

[H.A.S.C. No. 111-167]

**WIND FARMS: COMPATIBLE WITH  
MILITARY READINESS?**

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HEARING

BEFORE THE

SUBCOMMITTEE ON READINESS

OF THE

COMMITTEE ON ARMED SERVICES  
HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

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HEARING HELD

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## **WIND FARMS: COMPATIBLE WITH MILITARY READINESS?**

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HOUSE OF REPRESENTATIVES,  
COMMITTEE ON ARMED SERVICES,  
SUBCOMMITTEE ON READINESS,  
*Washington, DC, Tuesday, June 29, 2010.*

The subcommittee met, pursuant to call, at 10:05 a.m., in room 2118, Rayburn House Office Building, Hon. Solomon P. Ortiz (chairman of the subcommittee) presiding.

### **OPENING STATEMENT OF HON. SOLOMON P. ORTIZ, A REPRESENTATIVE FROM TEXAS, CHAIRMAN, SUBCOMMITTEE ON READINESS**

Mr. ORTIZ. This hearing will come to order.

I want to thank our distinguished witnesses for appearing before this subcommittee today.

Today, the Readiness Subcommittee will hear about wind farm development and its impact on military readiness. Overall, I am committed to renewable energy and the benefit it provides to the environment, the economy and, of course, our country. However, this project should not be pursued at the expense of military readiness.

Wind energy is a prime example of renewable energy. And although it is currently only 2 percent of domestic electricity supply, it is the fastest growing source of new energy generation in our country.

According to the Department of Energy, the United States has enough wind resources to generate electricity for every home and business in this Nation, but not all areas are appropriate for wind energy development.

Today, the industry is generating 14 times more wind energy across the United States than only 10 years ago. This increase is only expected to continue.

There are a variety of factors that contribute to the growth of wind energy, and one of the most prominent being Federal subsidies and stimulus money available to the industry.

A Department of Energy grant program entitled developers of renewable energy to 30 percent reimbursement of the cost of building a facility. Wind power projects were the largest sector, receiving 86 percent of the nearly \$2.6 billion that was disbursed.

But what stipulations are attached to the funding to protect military readiness? Of course, the interest of our readiness so that we can be ready in case that we need to defend ourselves and our allies.

The rise of wind farms could not be more apparent than in my home state of Texas. We lead the country in wind power capacity and generate one quarter of the Nation's entire production, or approximately 9,000 megawatts. This is enough electricity to power more than 2.5 million homes for one year. In my district alone, the stimulus bill provided more than \$440 million in direct contributions to wind farms.

With the rise of wind energy, industry continues to seek attractive development locations, some of which are too close to military installations. A great example of this type of development is in my district at the Naval Air Station in Kingsville, Texas.

As one can see in this slide showing on the screen, wind farms will significantly impair the ability of the Kingsville radar system to monitor and detect small aircraft like those flown at the Naval Air Station.

[The information referred to can be found in the Appendix on page 71.]

Mr. ORTIZ. We must ask ourselves, is this a problem? It is a serious problem. Is there anything that we can do to preserve the military capabilities threatened by wind farm development at the Naval Air Station in Kingsville and other military bases? In the short term, no. Am I concerned? You bet, I am concerned.

The Department of Defense has increasingly engaged to express reservations or objections to potential energy projects based on military readiness issues, specifically identifying conflicts with radars and existing training routes. Each application for wind farm development is reviewed by the Federal Aviation Administration in coordination with the Department of Defense.

However, I am deeply concerned about the lack of a coordinated, well-established review process within the Department of Defense to provide timely input for these green energy projects.

As a committee, we address this concern in the fiscal year 2011 National Defense Authorization Act and look forward to working with the Senate to refine the final language in conference. I don't consider it to be in our government's best interest to stunt the growth of this critical industry, nor to expand wind farm development at the expense of military readiness.

There are many different facets of this issue and a variety of stakeholders. As subsidies continue and the industry continues to grow, it is imperative to increase coordination between the Department of Defense and the Department of Energy on these efforts.

Beyond government coordination, industry as a whole needs to take ownership of their role in diminishing the impacts of wind farms on military readiness, and increase innovation to reduce conflicts with military radars and training routes. To that end, I want to hear what specific actions the government and industry partners are taking to, number one, improve the review process, to identify mitigation efforts, and invest in research and development solutions.

I want to conclude my opening statement by restating my commitment to pursue all energy solutions in partnership with the Administration but not, again, at the expense of military readiness.

Ladies and gentlemen, I think that we have a lot to discuss today, and I look forward to hearing you address these important issues.

[The prepared statement of Mr. Ortiz can be found in the Appendix on page 37.]

The chair at this moment recognizes my good friend from Virginia, Mr. Forbes, for any remarks that he would like to make.

**STATEMENT OF HON. J. RANDY FORBES, A REPRESENTATIVE FROM VIRGINIA, RANKING MEMBER, SUBCOMMITTEE ON READINESS**

Mr. FORBES. Mr. Chairman, as always, I thank you for your leadership, and I thank all of our witnesses.

