Testimony of Stu S. Webster, Director of Wind Development Permitting and Environmental, Iberdrola Renewables
On Behalf of the American Wind Energy Association
Before the Readiness Subcommittee of the House Armed Services Committee
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Introduction

Chairman Ortiz, Ranking Member Forbes, Members of the Subcommittee, I appreciate the opportunity to testify today on behalf of the American Wind Energy Association (AWEA). AWEA represents 2,500 member companies, including project developers, manufacturers, construction firms, transportation providers and others.

My name is Stu Webster. I am the Director of Permitting and Environmental for Iberdrola Renewables. Iberdrola Renewables, which is headquartered in Portland Oregon, is the second largest wind power generator in the United States with more than 3,600 MW in operation. We have operating wind power projects in more than a dozen states, including approximately 400 MW in Chairman Ortiz' District in Kenedy County.

Wind Energy and Military Operations Can and Must Co-Exist

Wind energy is a critical national resource. It is domestic, inexhaustible, clean, and affordable. Wind energy is important for our national security, energy security and economic security, as reinforced in the 2010 Quadrennial Defense Review Report. But, if we don't have a better system for engaging with federal agencies on radar and airspace issues, including improved transparency with respect to DOD analysis on impacts and the ability to discuss potential mitigation, then wind projects will continue to be imperiled and we will not be able to meet our nation's energy goals.

The wind energy industry recognizes that in some instances, depending on location, technology and radar mission, wind farms can impact military operations.

However, decades of experience in developing wind farms in the U.S. and around the world have demonstrated that wind turbines, radar, and military training can coexist.

The industry has been discussing with DOD, FAA, DOE, and NOAA for several years possible process improvements, including earlier engagement, and mitigation options. All parties seem motivated now to move beyond talking to implementing solutions. It is AWEA's hope that the ongoing White House interagency process facilitates implementation of these solutions.

For the most part, wind power projects proceed without objections from DOD or other Federal agencies. In instances when concerns are initially raised, most are resolved after discussions between developers and DOD. However, as the demand for renewable energy grows, there is a resource strain on reviewing agencies and concerns raised are impacting the ability of wind energy projects to be completed in a timely manner.

Mitigation Opportunities, Need for Research and Development

What makes this issue so complicated is that due to the variety of radars, missions and airspace needs, there is not a silver bullet solution that can solve every potential impact.

As detailed in the appendices in my written testimony, there are many technical mitigation measures. Some of these are available today.

For example, replacing older radars - roughly 80% of the nation's radars are from the 1950's-1980's[1] - or upgrading software in existing radars has been shown to address concerns and accommodate additional wind energy development. This was done at Travis Air Force Base in California. And recently, the U.K. government and industry announced the purchase of a TPS-77 long-range radar that can distinguish between aircraft and wind farms, which will free up 3,000 MWs of wind projects.

Further, many of these solutions can be achieved at relatively low cost. A gap filling radar that cost just $250,000 allowed hundreds of additional megawatts of wind in Scotland with no decreased levels of detection at the radar.

In other cases, more research is necessary. For example, there has been promising research on stealth composite blades, but the technology is not yet validated for U.S. radar systems. Federal investment in mitigation R&D needs to be increased to validate mitigation options. The goal should be to have as many mitigation options as possible, creating a toolbox from which different solutions can be pulled depending on the factors at a given location.

Comments on Language Proposed in FY11 National Defense Authorization Act

Finally, I want to briefly comment on the specific language in the House defense authorization bill.

Industry is generally supportive of the language to establish a single entity that will centralize the review of wind projects within DOD. This could improve transparency, consistency, and timeliness.

However, we have concerns with language proposing the establishment of military mission impact zones in which it would be difficult, if not impossible, to site wind farms. In my written testimony is a map with red/yellow/green areas. The red represents circles drawn around radar assets at 30 miles. The yellow is 30-90 miles. This type of mapping is a blunt tool that can put areas off-limits even if site specific analysis would show no problems. Because of the different kinds of radars, different missions, and varying terrain, among other factors, it would likely be unnecessarily restrictive to establish a one-size fits all rule for siting near a military asset.

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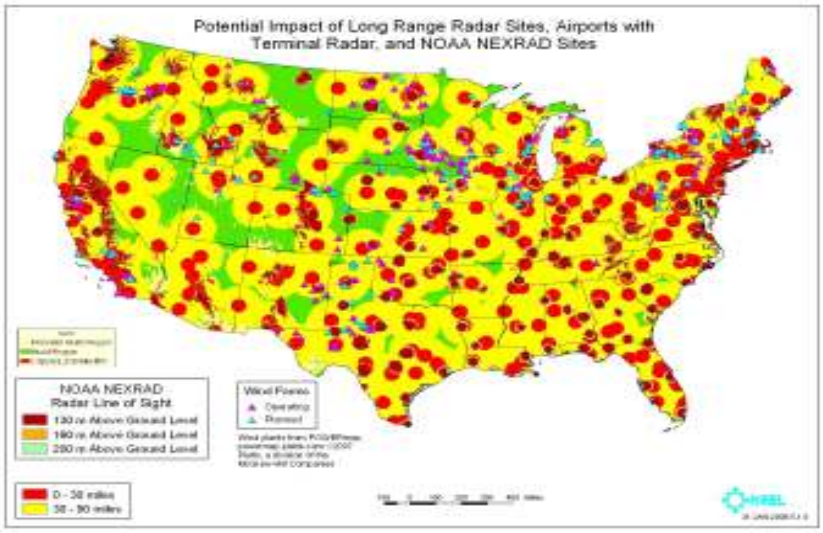
[1] JASON, Wind Farms and Radar, Report No. JSR-08-125, January 2008

