



**International Energy Agency (IEA)
Implementing Agreement for Co-operation in the Research and
Development of Wind Turbine Systems (IEA Wind)**

**Task 34 – WREN: Working Together to Resolve Environmental
Effects of Wind Energy**

Period: October 1, 2016 – September 30, 2020

~~June, 2017~~
May, 2018

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1 Scope

Wind energy continues to be deployed worldwide at a record pace as one of the solutions to comply with renewable energy policy targets. Questions about the impact of wind energy projects on wildlife can result in challenges for project development.

There continues to be a strong need to share lessons gained from field research, including management methods (e.g. adaptive management), wildlife monitoring methods, best practices, study results, and successful approaches to mitigating impacts and addressing cumulative effects. The global nature of the wind industry—combined with the understanding that many affected species cross national boundaries, and in many cases pass between continents—also points to the need to collaborate on a wide international level.

IEA Wind Task 34, known as WREN – Working Together to Resolve Environmental Effects of Wind Energy – is the leading international forum for supporting deployment of wind energy technology around the globe through a better understanding of environmental issues, efficient monitoring programs, and effective mitigation strategies. The scope of WREN is to facilitate an international collaboration that advances global understanding of the environmental effects of land-based and offshore wind energy development and creates a shared global knowledge base and community of practice around research, monitoring, and management, including good practice recommendations.

2 Introduction

Concerns for potential wildlife impacts resulting from land-based and offshore wind energy have created challenges for wind project development in WREN member countries. Because research results are not always readily accessible or satisfactorily advanced, decisions often have to be made based on the best available information, which may be missing key findings. For wind project opponents, the perceived high impacts to avian and bat species and marine mammals have been used as grounds to stop, downsize, or severely delay project development.

WREN was entered into force August 8, 2013 and has expanded from two member countries to its current membership of eleven countries.

3 Objectives and Expected Results

Concerns about environmental effects of wind energy continue to challenge the wide-scale deployment of land-based and offshore wind projects. WREN is the leading international forum for exchanging and disseminating up-to-date, science-based research and methods with which to assess and monitor the environmental effects of wind energy development. The Task efforts will compile and assess information from existing and proposed studies conducted by member and nonmember countries, as well as other information that is publicly available. Efforts that contribute to resolving conflict will continue to be pursued. These efforts include identifying the conflicts, the barriers, and strategies that are being adopted to resolve barriers.

The primary objective of WREN is to facilitate international collaboration to advance the global understanding of environmental effects of offshore and land-based wind energy development. Through the work packages in WREN, member representatives will contribute to advance the knowledge base to document what is known about the impacts of wind energy technology on wildlife and the environment. The strategy for accomplishing this objective is to use the shared global knowledge base and community of practice around research, monitoring, and management of the environmental effects of wind energy development compiled during the initial Task term and the resources and expertise of the member countries.

Expected results follow:

- Continued expansion of international collaboration and knowledge transfer including linking to efforts by other groups dealing with wind energy when appropriate. Such groups may include, but are not limited to, OSPAR Commission, International Council for the Exploration of the Seas (ICES), and Intergovernmental Fora.
- Dissemination of scientifically-based information and recommendations to government regulatory organizations, along with the research, wind development, and environmental communities, through a webinar series, development of one-page fact sheets and summaries of pertinent research findings, slide decks of relevant information, and other direct outreach approaches.
- Continued enhancement and maintenance of WREN Hub to facilitate easy access to existing literature and relevant information on the effects of wind development on wildlife and habitats at a global scale.
- Continued development and publication of white papers that focus on and advance the state of understanding on central issues of global concern within the wind community.

4 Approach and Methodologies

WREN efforts will focus on four work packages. Individual organization contributions will vary depending on interests and/or expertise.

WP1: Development of white papers

Description: Numerous topics are of interest to WREN members but information is not readily available within the existing literature that is useful to meet the member country information needs. White papers, which focus and facilitate discussion on and advance the state of understanding of global concerns within the wind community, are key products of WREN. White paper topics identified during the initial Task term include: adaptive management, individual effects to population-level impacts, cumulative impacts, transboundary collaboration, “green versus green” (e.g. balancing the local effects of a wind facility on sensitive species against its global benefits such as CO₂ emission reduction), and environmental risk-based management. The adaptive management technical paper was published November 2016. Three other topics – individual effects to population-level impacts, green versus green, and environmental risk based management – are in various stages of completion. An outline for the remaining paper (cumulative impacts) was also developed in the initial phase. An ‘individual effects to population-level impacts’ manuscript has been submitted to a peer review journal. This manuscript will also be the basis for an expanded white paper that extends the discussion of individual effects to population-level impacts to focus on cumulative impacts, integrating the

science with policy considerations. During the current phase, the white paper topics listed above will be completed. In addition, a paper discussing the interrelationships of these topics will be developed.