Dr. Robyn, it is great to see you here again.

General, it is good to have you here with us.

And to both of our other witnesses, we appreciate your time and expertise in coming this morning to testify.

This is a topic that we are all particularly excited about, especially the possibility of harnessing wind energy, because the chairman and I, I think can both agree that we have an abundance of excess wind right here in the Capitol that we would love to use in a more beneficial manner. And I know all of you have suggestions for us.

But even if we fail there, I don't think there is any question that the United States needs to do more to develop renewable energy sources. And wind farms are the most attractive options for truly clean renewable energy.

Recently, wind farms have grown significantly in popularity, so it is important that we take the time to carefully evaluate the placement of wind farms around the country because, like a lot of things in life, wind farms are a mixed blessing; clean renewable energy but also an impediment, as the chairman has mentioned, to military readiness and homeland defense.

The chairman has also mentioned and our witnesses will also cover in some detail wind farm impacts. I share his concerns, which were raised in some detail at a subcommittee hearing earlier this year. I believe that wind farm development, while important to our national energy security posture, must not be allowed to impede military readiness, and I think all of us agree with that.

The Department of Defense's real concerns have to do with the interference of their defense radar ringing the entire Nation as well as the obstructions created on low-level military training routes that criss-cross vast areas of the interior United States posed by wind farm development.

As it stands today, the Department lacks a one-stop shop for determining impacts, leading developers to be unsure of where to turn. As we have seen, mere proximity to a military installation is only the beginning of the story. The most obvious place for DOD [Department of Defense] to start is with a streamlined, transparent process that provides developers some guidelines for turbine placement and some certainty that their applications will receive a timely and credible review.

Unfortunately, the current process forces the Federal Aviation Administration [FAA] to solicit and represent DOD in the review.

While the FAA clearly needs to be involved in the placement of 500-foot tall structures, that agency should not be forced to represent DOD equities.

I look forward to hearing from all of our witnesses on constructive ways to improve the process in order to speed approval of wind farms that do not interfere with our national security or military readiness.

And again, Mr. Chairman, I thank you for scheduling this hearing. I yield back the balance of my time.

Mr. ORTIZ. Thank you, sir.

Today we have a panel of distinguished witnesses representing a good cross-section of views, including the Department of Defense, the Federal Aviation Administration, and the industrial perspectives.

Our witnesses include: Dr. Dorothy Robyn.

Doctor good to see you again. Welcome.

She is the Deputy Under Secretary of Defense for Installations and Environment, Department of Defense.

And Major General Lawrence Stutzriem, Director of Plans, Policy and Strategy for North American Aerospace Defense Command and the United States Northern Command.

General, welcome, sir.

Ms. Nancy Kalinowski. Sounds very Spanish to me. I hope I pronounce it right. She is the Vice President for System Operation Services of the Air Traffic Organization in the Federal Aviation Administration.

And Mr. Stu Webster, Co-Chair of the American Wind Energy Association Siting Committee.

Without objection, the witnesses' prepared statements will be accepted for the record.

And Secretary Robyn, welcome. And it is good to see you, and you can begin whenever you are ready.

**STATEMENT OF DR. DOROTHY ROBYN, DEPUTY UNDER SECRETARY OF DEFENSE, INSTALLATIONS AND ENVIRONMENT, U.S. DEPARTMENT OF DEFENSE**

Dr. ROBYN. Thank you, Mr. Chairman, Congressman Forbes.

It is great to be here talking about an issue that General Stutzriem and I have spent quite a bit of time dealing with in recent months. It is an important issue.

As you have explained in your opening statements, wind turbines can under some circumstances create interference and clutter that reduces the sensitivity and performance of radar, particularly older radar. The vast majority of all proposed wind turbines raise absolutely no concerns for the Department of Defense. In a small fraction of cases, however, we do have concerns, and that number could grow as wind energy development expands.

The problem arises in three different contexts. The first involves the long-range radars managed by NORAD [North American Aerospace Defense Command] and U.S. NORTHCOM [Northern Command] to maintain air space surveillance and air defense.

Second, turbines can affect DOD's ability to test a new weapons system, which requires an electromagnetically pristine environment in which to collect performance data.



Third, Mr. Chairman, nearest and dearest to your heart, the Department's training mission can suffer if air traffic control radars used to train pilots are degraded by interference.

Two key factors aggravate what would otherwise be a much more limited problem. First is the aging nature of our radar infrastructure. Our long-range radars are particularly old, decades old. Many still use analog technology, which has limited ability to filter out wind turbine clutter.

Second, the FAA's siting review or its OE/AAA [Obstruction Evaluation/Airport Airspace Analysis], process, on which we, the Department, rely to identify and prevent potential interference problems, is itself a kind of a legacy system. It was developed in the 1960s with a focus on airspace safety, and has not been updated to take account of current national security needs and operations.

Most significant, a developer only has to give the FAA 30 days notice of the start of construction of a wind turbine or other object. This is generally adequate for the FAA's purposes, but if we raise a concern at that late stage, particularly on something like a large wind farm for which the developer has by then gotten environmental permits, typically hundreds of millions of dollars of investment, we can create serious financial and execution challenges for the developer.