In addition, there is no requirement in the language to balance national security needs with also critical energy security needs. Prior to designating a military impact zone, the Secretary of Defense should be required to seek public comment on the designation, release as many details justifying the designation as possible, explain the expected mission impact from the renewable energy development that led to the designation, and explain any changes to operations and technical mitigation options that the Department of Defense considered before making the designation.

Finally, AWEA urges the inclusion of provisions requiring DOD to consider mitigation options, such as radar upgrades and replacements, prior to opposing a wind project. And, there needs to be more federal investment in mitigation R&D. We need to solve the challenges the industry and DOD are facing and not just change how we talk about those challenges. These upgrades and replacements will have positive benefits to national security and air safety that reach well beyond the wind industry alone.



Conclusion and Recommendations

The growth necessary to achieve 20% or more of our nation's electricity from wind, which DOE has determined is feasible, is unlikely to be achieved without resolving radar and airspace concerns. And these concerns cannot be resolved without cooperation between the wind industry and federal agencies. To that end, AWEA recommends:

(1) Developing an improved process for consulting agencies earlier;
(2) Establishing a proactive plan for upgrading radars to benefit national security as well as accommodate additional wind energy deployment; and
(3) Investing in significant research and development.

Thank you again for the opportunity to testify today. I am happy to answer any questions you have.

Appendix 1.

Brief History of Engagement Between Wind Industry and Department of Defense

2005: Congress mandates DOD study wind/radar interactions

2006: DOD report focuses on characterizing technical merits of possible impacts but only for select group of radar type and mission.

- Report suggests not siting wind projects in radar line of sight as only current mitigation but represents clear commitment to conduct further research.

2005-07: So. CA regional DOD and wind industry representatives work towards developing an evaluation tool for areas of DOD interest (relative to potential non-compatibility with wind energy) – "Red-Yellow-Green map"

June 2007: FAA/DHS *Industry Button* on FAA website is launched for most long range radar systems. Other assets of concern (NEXRAD and DoD flight paths) are added over time.

October 2007: Sandia Nat'l Labs hosts large gathering of federal agencies and industry to discuss technical arguments concerning wind/radar impacts and tools to assess impacts.

November 2007: Idaho Nat'l Labs brings federal agencies and radar industry together to discuss impacts and brainstorm about R&D topics.

January 2008: DHS brings group of government and radar industry experts together to present to the JASONs. JASON report, JSR-08-125 "Wind Farms and Radar" released.

September 2008: FAA Competition for the Skies Conference

- Side meeting with wind industry, DOD, DHS, NOAA, and FAA
- Agreement by all parties to work on joint R&D plan to study and prove mitigation options on both the radar side & wind farm side

October 2008: San Antonio Surveillance Conference-DOE and AWEA attend DoD/DHS/ NOAA/FAA conference and provide input on industry perspective on state of affairs, what needs to be obtained, and commitment from DOE to be the facilitator of collaborative efforts.

February 2009: Meeting with U.S. and British defense agency and industry counterparts to discuss points and merits of British model of collaboration.

July 2009: AWEA briefs the Air Force Scientific Advisory Board regarding the wind energy development process, the potential impact on military operations and AWEA's proposed mitigation R&D agenda.

October 2009: Meeting with AWEA, DOD, DHS, FAA, NOAA, and DOE to discuss potential paths forward on an MOU and R&D.

WINDPOWER 2006 (PA), 2007 (CA), 2008 (TX), 2009 (IL), 2010 (TX): Government listening session that has recognized and consistently agreed that efforts need to be improved by all stakeholders. Substantive progress since 2006 in identifying stakeholders, understanding the nature of impacts, and agreement to work collaboratively.

Ongoing: AWEA working with DHS and other federal agencies with respect to the RFP for a better radar and wind farm modeling tool.

Ongoing: AWEA generating list of potential R&D activities, hopefully to be merged with federal agency R&D priorities.

Ongoing: Individual developers engage with DOD/DHS/FAA/NOAA on specific projects.

Appendix 2.

A Sampling of Potential Mitigation Strategies for Dealing with Wind Turbine Impacts on Military Operations

Additional training for radar staff: In some cases, additional training will allow air traffic control operators to discriminate between wind farm clutter and aircraft.

