Report 2021

Task 34

Silver-haired bat *(Photo Credit: Cris Hein)*

Working Together to Resolve Environmental Effects of Wind Energy (WREN)

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Reducing the impact of wind energy development on wildlife requires scientifically robust, cost-effective solutions to inform sound wind siting, construction, operations, and decommissioning decisions.

THE GLOBAL NATURE of the wind energy industry, combined with the understanding that many affected species cross jurisdictional boundaries, highlights the need to collaborate internationally. WREN facilitates international cooperation to advance global understanding of the environmental effects of land-based and offshore wind energy development and creates a shared knowledge base of recommended practices for monitoring and mitigation strategies that meet both conservation and wind power generation goals.

In 2021, WREN published a technical report entitled "Cumulative Effects Analysis for Wind Energy Development: Current Practices, Challenges, and Opportunities". WREN conducted a horizon scan of the international wind energy and wildlife community to assess key topics and environmental issues over the next 5–10 years.

Table 1. Countries Participating in Task 34

	COUNTRY/SPONSOR	INSTITUTION(S)
1	**Belgium**	Royal Belgian Institute of Natural Sciences
2	**Canada**	Environment and Climate Change Canada
3	**France**	France Energies Marines
4	**Ireland**	EcoSource Consulting
5	**Italy**	Italian National Agency for New Technologies Energy and Sustainable Economic Development
6	**The Netherlands**	Rijkswaterstaat
7	**Norway**	Norwegian Institute for Nature Research
8	**Portugal**	STRIX; Bioinsight
9	**Spain**	Spanish Council for Scientific Research
10	**Sweden**	Vindval; Swedish Energy Agency
11	**Switzerland**	Nateco AG
12	**United Kingdom**	Marine Scotland Science
13	**United States**	U.S. Department of Energy; Pacific Northwest National Laboratory; National Renewable Energy Laboratory

A manuscript of the results entitled "International Assessment of Priority Environmental Issues for Land-based and Offshore Wind Energy Development" was submitted to the journal Global Sustainability. WREN supports the management of the Tethys knowledge base (https://tethys.pnnl.gov), which serves as a collaborative outreach and engagement platform to disseminate the latest research. WREN also published several fact sheets, developed a web-based tool summarizing the research status of monitoring and minimization technologies, and hosted a forum with subject matter experts on raptor collision risk with wind turbines.

Introduction

Environmental impacts associated with commercial land-based and offshore wind energy can delay construction or curtail operations. In response to these ongoing concerns, the International Energy Agency (IEA) Wind Technology Collaboration Programme WREN in October 2012. WREN serves as an international forum providing relevant, scientific data for government agencies, private industry, conservation organizations, and academia to inform siting and operational decisions. To help accomplish this, WREN conducts engagement and outreach activities to key stakeholder groups and develops state-of-the-science materials, including webinars, short science summaries, and publications. Specifically, WREN's goals are to:

Identify key stressors (e.g., noise or collision) and receptors (e.g., marine mammals or birds), relevant methodologies and technologies used in species impact assessment studies, and recommended practices,

Collect and analyse data on high-priority issues, and coordinate among international collaborators to disseminate information to critical stakeholders across sectors, and ensure the global community has access to the latest information on the technical readiness of existing monitoring and mitigation technologies.

Progress and Achievements

WREN published a technical report entitled "Cumulative Effects Analysis for Wind Energy Development: Current Practices, Challenges, and Opportunities" [1]. WREN conducted a horizon scan of the international wind energy and wildlife community regarding the priority issues related to environmental effects of land-based

and offshore wind energy within the next 5–10 years. We received a total of 294 responses from 28 countries. For land-based wind energy, the highest number of responses identified wind turbine collision risk to birds, followed by collision risk to bats. For offshore wind energy, the highest number of responses identified seabird collision risk, underwater noise for marine mammals, and displacement for birds.

WREN published 4 fact sheets summarizing the current state of the science on specific topics.