The wind turbine radar interference problem is a serious problem, but it is a largely solvable problem. Our country should not have to choose between national security and the development of renewable energy. The key is to improve our legacy systems, both the regulatory one as well as the electromagnetic one. Let me focus on three points.

First and most immediately, the Federal Government needs to improve the process for reviewing renewable projects so that potential interference can be identified early and mitigated more easily. Toward this end, and consistent with your proposed legislation, we are working to stand up a central DOD clearinghouse to which developers can come on a voluntary basis early in the development process for our review of a proposed wind energy project. Our goal is to create a streamlined, transparent, and layered process, one that can approve easy cases quickly and apply increasingly sophisticated tools, analytic tools, to the harder cases. Among other things, we are looking at whether we need statutory or other authority in order to protect proprietary project information, which is a necessary requirement if we are going to have developers come to seek us out.

Second, key Federal agencies, including DOD, need to realign their research and development priorities to give greater attention to this issue. Technology must become one of the military's primary means of protection in this domain, just as it is in many other domains. Toward this end, the White House Office of Science and Technology Policy has recently convened an interagency group to develop an R&D [Research and Development] plan in this area. And the Air Force recently entered a cooperative R&D agreement with Raytheon aimed at identifying hardware and software improvements that will make radar less susceptible to wind turbine interference.

Third, Federal agencies need to look at the current plan for upgrading the older surveillance radar. At least two questions merit analysis: One, is the current schedule for upgrading the radar sufficiently aggressive? For example, many of our older long-range radar will not go through this upgrade process, called a SLEP, Service Life Extension Program, until 2014. And, second, will the technology slated for insertion as part of that SLEP process do an adequate job of mitigating wind turbine interference? And I will return to that point in a minute.

To illustrate the importance of technology, let me briefly mention a 60-day study by MIT's [Massachusetts Institute of Technology] Lincoln Laboratory which we are releasing a summary of today. It was completed last week. They briefed the Department on it Friday and yesterday, and we have made a one-page summary available to you. And we are in the process of scheduling briefings, which will be at the secret level.

Lincoln Lab focused on a long-range radar in Fossil, Oregon. It is called the Fossil ARSR-3. ARSR stands for Air Route Surveillance Radar. Fossil refers to the nearby town in Oregon, not to the age of the radar. It is old, but it is not that old. The Department asked Lincoln Lab to do this analysis in late April during a controversy that I think you all are familiar with over a proposed 338-turbine wind farm project in Oregon, Shepherds Flat. We, the Department, withdrew our initial objection to the project partly, I would say, actually largely, in the belief that Lincoln Lab could identify ways to mitigate the interference during the period that the turbines were being constructed.

And Lincoln Lab did not let us down. Their options, based on actual experiments they ran on the Fossil radar, range from adjusting the settings to optimize the existing technology to inserting new technology, such as an adaptive clutter map that can edit out false targets. Some of the technologies that Lincoln Lab believes hold promise are scheduled for insertion as part of the 2014 upgrade or SLEP process.

We are eager to take the Lincoln Lab proposals to the next stage, namely, to engineer and demonstrate them in the field. I don't mean to imply they are a silver bullet. They are focused on this one particular radar. And the emphasis of our pilot effort would be how the new technologies will affect the operation of the radar by NORAD and U.S. NORTHCOM. Ideally, we would like to use Fossil, Oregon's, long-range radar as our test bed, in effect accelerating the SLEP, the upgrade improvements that would not otherwise take place until 2014. In addition to improving the Oregon radar on an accelerated basis, this pilot will yield lessons that we can apply to other ARSR-3 radars as part of this process.

In closing, let me say that to maintain military readiness and homeland defense, we must protect our irreplaceable test and training ranges and maintain our radar-based surveillance network. At the same time, the Department supports the development of wind energy as a means toward greater energy security goals, and we ourselves have been a leader in the development of renewable energy. These two sets of goals can and should be compatible. I have identified broad changes necessary to reduce many, if not

all, admittedly not all, conflicts. We look forward to working with you to implement these changes in the months ahead. Thank you.

[The prepared statement of Dr. Robyn can be found in the Appendix on page 42.]

Mr. ORTIZ. General.

**STATEMENT OF MAJ. GEN. LAWRENCE STUTZRIEM, USAF, DIRECTOR, PLANS, POLICY AND STRATEGY, NORTH AMERICAN AEROSPACE DEFENSE COMMAND AND U.S. NORTHERN COMMAND**

General STUTZRIEM. Chairman Ortiz, it is great to see you again, sir, Congressman Forbes, and members of the subcommittee. Good morning. It is an honor to appear before you today to discuss the impact of these wind turbines on homeland defense, and I am pleased to accompany Dr. Robyn and to represent the men and women of NORAD and U.S. NORTHCOM.