Approach: The white papers are developed by international writing teams. Members self-select white paper topics on which they wish to work based on their respective interest and expertise. For each topic, an outline and annotated bibliography has or will be developed, and a small writing team identified.

Full drafts of the white paper are reviewed by a group of experts that are identified by the writing teams. WREN members are asked to review the draft final documents and provide feedback to the writing teams, which are addressed in the next draft. Ultimately, final white papers are published as IEA Wind technical papers.

Deliverable(s)

- Manuscript on Individual Effects to Population-level Impacts submitted to journal; published
- White paper expanding the topic of individual effects to population-level impacts to focus on cumulative impacts
- White paper on environmental risk-based management
- White paper on Green versus Green
- White paper describing the interrelationship of all the topics

Project Lead:

- Norway and UK (manuscript on individual effects to population-level impacts)
- Netherlands (cumulative impacts)
- U.S. (environmental risk-based management)
- Sweden (green versus green)
- TBD (interrelationships)

Participants:

- Writing Team for individual effects to population-level impacts journal manuscript: Norway, Switzerland, United Kingdom
Reviewers: France, Ireland, Netherlands, Portugal, Spain, Sweden, United States
- Writing team for cumulative impacts: Netherlands, Spain, Sweden, United Kingdom
Reviewers: France, Ireland, Norway, Portugal, Switzerland, United States
- Writing team for environmental risk-based management: Spain, United States, United Kingdom, Portugal, Norway, others to be determined
Reviewers: France, Ireland, Netherlands, Sweden, Switzerland
- Writing team for Green versus Green: Spain, Sweden, Switzerland, United Kingdom
Reviewers: France, Ireland, Netherlands, Norway, Portugal, United States
- Writing team (interrelationship paper): To be determined

WP2: Expanding Content of WREN Hub

Description: WREN Hub was developed as a dedicated, publicly available, centralized knowledge management system providing easy access to existing information pertaining to wind-wildlife issues for both offshore and land-based wind energy. Built on the existing Tethys

platform (<http://tethys.pnnl.gov>), WREN Hub serves as a go-to location to facilitate collaboration within the international community on wind-environmental issues. The Hub is intended to foster international collaboration through a variety of channels. As a centralized location for the collection and access to knowledge on land-based and offshore wind energy regulatory structures, environmental effects, effective monitoring practices and strategies for impact avoidance, minimization, mitigation, and compensation, and other relevant information and research being conducted around the world, WREN Hub provides access to as much relevant information as possible. To continue to be useful, WREN Hub will be enhanced and updated on a regular basis, increasing the functionality as deemed appropriate and expanding the inclusion of relevant materials.

In addition to providing access to relevant literature and products developed within WREN, WREN Hub also provides information on key contacts, calendar of events, and other social media outreach forums as deemed appropriate. Components of WREN Hub (Figure 1) will continue to be updated and expanded during the extension term of this Task.