Re-routing aircraft: While not an option everywhere, re-rerouting aircraft can reduce impacts. In some cases, DOD has re-evaluating training routes and airspace height restrictions in order to accommodate additional wind energy while maintaining military readiness.

Optimization: Adjustments to the radar and associated systems fed by the radar has been shown to lessen the effects of wind farms using current capabilities.

Relocating/repositioning radar: Increasing the height of a radar installation may be able to eliminate most or all of the undesirable performance problems with respect to wind farms. A related option is a slightly increased antenna elevation angle.

Radar upgrades/replacements: For example, upgrading to a Raytheon ASR-11, has been shown to improve detection of aircraft and reduce the visibility of the wind farm on radar. Similarly, in the U.K. purchasing a Lockheed Martin TPS-77 radar led the Ministry of Defense to lift their objections to over 3,000 megawatts of offshore wind projects.

Concurrent beam processing: Solution involves two radar beams, a high beam and a low beam, that are received and processed simultaneously to help discriminate between aircraft and wind farm clutter.

Increased system bandwidth: As with your computer, higher bandwidth in radars improves resolution which, in turn, can improve the ability to track a target, even between wind turbines.

Gap filler: Involves another radar strategically placed to cover areas that would otherwise be obscured by the wind farm.

Modern plot and track filters: These utilize advance signal processing techniques to discriminate between wanted and unwanted returns. One example is track eligibility processing, which analyzes how legitimate a target is based on velocity, appearance on successive scans, etc.

Detection or plot suppression areas: In areas of dense clutter, one could suppress the detection of objects corresponding to the location of wind turbines or plots formed so as to reduce clutter density.

Constant false alarm rate processing: The average background level, which determines the detection threshold and sets of the CFAR, increases as the signal level rises. High level signals from turbines raise the average value, raise the detection threshold and subsequently reduce detection probability. Suppressing data in cells representing the high level signals contributing to the average process reduces the threshold and hence reduces detection losses of aircraft in the vicinity of turbines.

Wind farm layout: In some cases, it may be possible to limit the impact by changing the location of some of the turbines to reduce the number of radar cells impacted.

Radar absorbing materials: As noted elsewhere in the testimony, there has been initial promising research on stealth composite blades, but the technology is not yet validated for U.S. radar systems.

Appendix 3.

List of Mitigation R&D by Radar Type Proposed by the Wind Industry

FPS-20 series and ARSR-1/2s

- Identify impacts and present optimization/performance limitations including Radar Processing Platform (RPP) and the Raytheon LRR SLEP upgrade, which is currently being deployed
- Consider:
    - Adding high beam
    - Implementing concurrent beam processing
    - Developing Track Eligibility type functionality for use within C2 systems
    - Adding capability to fuse other radar, such as gap-fill radar

ARSR-3

- Identify impacts and present optimization/performance limitations including SMART radar and FAA prototyped Advanced Runlength Processor (ARLP)
- Consider:
    - Adding ARSR-3 to LRR SLEP
    - Conducting field trials with Sensis SPE-3000

ARSR-4

- Identify impacts and present optimization/performance limitations including influence of impulse interference protection circuit, false weather, and elevation sidelobes
- Consider:
    - Adding Doppler processing to upper beams
    - Enhancing clutter map processing including adding beam gain offsets and increasing clutter map resolution
    - Restraining Angel Desensitization over wind farms
    - Inhibiting track initiation over wind farms
    - Using Track Eligibility Factor fields within C2 systems
    - Developing I/Q recording capability for research purposes

TARS

- Identify impacts and present optimization/performance limitations including Sensis TDX-2000
- Consider:
    - Conducting field trials with SPE-3000

ASR-8

- Identify impacts and present optimization/performance limitations including TDX-2000
- Consider:
    - Conducting field trials with the SPE-3000
    - Replacing with ASR-11s

ASR-9

- Identify impacts and present optimization/performance limitations including MIT/LL 9-PAC
- Reconsider implementing Proof of Design System (PODS)
- Consider:
    - Conducting field trials with the SPE-3000
    - Replacing with ASR-11s

ASR-11

- Identify impacts and present optimization/performance limitations including Advanced Signal Data Processor (ASDP) plus performance enhancements
- Consider:
    - Conducting joint field trials with Track Eligibility (Build 58 or greater)
    - Implementing concurrent beam processing
    - Adding capability to fuse other radar, such as gap-fill radar

Gap-Fill Radar

- Consider:
    - DeTect Harrier
    - Raytheon X-band panel radar
    - Cambridge Consultants CH In-Fill™
    - OCAS
    - SRC LSTAR®
- Potential exists for multi-use capabilities, such as detection of aircraft, micro-lights, thunderstorms, tornadoes, birds, and bats; or activation of obstruction lights and audible warnings for pilots
- Ability to fuse data within nearby radar or C2 systems essential

Appendix 4.

Selected Bibliography of Reports on Mitigation Strategies Related to Wind Turbines and Military Operations

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