We are responsible for homeland defense, civil support, security cooperation, to defend and secure the United States and its interests. In all domains: air, maritime, land, our focus is on defense of the homeland. NORAD provides aerospace warning, aerospace control, and maritime warning in the defense of North America.

The FAA's radars provide us the situational awareness and threat detection capability we need to defend the Nation's airspace. Under certain circumstances, wind turbines and other radar obstructions cause interference that degrades these radars, and it jeopardizes our ability to defend the United States and Canada.

Of the 214 FAA radars that provide our domestic radar coverage, 13 currently operate with some form of degradation due to wind-turbine-induced interference. In 2009, NORAD processed 1,789 tracks of interest, including an airplane that was stolen from a flight school in Thunder Bay, Ontario, and of course the Christmas Day attempted bombing on Northwest Flight 253. This year, we have already processed over 700 tracks of interest. Each track has a unique set of circumstances and demands clear situational awareness. Our decision time is measured in minutes.

We know that our Nation's future depends upon a strong defense. We also recognize that harnessing alternative energy sources is critical to our Nation's future. We understand the importance of projects that enable our Nation's energy independence, and we fully support their development. We review proposals for new developments, such as wind farms, commercial buildings, other structures, and assess whether they will hinder our ability to keep North America safe. We provide our assessment to the FAA, who then renders a determination of hazard.

I want to stress that situations where the FAA renders a determination of hazard on our behalf do not occur frequently. In fact, we have supported over 87 percent of the 2,196 proposed wind turbines that we have evaluated since 2008.

I am also pleased today to be joined by the American Wind Energy Association and the FAA, and we, along with other organizations within the Department of Defense and Federal Government, are actively engaged with the private-sector alternate energy organizations to identify best practices and improve wind farm siting procedures.

NORAD and U.S. NORTHCOM are committed to participate in this interagency process that evaluates proposals for wind farms and other developments with the potential to obstruct radar signals. All of this is done with the defense of our homeland as our primary consideration.

Mr. Chairman, I appreciate the opportunity to answer any questions you may have.

Mr. ORTIZ. Ms. Kalinowski, you may go ahead. You are next.

**STATEMENT OF NANCY B. KALINOWSKI, VICE PRESIDENT,  
SYSTEM OPERATIONS SERVICES, AIR TRAFFIC ORGANIZATION,  
FEDERAL AVIATION ADMINISTRATION**

Ms. KALINOWSKI. Thank you very much, Chairman Ortiz, Congressman Forbes, and members of the subcommittee. We appreciate the opportunity to appear before you today. My name is Nancy Kalinowski, and I am the Vice President for System Operations Services for the Federal Aviation Administration.

My office evaluates the impact of proposed construction on the National Airspace System and determines whether it is a hazard to air navigation. The FAA's mission is to ensure the safe and efficient use of aircraft in the National Airspace System. Proponents of construction projects must give adequate public notice when the proposed structure could impact the safety or the efficiency of the National Airspace System. This notice provides the FAA with the opportunity to identify the potential aeronautical hazards to minimize any adverse impacts to aviation. The FAA uses an online tool that allows the public to file electronically and to track their proposals online.

We evaluate approximately 100,000 proposed construction filings every year, including wind turbines. Wind turbine proposals have grown exponentially. In 2003, the FAA received just over 3,000 wind turbine filings. In the first 6 months of 2010, we have already received close to 19,000 wind turbine filings. We expect that number to increase substantially as the country prioritizes renewable energy. We have approved over 100,000 wind turbine projects since 2003.

Wind turbines present a unique challenge to our agency because of the special characteristics and the potential impacts on the airspace and our air navigation facilities. In the case of wind farm evaluations, each wind farm, each wind turbine, is evaluated separately.

The cumulative effect of the wind turbines on navigable airspace will obviously be more significant based on the total number of wind turbines grouped together. When the wind turbine blades spin, and in some instances it is at more than 200 miles per hour, the signal can be picked up by radars as clutter. The clutter created by wind turbines can result in the complete loss of primary long-range radar detection above a wind turbine farm. When a radar system repeatedly sees a return this large from its signal, the radar may not be able to detect an actual aircraft in the area. Consequently, there are real and significant issues that must be evaluated by the government before its approval of wind turbine projects.

How can we address these issues? The Federal Government can better serve our interests and those of the energy developers by improving the filing and the communication process. FAA is continually enhancing its public website to improve the filing process and to add tools that assist developers with siting wind turbine projects. The FAA also hosts a DOD preliminary screening tool that allows proponents to assess if their proposed locations for wind turbines would be in an acceptable geographic area in relation to radar locations.

This month, we added a new mapping tool on our website that depicts wind turbine determinations issued by the FAA in every State. This tool will allow the developers to more easily identify areas that are already congested with wind turbines and will also identify possible cumulative impact. We have also collaborated with the Department of Homeland Security in an effort to develop a dynamic, flexible modeling tool to better analyze the impact of wind turbines on long-range radars.