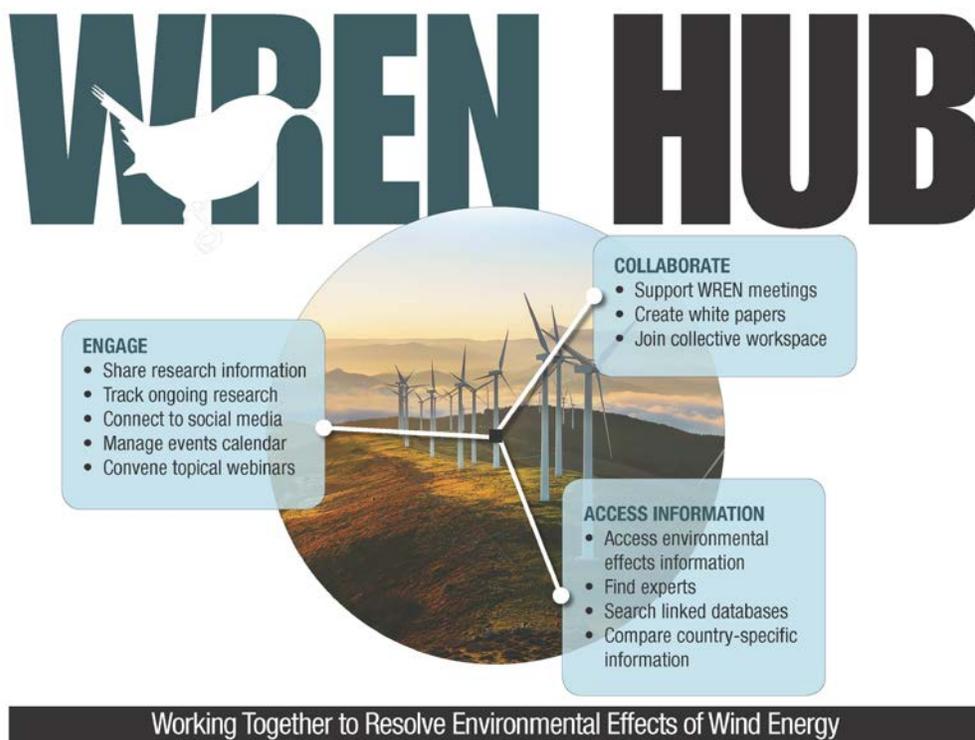


Figure 1: WREN Hub components

Approach: Expansion and enhancements to WREN Hub will consist of the following elements:

- Continual updates and additions of new papers and other media as they become available.
- Enhancements to WREN Hub functionality, as appropriate.
- Expansion and utilization of community functions of WREN Hub through links to and from external sites, commenting ability, and engagement with ongoing functions such as webinars, minor use of social media, etc.

- Review of WREN Hub by WREN member representatives and other experts and integration of suggested improvements as deemed appropriate
- Annual or bi-annual peer review of WREN Hub content and functionality by WREN members and other experts, consistent with the approach utilized in the initial phase.
- Address gaps identified by the peer review as deemed appropriate.

Deliverable(s):

- Curated and expanded collection of papers, reports, and other media on WREN Hub.
- Quarterly and annual metrics on use of WREN Hub through Google analytics and other sources, designed to indicate continued expansion and use of WREN Hub.
- Increased functionality throughout WREN Hub knowledge base, including improved searches, filters, and tags.
- Results of annual peer review and actions taken to address peer review comments.

Project Lead: United States (Pacific Northwest National Laboratory)

Participants: Canada, France, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

WP3: Short Science Summaries

Description: This effort is a focused outreach strategy, primarily based on the development of short summaries (one-pagers) of key results. Topics will likely include findings as discussed in the white papers and syntheses of scientific results. The summaries will be focused on wind and wildlife effects, controversies, and applications or implications for management. These will be available on WREN Hub for distribution to decision makers and other audiences. The intent of these shorter documents is to facilitate easier access to information and provide brief overviews of key findings. Syntopical briefings will also be developed as appropriate. The format of these summaries will provide the reader with what is known and what is not known about specific interactions.

Approach: WREN members will identify topics that are appropriate for synthesis, review existing sources, and develop the documents. WREN members will engage subject matter experts before developing syntheses to ensure that other suitable products do not already exist (for example, some one-page fact sheets developed by the National Wind Coordinating Collaborative may simply be posted on WREN Hub). One to two-page summaries will be developed as the major outreach mechanism. A template for the document layout will be developed to ensure that all summaries follow a consistent and accessible format and are branded visually as WREN products. These summaries will be translated and adapted, as needed, for dissemination to meet specific country needs.

Deliverables:

One or more summaries will be developed and disseminated on key topics, each year.

Project Lead:

The synthesis and outreach product development will be dependent on the topic and the relative importance of that topic to specific WREN member nations.

Participants:

All WREN members will engage with the review of each topic; development of the syntheses and summaries will be dependent on the importance of the topic to each WREN member nation.

WP4: Outreach and Engagement

Description: Reaching the goals of WREN requires that an active outreach and engagement process be followed. Based on the draft outreach and engagement plan, specific audiences and the messages they ought to receive will be determined and specific existing outreach vehicles and products will continue to be deployed. In addition, new products and methods of engaging and reaching audiences will be developed. Key existing activities that will continue include: the WREN webinar series; *Tethys Blasts*; *Tethys Stories*; and presentations by WREN members at key conferences and workshops. An outreach strategy for dissemination of the white papers (WP1) and the one-page summaries (WP3) will be developed and executed. All WREN members will identify opportunities to be ambassadors for WREN, to craft WREN outreach materials for key audiences in their nations and share opportunities to spread WREN materials and messages internationally.

Approach: Outreach and engagement activities will continue throughout this phase. Specifically, activities will include:

