of Annex IV members and MRE community in social and economic issues • The social and economic theme will inform the MRE community of the importance of social and economic benefits to MRE development, and promote targeted research that minimizes conflict with existing and future uses of ocean space.

Reducing Risk and Uncertainty

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Activity	Timing	Output	Outcome
Webinars	1-2 per year, quarterly	Initial webinar on risks (as informed by 2016 SoS and new research), specifically to regulators, other members of MRE community. Subsequent webinars to share regulatory perspectives with developers and researchers.	Increased understanding of proportional risk, and identification of appropriate data collection targets, by regulators and other members of the MRE community.
Expert Forums	1-2 per year, as needed	Discussion of regulator challenges among regulators for U.S., and multiple Annex IV nations.	Sharing of potential solutions to regulatory barriers to MRE development.
Workshops	Up to 1 per year, in coordination w/existing conference.	Inclusion of regulators and developers in research-oriented workshops, starting with METS.	Increased understanding of research challenges that need to be solved to meet regulatory needs.
Conferences	1 or more per year [EIMR, EWTEC, ICOE, METS]	Environmental track/sessions.	Increased awareness of implications of environmental interactions for engineers, developers, and other members of MRE community.
Short Science Summaries	Likely 1 in first year, more as needed in out-years.	Specifics of stressor/receptor relationships as informed by interactions with regulators and developers; broad dissemination to regulators, developers, and other key audiences.	Increase awareness of proportional risk among developers as well as policy, management, other members of MRE community.
2020 State of the Science	Planning and implementation in year 3	State of understanding of key topics in environmental risks as of 2019.	Definitive evaluation of key environmental risks on MRE development.

Thoughts on Phase 3 Workplan

- Are the themes the right ones?
- What are the greatest priorities, among themes, and within themes?
- What parts are most important for your nation?
- What role can you and your colleagues play?

Management Measures Workshop

- Opportunity for Annex IV to join with Scottish effort, to make discussion of/developing toolbox of management measures more international

- Management measures that can be implemented for:
  - Pre-installation (design changes)
  - During installation
  - During operations
  - Catastrophic need to mitigate (shut down, removal)

- Likely to examine:
  - Collision risk (largely tidal)
  - EMF (wave and tidal)
  - Noise emissions (wave and tidal)
  - Benthic disturbances (wave and tidal)

- Will look at measures to determine:
  - Feasibility and efficacy for conservation, technically, and financially.

Management Measures Workshop

- Likely to be May 9th in Glasgow, Scotland (the day before All Energy)
- Questions:
  - Is this concept useful?
  - Would it benefit developers, regulators, researchers, in your country?
  - Will you attend and/or encourage developers, researchers, maybe regulators, from your country to attend?

2017 Conferences for Annex IV

- EIMR 2017
  - Planned for April in Scotland has been cancelled, planned for 2018
- METS 2017
  - May in Washington DC (largely US) will have Annex IV presence
  - Might also have initial “reducing risk” meeting with US regulators (to test out process)
- EWTEC 2017
  - August – September in Cork, Ireland
  - Andrea and Jan are environmental track chairs
  - About 22 abstracts received
  - **Abstract deadline extended to January 27th**
  - Potential for Annex IV workshop
- Others…??