Currently, proponents are required to file a notice with the FAA as early in the planning process as possible but no later than 30 days before the date of the proposed construction is expected to begin. That 30-day time frame has been in place for 45 years, and it was appropriate for single stationary structures that the FAA largely dealt with in that time and since. We certainly support consideration for requiring earlier notification to seek a more realistic time frame for the FAA to evaluate all the valid aeronautical comments, to review all pertinent analytical reports, and to issue determinations that take into account all comments and filings.

We agree with the Department of Defense in its assertion that technological improvements and sound research should go a long way to addressing the challenges presented by wind turbines. Better tools and modeling to ascertain the impact of a proposed wind farm on specific radar systems plus more advanced cyclical processing to allow the removal of false targets will greatly improve the ability to deal with the impact on long-range radars.

We will continue to work with the National Security Council, with the Congress, our partners in the Federal Government, and all interested parties to develop these improvements.

Thank you for the opportunity to describe FAA's role in this very important process. This concludes my statement, and I will be happy to answer any of your questions later. Thank you.

[The prepared statement of Ms. Kalinowski can be found in the Appendix on page 49.]

Mr. ORTIZ. Thank you so much.

Mr. Webster.

#### **STATEMENT OF STU WEBSTER, CO-CHAIRMAN OF THE SITING COMMITTEE, AMERICAN WIND ENERGY ASSOCIATION**

Mr. WEBSTER. 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 Director of Permitting and Environmental for Iberdrola Renewables.

Iberdrola, which is headquartered in Portland, Oregon, is the second largest wind power generator in the United States, with more than 3,600 megawatts in operation. We have operating wind power projects in more than a dozen States, such as California, including approximately 400 megawatts in Chairman Ortiz's district in Kenedy County, and we appreciate the opportunity to do that.

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 needs.

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 co-exist. The industry has been discussing with DOD, FAA, DOE [Department of Energy], and NOAA [National Oceanic and Atmospheric Administration] for several years possible process improvements, including earlier engagement and mitigation options. All parties seem motivated now to move beyond talking to implementing those 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 and other Federal agencies. In instances when concerns are initially raised, most are resolved after discussions between developers and the agency of concern. 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.

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, and some of these are available today.

For example, replacing older radar, as roughly 80 percent of the Nation's radars are from the 1950s to 1980s era, 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. [United Kingdom] Government and industry announced the purchase of a TPS-77 [Tactical Transportable Radar System] long-range radar that can distinguish between aircraft and wind farms, which will free up approximately 3,000 megawatts of wind energy.

Further, many of these solutions can be achieved at relatively low cost. A gap-filling radar that costs 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.

Finally, I want to briefly comment on specific language in the House Defense Authorization bill. Industry has generally supported the language to establish a single entity that will centralize the review of wind projects within the 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, 30 to 90 miles. This type of mapping is a blunt tool that can put areas off limits, even if site-specific analysis shows that there are no problems. Because of the different kinds of radar, 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 of concern.

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 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 the 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.

The growth necessary to achieve 20 percent or more of our Nation's electricity from wind, which DOE has determined feasible, is unlikely to be achieved without resolving radar and aerospace concerns, and these concerns cannot be resolved without cooperation between the wind industry and Federal agencies.

To that end, AWEA recommends: One, developing an improved process for consulting agencies earlier; two, establishing a proactive plan for upgrading radars to benefit national security as well as accommodate additional wind energy deployment; and, three, investing in significant research and development.

I greatly appreciate your time today. Thank you for the opportunity to testify. I am happy to answer any questions that you have.

[The prepared statement of Mr. Webster can be found in the Appendix on page 56.]

Mr. ORTIZ. Thank you.

As it always happens right in the middle of testimony, we have a vote. We have two votes coming up. I am just going to ask one question for now.

Ms. Kalinowski, you mentioned that 100,000 projects have been approved. Am I correct?

Ms. KALINOWSKI. That is correct, sir.

Mr. ORTIZ. Can you tell me how many of these 100,000 projects are close to military bases?

Ms. KALINOWSKI. Not off the top of my head, but I could get that information for you.

[The information referred to can be found in the Appendix on page 75.]

Ms. KALINOWSKI. In each and every case, the projects that were close to military bases or military installations or close to the FAA's long-range radars were coordinated with the military, and they had the opportunity to comment on it. In many cases, we were able to successfully work with the proponent and with the military in order to mitigate the effects on the radar or on the military installation.

Mr. ORTIZ. Have you all taken into account the old radar system that we have that dates back to the 1950s?

Ms. KALINOWSKI. Yes, we have. And that long-range radar system and the secondary radar system serves the FAA's mission quite well in terms of evaluating the safety and the efficiency on the impact of the navigable airspace. It is the DOD's mission, of course, to use the long-range radars for their particular mission for the defense of the country. We work with them, and they provide resources to us in order to maintain the long-range radar sites to ensure that that ability is there for them to complete their mission.

Mr. ORTIZ. You know, one of the things that we worry about is that military installations bring jobs to our districts. We don't want the military or anybody else to come to us with any excuse and tell us, you know what, we are going to have to move our base, because you are impacted by the wind farms.