- European Grouse and Wind Energy Development [2]
- European Migratory Soaring Birds and Wind Energy Development [3]
- White Storks in Europe and Onshore Wind Energy [4]
- Offshore Wind Farms as Stepping Stones for Non-indigenous Species [5]

WREN continues to manage the Tethys website (https://tethys.pnnl.gov), which provides key contacts, archives webinars, aggregates available literature and displays a calendar of upcoming events. Highlights include:

- 732 New documents (publications, reports, presentations) added to the knowledge base
- 469,560 Page views for Tethys
- 2,241 Page views for the WREN webpage

Highlight

The Gill and Hein (2022) technical report on cumulative effect analysis (CEA) examines existing legislation in the United States and Europe and the challenges and opportunities for implementing CEAs. The increasing global deployment of wind energy has given rise to concerns about potential adverse effects on certain wildlife species and habitats. Several countries use environmental impact assessments to evaluate the environmental effects of wind energy to inform planning, siting, and operational processes. A key component of environmental impact assessments is the cumulative effects analysis (CEA). CEAs consider the effects of a proposed development in the context of past, present, and future developments. However, practitioners have struggled to implement cost-effective and consistent processes for CEAS.

Moreover, there is no widely accepted scientific method to assess cumulative effects. The report highlights the need to develop recommended practices and consistent terminology, collect and disseminate baseline data, and integrate regional and project-level analysis to streamline CEAS. In addition, the report discusses the challenges that affect costs and timelines for wind energy development. Updating existing practices to align with the current recommended practices will provide opportunities to address these challenges.

Horizon scan banner *(Source: NREL)*

Outcomes and Significance

International collaboration is essential to understand how the global deployment of wind energy impacts species and habitats that cross jurisdictional boundaries. WREN's approach is to leverage research and incorporate perspectives to enhance our global knowledge base. The outreach and engagement activities are designed to:

1. Ensure research and recommended practices are broadly disseminated to accelerate wind energy deployment while protecting species,

2. Expand international engagement among WREN and non-WREN members, and

3. Create and maintain a global technology database as a reference for available monitoring and mitigating strategies.

This knowledge transfer among WREN member and non-member nations may assist in advancing wind energy development by decreasing the levelized cost of energy and impacts on the environment.

Next Steps

In 2022, WREN will release the technology tool on Tethys and continue to update it as new technologies become available. WREN will host an expert forum on technologies associated with monitoring and minimizing raptor collisions with wind turbines. Two publications are expected in the next year, a journal article summarizing the results of the horizon scan will be published in the journal Global Sustainability, and a fact sheet discussing barotrauma in bats.

References

[1] Gill, E., and C. Hein 2022. *Cumulative effects analysis for wind energy development: current practices, challenges, and opportunities. IEA Wind Technical Report.* https://tethys.pnnl.gov/publications/iea-wind-white-paper-cumulative-effects-analysis-wind-energy-development-current.

[2] Coppes, J., K. Bollmann, V. Braunisch, W. Fiedler, V. Grunschachner-Berger, P. Mollet, U. Nopp-Mayr, K. E. Schroth, I. Storch, and R. Suchant. *European grouse and wind energy development.* https://tethys.pnnl.gov/summaries/short-science-summary-european-grouse-wind-energy-development.

[3] Correia, S., and F. Canario. *European migratory soaring birds and wind energy development.* https://tethys.pnnl.gov/summaries/short-science-summary-european-migratory-soaring-birds-wind-energy-development.

[4] Münter, L., and M. Ferrer. *White storks in Europe onshore wind energy development.* https://tethys.pnnl.gov/summaries/short-science-summary-white-storks-europe-onshore-wind-energy.

[5] Rumes, B., and F. Kerckhof. *Offshore wind farms as stepping stones for non-indigenous species.* https://tethys.pnnl.gov/summaries/short-science-summary-offshore-wind-farms-stepping-stones-non-indigenous-species.

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