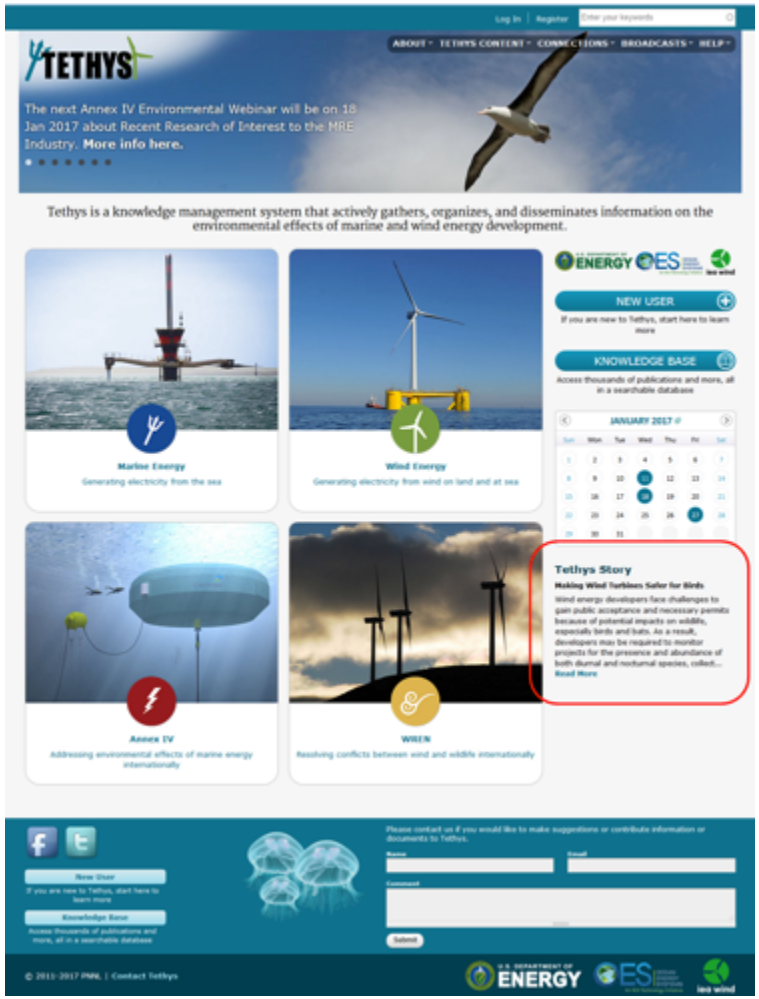
Webinars

- Quarterly webinars
  - January 18th – Recent Research of Interest to MRE
  - Two US-based contributions: EMF studies and fish interaction with turbines
  - March 2017 – Use of algorithms to extract information for animal interaction with devices from underwater video
  - Likely one US, one European presenter
  - June 2017 on – wide open!
- Suggestions…??

Tethys Stories

- Short stories start on the front page of Tethys and continue on another page
- Communicate new and interesting happenings in this field.
- Could be about a program, a set of new findings, a new paper that is particularly thought-provoking, or other topics.

- Suggestions…??



Making Wind Turbines Safer for Birds

Posted By: Elise DeGeorge **On**: October 28, 2016

Wind energy developers face challenges to gain public acceptance and necessary permits because of potential impacts on wildlife, especially birds and bats. As a result, developers may be required to monitor projects for the presence and abundance of both diurnal and nocturnal species, collect data on bird or bat collisions with turbines, and implement mitigation strategies that reduce fatalities, despite the fact that parameters for risk have not been adequately defined. Many of the data gathering requirements are best met with technologies mounted on or near wind turbines that can remotely monitor effects, should they occur. To meet current and future regulatory requirements, project developers need to know which technologies meet the permitting requirements and are cost-effective. Technology solutions are likely to vary by species and specific regulatory requirements and jurisdictions. So a range of technology solutions will be needed to fulfill the needs of wind energy projects.

A number of technologies that can detect or deter bird and bat species are commercially available, whereas others are in various stages of development. However, many of these systems have not undergone independent testing and validation, and there is no standard by which comparisons can be made among existing and emerging systems.

Over the past several years, the National Renewable Energy Laboratory (NREL) has played a prominent role in the following initiatives of interest:

- Testing of radar and visual camera systems using eagles and falcons
- Installing thermal imagery systems, visual imagery systems, contact microphones, and accelerometers to evaluate technologies designed to detect bird strikes on wind turbines
- Assisting with U.S. Geological Survey experiments by installing thermal imaging cameras and managing the collection of data from equipment mounted on turbines at the National Wind Technology Center (NWTC) at NREL
- Analyzing available avian detection and deterrent technologies to help an offshore wind farm developer meet their pending permit requirements
- Hosting meetings of the Association of Fish and Wildlife Agencies and Bat Conservation International to support wind energy impact mitigation for bats, grouse, and other birds over three different landscape scenarios
- Convening wildlife statisticians, biologists, and engineers to develop effectiveness testing protocols for emerging avian and bat detection and deterrent technologies.

During 2016, NREL hosted two wind energy companies—Laufer Wind and RES Americas—to install and monitor avian detection systems at the NWTC. Both systems are designed to detect bird interactions with turbines to reduce collisions. The 2016 study consisted of outfitting two eagles from Auburn University's Southeastern Raptor Center with Global Positioning System loggers. To compare the technologies, the eagles were encouraged to cross the two avian detection systems at a variety of angles. The results will allow wind energy developers to better characterize the limits of their detection algorithms and improve analysis methods.

The two eagles, Spirit and Nova, are rescues that have been rehabilitated at Auburn University's Southeastern Raptor Center. The eagles have been trained to fly across a football stadium and land on the field. They do not typically soar like birds do in the wild. Instead, they trade altitude for airspeed and are released from the upper deck of the stadium. To make the most of the eagle flights at the NWTC, birds were released from a man lift, maximizing altitude to, in turn, maximize flight time.