You know, the amount of wind farms dotting the landscape in south Texas is quite amazing to the south and to the north. And God knows we need the energy because we hope that—we cannot continue to be dependent on foreign energy. But my installation at Naval Air Station Kingsville is becoming increasingly concerned. Should they continue to be concerned, or do you think that we can pacify them because we do have a solution to this problem? For anybody.

Mr. WEBSTER. Chairman Ortiz, I will go ahead and address your question. The reality is that the wind energy is a broad and diverse group of stakeholders that have varying levels of sophistication and understanding about how to go about developing a wind project. Iberdrola Renewables has 400 megawatts in your district near the air station and, as a result of our development efforts, sited that facility so that it didn't pose an impact.

To the issue at hand today, the projects that are potentially posing or are posing an impact perhaps could be remedied not nec-



essarily just by siting changes alone, but the changes in the mitigation and the technology that is out there. The surveillance community met in October 2008. The wind energy was a minor line item in a large agenda that was primarily concerned with the sophistication of the technology that they are currently utilizing, and it seems like this is a ripe opportunity to add the political momentum that wind energy has to address a much larger and long-standing concern with the surveillance community to upgrade their facilities. In doing so, issues such as the air station in your district could be mitigated and therefore remedied.

Mr. ORTIZ. You know, we have about less than 3 minutes for the next vote.

Mr. Garamendi, you will be first to ask questions when we come back, but I think we should be back soon. It is three votes. We are going to recess for a few minutes. And then we will come back. I know that your time is very valuable. We will try to come back and see if we can continue with this hearing. We are recessed.

[Recess.]

Mr. ORTIZ. Now, we are going to continue with our hearing. Let me yield to my good friend for any questions he might have. Mr. Forbes.

Mr. FORBES. Thank you, Mr. Chairman. And, again, thank you to all of the witnesses for your time here today.

Ms. Kalinowski, you have a very impressive résumé. You have done a lot of things and there are a lot of things on your plate. And unfortunately for you, if something goes wrong we find out in a very dramatic manner.

I was excited to hear you mention not once but twice in your testimony about the use of modeling. And I take it that it is modeling and simulation that you are utilizing.

Two questions regarding that. One, are we giving you everything you need now to do all of the modeling that you need to accomplish your goals? And if not, how can we help you there as a Congress? Because I think that is absolutely crucial for you to be able to do.

And the second thing is, how do developers or individuals who are doing some of these projects tap into the modeling that you have in at an early stage? Because I know you have probably some privacy concerns and some things that you don't want to allow them to know. Is there some way that they can utilize that modeling capability at the front end instead of waiting at the back end and finding out, Oh, my gosh, this is having a huge negative impact?

Ms. KALINOWSKI. Thank you very much for that question, Mr. Forbes. I appreciate it.

We have enjoyed great support from the Congress for our resources and we believe that we are using them efficiently and effectively, and so we do thank you for your support in that department.

We are also working closely with the Department of Defense and the Department of Homeland Security in terms of educating ourselves and improving the modeling that we have to bring to the challenges of wind farms and understanding the limitations of radar.

We have been very impressed with the Joint Program Office and the work that has been done by the Department of Defense's office.

We refer to them as the 84th RADES [Radar Evaluation Squadron]. That is their office that does extensive work and modeling on long-range radar and the effect of wind turbines on radar. Our technical people, our engineers within the FAA, have been working very closely with them to understand the radar and to develop and look to the professional community on better modeling and simulation. Thank you.

Mr. FORBES. Thank you. Do we know how many turbines exist today? I know you mentioned about 100,000 projects that had been approved. Do we know how many actual turbines have been constructed and how many do we predict will be constructed over the next 5 years?

Ms. KALINOWSKI. I mentioned the statistics before. We received 1,500 cases to look at this week alone. So it is definitely increasing in numbers. I know that the Administration and the Department of Energy and Mr. Webster's supporting association, AWEA, have hoped that we can move toward energy independence by increasing the number. If there are 100,000 today that have been approved, I know that their hopes are to go upwards to 800,000 in the future. So we are gearing up to make sure that the Department of Defense and the FAA can address that kind of influx of cases and to analyze exactly what their impact would be on military readiness.

Mr. FORBES. Mr. Webster, do you have any idea currently how many turbines we have already constructed? And what is your best projection for how many we would expect to have constructed within the next 5 years?

Mr. WEBSTER. Sir, I don't think we have an accurate number. We can certainly try and estimate that and get back with you and the others.

[The information referred to can be found in the Appendix on page 75.]

Mr. WEBSTER. I would say that from—this is a very difficult issue to address, but the lion's share of the proposals that are brought into the FAA, for example, and other agencies don't actually become real projects. So while there are 100,000 turbines that have been assessed in any given year, we are talking somewhere on the order of magnitude less than that coming to fruition. So it is a difficult tug and pull, if you will, trying to determine, from an agency perspective, what is actually going to become an actual project versus what is sort of a touch by the industry to try to determine whether or not there is going to be an impact in that particular area.