- Increased outreach to expand knowledge and use of WREN Hub, through: linkages to other websites; printed materials that prominently display the WREN Hub URL; and, presentations on the content and value of WREN Hub at key conferences, workshops, and meetings.
- Webinars to disseminate information to the research community, wind development community, environmental community, and government regulation organizations. WREN will continue to host two to four webinars each year. Topics will vary, covering both land-based and offshore applications, species focus, tools and models, and other relevant topics. Speakers will be comprised of experts in their fields from across the international community and will not be limited to members only. Webinars will be recorded and posted on WREN Hub for future reference, along with copies of presentations, where feasible. Notifications on upcoming webinars, for electronic distribution within countries, will also be developed.
- WREN members will identify conference or meeting opportunities where they can share information on WREN and its activities. Where appropriate, members will submit abstracts to relevant conferences, including but not limited to: the National Wind Coordinating Collaborative bi-annual wind research meeting (U.S.) and the Conference on Wind Energy and Wildlife Impacts bi-annual wind research meeting (Europe).
- Specific outreach materials will be developed and provided on WREN Hub for use by a wide range of stakeholders. Products are likely to include one-pagers summarizing the white papers, fact sheets, and slide decks on relevant topics.
- WREN members will identify opportunities to convene Expert Forums on specific research questions. These forums will be structured as mini-working groups, by invitation only, and, if possible, will be recorded and posted on WREN Hub. WREN may also develop an outreach activity or forum that engages regulators, which could be facilitated through the webinar series.
- WREN members will write *Tethys Stories* to be posted on the front page of *Tethys* to alert readers to new developments in wind and wildlife. Topics will be suggested by individual WREN members or determined by the members jointly. WREN will provide approximately one *Tethys Story* per quarter.

- Appropriate wind and wildlife material will be included in the biweekly *Tethys Blast* to notify users of new papers on wind and wildlife on *Tethys* and to make key announcements, such as upcoming WREN webinars.
- Where possible, WREN members will work with the media to get press coverage for the work of WREN.
- WREN members will serve as ambassadors, utilizing internal networks to disseminate information about product publications, upcoming events, and other pertinent information. Materials will be translated as determined by member representatives.
- When possible, WREN meetings will be scheduled to co-locate with international conferences on wind energy and wildlife to learn from each other, coordinate discussions with other experts, and facilitate dissemination of WREN-related information.

Deliverable(s):

- At least one presentation pertaining to WREN will be carried out by a WREN member at a conference or meeting each year.
- Two to four webinars will be hosted each year.
- Notifications on upcoming webinars will be developed and circulated.
- One-page summaries will be developed for each published white paper (WP1) and for the syntheses of important science topics (WP3).
- *Tethys Stories* will be developed and posted.
- At least one Expert Forum will be held each year

Project Lead:

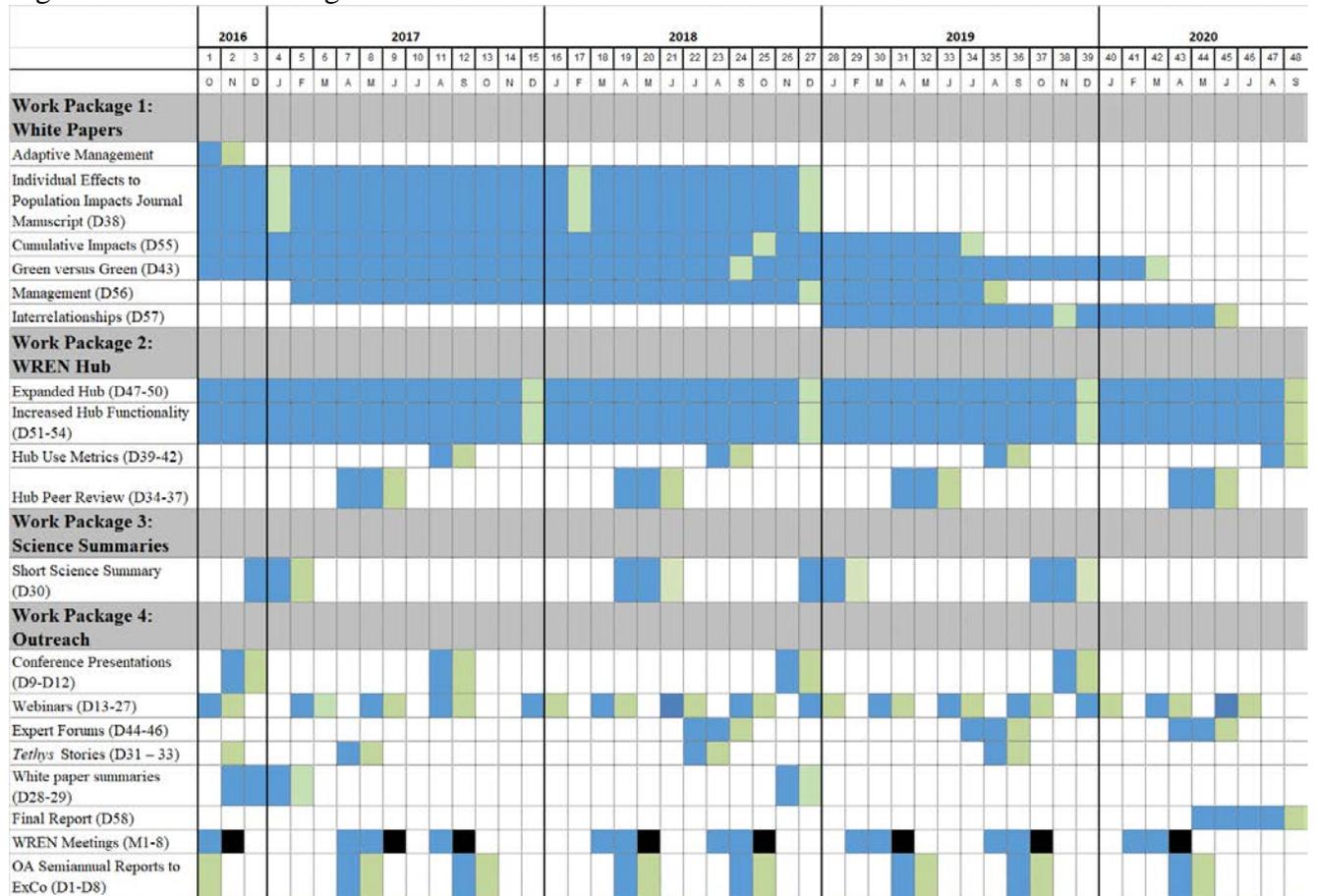
United States

Participants: Canada, France, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

5 Chronogram and Key Dates

The timeline for completing the second term of WREN activities is presented in Figure 2.

Figure 2. WREN Chronogram



Milestones (M) – black; Deliverables (D) – green; Progress – blue

6 Reports, Deliverables, and Dissemination of Results

WREN will work to bring together experts to exchange information and experience in the areas covered by this Task. The wind research community has always had difficulties incorporating project developers, and in many ways regulatory organizations, even though these sectors will likely gain the most from the information resulting from this work. The WREN team will implement concrete communication tools, such as thematic workshops, peer-review processes, and conference calls, among others, to make sure that the necessary exchanges take place and that outcomes from the Task efforts have broad usability. Papers will be published by one or more of the participating agencies as formal peer-reviewed technical reports. Outcomes will be publicly available on WREN Hub. In addition, findings will be presented at international conferences and meetings, and in scientific journals, if appropriate. Webinars and direct outreach to government regulatory organizations, along with the research, wind development, and environmental communities, will be conducted when appropriate. Table 1 summarizes WREN deliverables.

Table 1. Deliverables

Number	Deliverable	Lead Organization	Month Due
completed	Adaptive Management Technical Report	US, UK, NO, DE	2
D-1– D-8	Semiannual progress reports to the Executive Committee	US (OA)	1,8,13, 20, 25, 32, 37, 44
D-9 – D-12	Conference presentations	D-9: NWCC – NL, SE, US; International Workshop – US D-10: CWW – NL, NO, PT, UK, US	3, 12, 27, 39
D-13 – D-27	Webinar Series	US (PNNL/NREL)	2,6,9,12,16,19,22,25, 28,31,34,37,40,43,46
D-28 – D-29	One page summarizes that synthesize white papers (beginning with Adaptive Management)	US	5, 27, and ongoing
D-30	One page summaries that synthesize key science topics (short science summaries)	To be determined	5, 21, 29, 39
D-31 – D-33	<i>Tethys</i> Stories	PNNL	2, 8, 23, 36
D-34 – D-37	Annual peer review of WREN Hub	PNNL	9, 21, 33, 45
D-38	Manuscript on individual effects to population-level impacts submitted to journal	nateco AG; NINA; Marine Scotland Science, Marine Laboratory	4, 17, 27
D-39 – D-42	WREN Hub – annual use metrics	PNNL	12, 24, 36, 48
D-43	White paper on Green versus Green	Swedish Energy Agency	24,42
D-44 – D-46	Expert Forums	To be determined	24,36, 45
D-47 – D-50	WREN Hub – expanded content	PNNL	15, 27, 39, 48
D-51 – D-54	WREN Hub – increased functionality	PNNL	15, 27, 39, 48
D-55	White paper on cumulative impacts	NL	25,34
D-56	White paper on Risk Management	PNNL; NREL	27,35
D-57	White paper on Interrelationships of white paper topics	To be determined	45
D-58	Final IEA Wind Task 34 report	OA	48

Notes: OA – Operating Agent

7 Methods of Review and Evaluation of the Work Progress

At least every six months the Operating Agent will consult each project Participant on the progress made in relation to the plan. Based on input from these regular consultations, the Operating Agent will prepare a status report that summarizes the progress of the Task work plan and budget plan and deliver it to the IEA Wind Executive Committee.