Because Laufer Wind uses a radar system to detect aircraft, the data from this study will help them test and validate their equipment for detecting birds. RES Americas developed a stereoscopic, camera-based system to detect and identify flying wildlife, in collaboration with Boulder Imaging, named IdentiFlight. They are also using the data to test and validate their system.

Although this experiment was not the first time birds have been hosted at the NWTC to track flight patterns, Project Lead Jason Roadman stated that "This has been the first large-scale field research campaign to collect flight data around wind turbines, and appears to have yielded some really useful data." He further explained that the NWTC is unique in its ability to support testing of a wide range of technologies designed to reduce bird and bat fatalities at wind energy projects while providing regulatory agencies and developers with a higher level of confidence that mitigation measures will have their desired impacts.

Tethys Stories

Tethys Stories are intended to feature information on news, events, research, and projects relevant to marine and wind energy development activities across the globe. Stories are contributed by a diversity of individuals working in the field, and are meant to highlight the big picture of advancing the energy industry in an environmentally responsible manner. If you are interested in providing content to be featured as a Tethys Story, please email jonathan.whiting@pnnl.gov.

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Collaboration Between Two International Networks

Posted By: Andrea Copping **On**: October 14, 2016 | 0 Comments
Annex IV and ORJIP-Ocean Energy has signed an agreement that will enhance collaboration and data sharing to understand and reduce uncertainty about potential environmental effects of MRE development. Both organizations address issues that are challenging to the siting and permitting/consenting of wave and tidal projects. Annex IV and ORJIP Ocean Energy plan to jointly develop and share strategic research needs and identify data gaps on environmental effects; to seek opportunities to convene expert groups and consultation processes to address environmental effects and reduce consenting/... **Read More**

Are Larvae and other Planktonic Organisms at Risk from Tidal Energy Development?

Posted By: Andrea Copping **On**: August 29, 2016 | 0 Comments
As tidal energy development ramps up in Europe and North America, questions have been raised about the potential for turbine blades to strike marine mammals, fish, and other marine organisms. Less attention has been paid to potential threats to smaller planktonic organisms such as the larvae of fish, lobster, and the zooplankton that spend their lives floating in moving ocean water. A small group of experts came together recently to explore whether larvae and zooplankton might be at risk from tidal turbines. Lobster and fish larvae are most commonly buoyant and distributed by tidal... **Read More**

Tidal Lagoons: Another Technique for Capturing Marine Renewable Energy

Posted By: Matthew Preisser **On**: July 06, 2016 | 0 Comments
The power of the tides can be harnessed either by placing turbines in the tidal stream or by taking advantage of the tidal range. The height difference between the high and low tides can be captured by the placement of a tidal barrage – effectively a dam like those used in rivers – across the mouth of an estuary or bay. Alternatively, the tidal range can be captured within a lagoon by building an encircling wall within a tidal bay or inlet. Key examples of tidal barrages include one developed at La Rance in Brittany (northern France) in 1966, or the placement of turbines in a causeway at... **Read More**

Are Fish Attracted to Marine Renewable Energy Devices?

Posted By: Andrea Copping **On**: June 02, 2016 | 0 Comments
Most people who spend time around the marine environment know that many species of fish are attracted to structures and hard surfaces in the ocean. Imagine tropical fish flocking to coral reefs, salmon hiding out under piers, and fish attracted to navigation buoys. The question has been posed as to whether fish will be attracted to marine energy devices placed in the ocean as well. And if they are attracted, could tidal and wave devices pose a threat to these fish or their prey? H. T. Harvey & Associates addressed this question in a 2015 report in which they evaluated the potential... **Read More**

Environmental Effects of Marine Renewable Energy: Final State of Science Posted

Posted By: Nikki Sather **On**: April 25, 2016 | 0 Comments
The 2016 final report on environmental effects of marine renewable energy (MRE) around the world has been released by the Annex IV initiative. The 2016 State of the Science report was developed under the auspices of the 13 nations

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Peer Review of *Tethys*

- We do peer review every year to:
  - Ensure that the content of *Tethys* remains useful to our community
  - To examine the functionality of *Tethys* for the uses requested
  - To gather any missing papers or reports
  - To help introduce *Tethys* to additional users
- Adding up to: maintaining *Tethys* as the premier international site for finding information on environmental effects of MRE, and as the first stop for finding useful outreach engagement.
- 2017 Peer Review
  - Strictly run off Survey Monkey
  - Link to survey went out by email yesterday (January 11th)
  - Survey results due February 10th
  - Results will be collated and presented, used to focus changes, additions to *Tethys*

Meeting Times

- Try to set up a standing Annex IV meeting
- Perhaps same time and day, every other month
- Doodle poll will be coming soon

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