Mr. FORBES. The chairman and I were talking in the break about impacts these could have on our bases and other types of things in there. I think it would be useful for us. Just like when we are doing planning for highways, it is I think a crucial piece of information to know how many cars we think we have on the road and how many we would expect to have on the road in 5 years. So if you could help us with those numbers, I think it would be useful for the committee, even though it is not exact, if we can just get our hands around how many we think we have got out there and how many is our best estimate of what we will have in the next 5 years could be useful information for us.

Dr. Robyn and General, Dr. Robyn made a statement that I certainly do not disagree with. You said that we should not have to accept a decrease in military readiness to support national energy initiatives, or some paraphrase of that. The problem is, as we all know, sometimes just from a timing sequence, even if we have enough money, we can't get things underway; and sometimes with the budget concerns we have today, we have a budgetary concern.

In all of the witnesses' opinions, do you think that there would ever be a time that we should accept a decrease in military readiness to support national energy initiatives? And I don't care who starts, whoever has that opinion, but we would just like your thoughts on that.

Dr. ROBYN. I think it is a mistake to frame the problem that way, because I think—

Mr. FORBES. Help me.

Dr. ROBYN. What I said in my statement was the country should not and does not have to choose between national security and the development of renewable energy. And I think what you have heard all of us say is that the two keywords, improving the process, which allows for early discussions and increases the chances significantly of working out some sort of mitigation, and the other is technology. And there is an overlap, because so far mitigation largely means moving the radar to a different place.

Mitigation also means changes to the radar itself, improvements in the software, improvements in the hardware, potentially replacement of the radar. I am not saying that every problem can be solved, and even Mr. Webster said there is no silver bullet. But we have yet to really bring to bear the potential for technological development or insertion of better technology.

Mr. FORBES. And, Doctor, I guess then I kind of take back my statement where I agreed with you, because I disagree with you. Because I think while it may be our goal that the two don't conflict, the real world we live in is that it is not just theory. The real world—sometimes it does come down to a conflict, either again because of timing—we just can't get there quick enough—or because of money. So if you can address that. General, do you feel—

Dr. ROBYN. Can I just—

Mr. FORBES. Sure.

Dr. ROBYN. Let me address each of those, because when I said we ought not have to choose—

Mr. FORBES. I agree with you, we shouldn't have to choose. But unfortunately sometimes in this committee—

Dr. ROBYN. Timing is critical. I don't mean to imply that you just say "Okay, we are never going to say no because we can figure out how to solve the problem technically."

So the key to fixing the process is so that you have the time so that we can learn about projects early, work with developers to come up with a mitigation strategy, whether it involves moving the turbines or improving the radar. But timing is absolutely critical.

The second thing is money. And no one has put this on the table yet. I am wishing I had done this in my testimony. These wind energy development projects are—they are big and they involve a lot of investment and that is a potential—those developers are a potential source of improvements in the technology. This is something

that happens in other areas when one person wants to make better use of the electromagnetic spectrum and what they are proposing would interfere with somebody who is occupying the spectrum; they will pay to upgrade their receivers so that their activity doesn't create interference. That is very common. There is a market for that. We need to develop the same kind of thing here.

Mr. FORBES. I don't disagree with that. Again, all you guys are good guys. It is not a white hat, black hat—these are not trick questions. The question, though, at some point that this committee just has to keep in mind as our checkoff—and I think it is a fair question—is the Department willing to accept decreased military readiness to support national energy initiatives?

It is a fair response to say we hope to have both. It is a fair response to say we need both. It is a fair response to say we hope we don't have to choose between them. But none of those are my question.

My question is if rather it is because of timing or budgets or whatever else, beyond any of our controls in here, if we have to choose—it is a simple question—would the Department be willing to accept a decreased military readiness to support national energy initiatives?

Dr. ROBYN. We haven't to date, and I don't think we intend to accept a significant level of reduction in military readiness, no.

Mr. FORBES. General, what was your response?

General STUTZRIEM. Yes, sir. As you know, I cannot speak for the Department of Defense, but as the COCOM [Combatant Commander], I can. We, of course, will always do a very serious and detailed operational risk assessment based upon interference that may be caused by these wind turbines. And it is clear that in our mission, we have to be able to detect and track and, if necessary, take action on a track of interest before it injures or hurts American citizens. So in that risk assessment, we will be very sober and objective about risk that is unacceptable.

And in the operational realm, if we have risk that is unacceptable, we have to mitigate that down to an acceptable level. So in our part of this process, we will be very forthright with that analysis which we have focused quite a bit in the last few weeks and bolstered.

However, I do also share Dr. Robyn's comment that some of the recent studies in what we see, there is probably a lot of technological pieces out there in the future that can help mitigate that risk. We will not as a combatant command have any kind of gap, however, that is unacceptably managed.

Mr. FORBES. General, I am sure you are articulating a lot better than I am understanding it. So I don't want to push you further than you can go. Sometimes we have to just come down to hard and fast decisions.

Is it your opinion that we should ever accept a decrease in military readiness to support national energy initiatives?

General STUTZRIEM. Once again, that is a policy question for the Department. But we will always, from the operational level, mitigate that risk in some way.