The milestones include the planned meetings, indicating all planned Participants expect to be engaged. These in-person meetings will be held twice a year (see Figure 3). At these meetings, the Participants will evaluate progress in relation to the work plan and may propose changes as needed. Table 2 summarizes the planned virtual and in-person meetings.

Table 2: Milestones for planned meetings

Number	Milestone	Contributors	Month Due
VM-1	WREN conference call	UK, US	November 16, 2016
M-1	In-person meeting #1 (co-located with NWCC Research Meeting in Broomfield, CO, US)	IE, NL, SE, CH, UK, US	November 28 – 29, 2016
VM-2	WREN conference call	CA,IE,PT,CH, UK, US	March 17, 2017
M-2	In-person meeting #2 - Sweden	IE,NL,NO, PT,SE, CH, UK, US	June 13 – 14, 2017
M-3	In-person meeting #3 (co-locate with CWW meeting in Lisbon, Portugal)	IE, NL, NO, PT, SE, CH, UK, US	September 4 – 5, 2017
VM-3	WREN conference call	CA, IE, NL, PT, ES, SE, CH, UK, US	January 8, 2018
VM-4	WREN conference call	CA, IE, NL, NO, PT, SE, CH, UK, US	April 11, 2018
M-4	In-person meeting #4 – Netherlands	All	May 23 – 25, 2018
VM-5	WREN conference call	All	2018-July
VM-6	WREN conference call	All	2018-August
M-5	In-person meeting #5 – Spain	All	2018-October
VM-7	WREN conference call	All	2018-December
VM-8	WREN conference call	All	2019-March
M-6	In-person meeting #6 – host to be determined	All	Spring 2019
VM-9	WREN conference call	All	2019-June

VM-10	WREN conference call	All	2019-August
M-7	In-person meeting #7 – host to be determined	All	Fall 2019
VM-11	WREN conference call	All	2019-December
VM-12	WREN conference call	All	2020-March
M-8	In-person meeting #8 – host to be determined	All	Spring 2020
VM-13	WREN conference call	All	2020-June
VM-14	WREN conference call	All	2020-August

M: in-person meeting
VM: virtual meeting

8 Obligations and Responsibilities

The success of WREN is directly attributable to the collaborative nature of the Task and the contributions of all Participants. The general obligations and responsibilities of the Operating Agent and Participants are described in this section.

The products developed through this Task are available equally to all Participants; final products will be posted to WREN Hub. While in development, products of this Task will not be available externally until the Task is complete or until all Participants agree to their dissemination. New entrants will be encouraged throughout the Task and will be obligated to contribute to specific activities as identified after they have joined. Participants who wish to withdraw from this Task after it begins will be obligated to complete contributions to which they committed for the year in which they wish to withdraw.

Operating Agent:

In addition to the requirements outlined in Article 5 of the IEA wind agreement, the Operating Agent shall:

- Prepare a detailed program of work in cooperation with the other Participants and submit for approval by the Executive Committee

- Coordinate work of the Participants (e.g., meetings, reports, website)
- Enforce the agreed-on schedules for work to be done, as well as deliverables
- Report each year to the Executive Committee on the progress and results of the work performed under the program of work
- Provide input to the annual IEA wind report
- Keep the Executive Committee secretary informed of planned meetings so they can be listed on the Executive Committee calendar
- Arrange for a public Web presence for the Task strategy and results either on IEAWind.org or a site that can be linked to or from IEAWind.org
- Provide the Executive Committee with a final report summarizing the findings of the Task for the Committee's approval and transmittal to the agency within six months after all work defined in the work program is complete.

The responsibilities of the Operating Agent relate to the international cooperation in Task 34. The Operating Agent shall not be liable for the national efforts of the Participants even if the national efforts are in relation to the Task 34.

Participants

In addition to any obligations listed in the IEA wind agreement, the project Participants will adhere to the following obligations and responsibilities:

- Each Participant shall bear its own cost for the scientific work, including travel expenses.
- The host country shall bear the costs of workshops and meetings of experts.
- Each Participant shall submit presentation materials and reports presented at the Task meetings to the Operating Agent for posting on the Task website. The Participants shall agree on the format of these materials.
- Each Participant will contribute to editing and reviewing Task 34 products—as determined by the Participants—along with the Task final report.

In addition to the activities described in the work packages in Section 4, each participating country is conducting related work. The planned effort from each participating country is estimated in Table 3. The column “Task 34 (WREN) Effort” indicates the effort taken specifically for this Task. The column “Related Projects” indicates the effort for related work that will partly support this Task. The current Task term began October 1, 2016, and will conclude on September 30, 2020.

Table 3. Planned effort (in FTE months) for each Participant for each year

	Task 34 (WREN) Effort					Related Projects*					Total Effort				
Country ^a	Start: 01.10 2016	2017	2018	2019	End: 30.09 2020	Start: 01.10 2016	2017	2018	2019	End: 30.09 2020	Start: 01.10 2016	2017	2018	2019	End: 30.09 2020
Canada	N/A	TBD	TBD	TBD	TBD	N/A	TBD	TBD	TBD	TBD	N/A	TBD	TBD	TBD	TBD
France	0.5	1.5	1.5	1.5	1	30	110	110	110	80	30.5	111.5	111.5	111.5	81
Ireland	.13	0.52	0.52	0.52	.39	315	900	900	900	900	315.13	900.52	900.52	900.52	900.39
Netherlands	2	3	3	2.5	2.5	110	110	110	110	110	112	113	113	112.5	112.5
Norway	1.5	1.5	1.5	1.5	1.5	1	1	0	0	0	2.5	2.5	1.5	1.5	1.5
Portugal	0.1	1.4	1.3	1.3	1.2	55	100	100	100	61	55.1	101.4	101.3	101.3	62.2
Spain	0.2	1.5	1.5	1.5	1	5	20	20	20	15	5.2	21.5	21.5	21.5	16
Sweden	.375	1.5	1.5	1.5	1.125	6.75	27	27	27	20.25	7.125	28.5	28.5	28.5	21.375
Switzerland ^b	0.5	N/A	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	1.5	N/A	N/A	N/A	N/A
United Kingdom	0.5	1.5	1.5	1.5	1.0	50	150	150	150	100	50.5	151.5	151.5	151.5	101
United States ^c	1.8	7.2	7.2	7.2	5.4	30	120	120	120	90	31.8	127.2	127.2	127.2	95.4
Total ^d	7.605	18.12	18.02	17.52	15.115	593.75	1538	1537	1537	1376.25	611.355	1557.62	1556.52	1555.52	1391.365

^a Participating countries are asked to commit at least 20 hours/month of labor. This effort is spread across all four work packages. In addition, members must pay own travel costs to two in-person meetings each year.

^b Out-year data not available as determination to continue is task has not been made.

^c Operating Agent labor costs are reflected separately in Table 4. U.S. estimate will be updated as more information becomes available under new federal administration.

^d Total will be completed once input has been received from all countries.

* related project values are approximate estimates reflecting the fact that a large number of disparate government organizations work on projects that are related to the Task 34 effort.

9 Types of Funding and Operating Agent

The current research Tasks are all Task-shared, where the work is shared among the countries. The Operating Agent acts as the coordinator of the research Task. Each Participant shall bear their own costs for carrying out the agreed-on Task work package, including travel-related

expenses for participating in two in-person meetings each year. The host country for in-person meetings shall bear the costs of workshops and meetings convened in conjunction with this Task.

The Operating Agent is Karin Sinclair of NREL (15013 Denver West Parkway, MS 3811, Golden, CO, USA, 80401; Karin.sinclair@nrel.gov). The costs of the Operating Agent will be borne by the USDOE, dependent on funding availability, throughout time extension period.

10 Budget Plan

The total estimated cost of the Operating Agent for coordination, management, and reporting is \$360,000 over a four-year period. This Task, however, shall operate without a common fund because the Operating Agent expenses will be covered by United States Department of Energy (pending annual fiscal year funding availability) during the period (October 2016–September 2020). Table 4 shows the estimated costs for Operating Agent activities, which include coordination, management, reporting, and travel.

Table 4. Estimated costs for Operating Agent activities

Costs

Costs (in USD)	Yearly Budget	Actual Costs (per year)
Labor	\$75,000	
Travel	\$13,500	
Other costs	\$ 1,500	
Total	\$90,000	

Revenues

Country Revenues	Invoiced (per year)	Actual Received (year)
Country		
N/A	N/A	N/A
Total (USD)	\$0	\$0

11 Management of the Task

The management of WREN shall be consistent with other IEA Wind Tasks, with the Operating Agent taking a key role in organizing and coordinating meetings, circulating the agenda, providing meeting notes, and supporting the coordination of Task-specific documents and outputs. The Operating Agent may subcontract some of the specific activities of this work to other organizations or Task members, but remains ultimately responsible for the completion of the activities described.

12 Organization

See work plan in Section 4.

13 Information and Intellectual Property

Executive Committee's Powers. The publication, distribution, handling, protection and ownership of information and intellectual property arising from activities conducted under this Task, and rules and procedures related thereto shall be determined by the Executive Committee, acting by unanimity, in conformity with the Agreement.

Right to Publish. Subject only to copyright restrictions, the Task Participants shall have the right to publish all information provided to or arising from this Task except proprietary information.

Proprietary Information. The Operating Agent and the Task Participants shall take all necessary measures in accordance with this paragraph, the laws of their respective countries and international law to protect proprietary information provided to or arising from the Task. For the purposes of this Task, proprietary information shall mean information of a confidential nature, such as trade secrets and know-how (for example computer programs, design procedures and techniques, chemical composition of materials, or manufacturing methods, processes, or treatments) which is appropriately marked, provided such information:

- (a) Is not generally known or publicly available from other sources;
- (b) Has not previously been made available by the owner to others without obligation concerning its confidentiality; and
- (c) Is not already in the possession of the recipient Participant without obligation concerning its confidentiality.

It shall be the responsibility of each Participant supplying proprietary information, and of the Operating Agent for arising proprietary information, to identify the information as such and to ensure that it is appropriately marked.

Use of Confidential Information. If a Participant has access to confidential information which would be useful to the Operating Agent in conducting studies, assessments, analyses, or evaluations, such information may be communicated to the Operating Agent but shall not become part of reports or other documentation, nor be communicated to the other Participants except as may be agreed between the Operating Agent and the Participant which supplies such information.

Acquisition of Information for the Task. Each Participant shall inform the other Participants and the Operating Agent of the existence of information that can be of value for the Task, but which is not freely available, and the Participant shall endeavor to make the information available to the Task under reasonable conditions.

Reports of Work Performed under the Task. Each Participant and the Operating Agent shall provide reports of all work performed under the Task and the results thereof, including studies, assessments, analyses, evaluations and other documentation, but excluding proprietary information, to the other Participants. Reports summarizing the work performed and the results thereof shall be prepared by the Operating Agent and forwarded to the Executive Committee.

Arising Inventions. Inventions made or conceived in the course of or under the Task (arising inventions) shall be identified promptly and reported to the Operating Agent. Information regarding inventions on which patent protection is to be obtained shall not be published or publicly disclosed by the Operating Agent or the Participants until a patent application has been filed in any of the countries of the Participants, provided, however, that this restriction on publication or disclosure shall not extend beyond six months from the date of reporting the invention. It shall be the responsibility of the Operating Agent to appropriately mark Task

reports that disclose inventions that have not been appropriately protected by the filing of a patent application.

Licensing of Arising Patents. Each Participant shall have the sole right to license its government and nationals of its country designated by it to use patents and patent applications arising from the Task in its country, and the Participants shall notify the other Participants of the terms of such licenses. Royalties obtained by such licensing shall be the property of the Participant.

Copyright. The Operating Agent may take appropriate measures necessary to protect copyrightable material generated under the Task. Copyrights obtained shall be held for the benefit of the Task Participants, provided however, that the Task Participants may reproduce and distribute such material, but shall not publish it with a view to profit, except as otherwise directed by the Executive Committee, acting by unanimity.

Inventors and Authors. Each Task Participant will, without prejudice to any rights of inventors or authors under its national laws, take necessary steps to provide the co-operation from its inventors and authors required to carry out the provision of this paragraph. Each Task Participant will assume the responsibility to pay awards or compensation required to be paid to its employees according to the law of its country.

14 List of Participants

WREN Participants are shown in Table 5.

Table 5. WREN (Task 34) Participants

	Country	Lead Participant	Organization	Commitment	Contact Email
1	Canada	Ryan Zimmerling	Environment and Climate Change Canada	Yes	ryan.zimmerling@canada.ca
2	France	Jean-Philippe Pagot	EDF R&D	Yes	jean-philippe.pagot@edf-en.com
3	Ireland	Oonagh Duggan	BirdWatch Ireland	Yes	oduggan@birdwatchireland.ie
4	Netherlands	Marijke Warnas	Rijkswaterstaat	Yes	marijke.warnas@rws.nl
5	Norway	Roel May	Norwegian Institute for Nature Research	Yes	roel.may@nina.no
6	Portugal	Miguel Repas Miguel Mascarenhas	STRIX Bio3	Yes	miguel.repas@strix.pt Miguel.m@bioinsight.pt
7	Spain	Miguel Ferrer	Spanish Council for	Yes	mferrer@ebd.csic.es manuela@ebd.csic.es

		Manuel de Lucas	Scientific Research		
8	Sweden	Åsa Elmqvist Annika Nilsson	Vindval Swedish Energy Agency	Yes	asa.elmqvist@arwenkonsult.se annika.nilsson@energimyndigheten.se
9	Switzerland	Muriel Perron	Nateco AG	Yes	murriel.perron@nateco.ch
10	United Kingdom	Finlay Bennet	Marine Scotland Science	Yes	Finlay.bennet@gov.scot
11	United States	Karin Sinclair Jocelyn Brown-Saracino Andrea Copping	NREL DOE PNNL	Yes	Karin.Sinclair@nrel.gov jocelyn.brown-saracino@ee.doe.gov andrea.copping@pnnl.gov