Mr. FORBES. General, I will try this one more time. What we are told by the Secretary of Defense always, is when we have witnesses

here, we can ask your personal opinion and we rely on this personal opinion. Again, it is not a trick question. It is something we need to know.

In your personal opinion, should we ever accept—I understand we want to mitigate, we want to not be there. But if it comes down to it, should we ever accept a decrease in our military readiness to support national energy initiatives?

General STUTZRIEM. Yes, sir. In my opinion, homeland defense is our top priority, our mission priority, and that should take precedent.

Mr. FORBES. Thank you. And, Ms. Kalinowski, the same thing.

Ms. KALINOWSKI. I can certainly speak for the FAA that we would not accept the degradation of the safe and efficient use of the navigable airspace. I believe that we at this table all want to support a national goal toward energy independence, and that also speaks to the Nation's security. Thank you.

Mr. FORBES. Fair response. And, Mr. Webster.

Mr. WEBSTER. I would say that we do as an industry—obviously do not want to see significant or adverse impact to our ability as a Nation to protect ourselves and do not advocate nor want to promote any notion that the industry feels that it is somehow of higher importance than national security.

That said, the industry does feel along with our counterparts in the agencies, that there are real technical solutions that can be deployed today, and it is just the amount of collective willpower to mobilize that technology to resolve these issues so that we do not have that adverse impact threshold reached, which to this date, at least according to the Concurrent Technologies Corporation's recent report has not been reached.

Mr. FORBES. Thank you all so much for your expertise. And, Mr. Chairman, I yield back the balance of my time.

Mr. ORTIZ. Mr. Kissell.

Mr. KISSELL. Thank you, Mr. Chairman. And thanks to our witnesses for being here today. I have a series of questions, more or less trying to get an idea in my mind some of the parameters of the issues. So I am not even sure I can direct them to one person or not.

But the first question, Ms. Kalinowski, when you talk about projects that are being given to us and that you all are reviewing, on average how many devices per project, how big of an area are these projects? Kind of just the scope of what an average project would consist of.

Ms. KALINOWSKI. Thank you, Congressman. If you are speaking of wind farms, we have dealt with wind farms as small as four or five wind turbines, but the average is more along the lines of 100 to 200 wind turbines on up to 500.

Mr. KISSELL. And these devices, on average, in size—I had read some can be as high—tall as 500 feet. What is the average size of one of the wind turbines?

Ms. KALINOWSKI. I think Mr. Webster would probably be a better person to ask that question, but we have dealt with them ranging from 200 to 400 feet.

Mr. KISSELL. Mr. Webster, would that be in the neighborhood then?

Mr. WEBSTER. Four hundred to 425 feet.

Mr. KISSELL. Good. Thank you.

And, Dr. Robyn, I am going to give these questions to you, and then once again feel free to move them to somebody in the best place. The issue itself in the radar interference, is it more of an issue based upon where the wind farms are and to the number of miles to the base? Or is it more of a directional issue; or is it an elevation issue; or what creates the situation where some wind farms might be a problem and others wouldn't be?

Dr. ROBYN. I am an economist, not a physicist. So my understanding is—certainly, you see in many places wind turbines near military bases with no issue. It becomes a problem—it is very case by case. And it can become a problem—the two key things: line of sight, that is an issue. If the turbines are shielded from the radar by the terrain, there is not an issue. So, line of sight. And the number of turbines so that you can have 500 turbines that do not create an issue. And then when you add another 100, their cumulative impact on existing technology, particularly the older radar, can become a problem.

Mr. KISSELL. And, General, with that said—and once again I don't know where is the best place to ask these questions. So you have some farms that could be within a few miles and not be a problem and others somewhere else that it could be a problem. Is it a difference in the radar between—are they more of an issue for long-range radars versus short radars? So is it more specific, and can we predict, as the modeling that Mr. Forbes is talking about, can we predict where we would have a problem and not have a problem?

General STUTZRIEM. Yes, sir. It does vary from radar type to radar type. It is very dependent upon the environment. So, for example, I can speak to simply one piece of this which is once again the operations risk assessment. We look at that in terms of what is that environment around the radar itself. So once again, depending upon the sophistication or the technology of the radar itself, it may deal with that interference better or worse.

One radar that Dr. Robyn talked about out at Shepherds Flat, of course, is an older radar. And it shows a lot of the clutter based upon that interference that comes from those wind turbines.

Mr. KISSELL. My last question. Well, I will see how my time is, whether it is my last question. It would seem to me that if you are looking at a huge investment and you know this issue is being a problem, that you would want to go to whatever authority much sooner than 30 days from the time you want to start building this.

Are we seeing that, that people are coming to us from the initial concepts and saying, "Hey, do you think this is going to be a problem?" Are we seeing any of that?

Mr. WEBSTER. The industry has largely been increasing its level of engagement with the agencies much sooner for the past, I would say, 4 years, when this issue first arose to a sort of national prominence, if you will. The result of that has been largely unanimous recommendation from all of the stakeholders that there is no process to engage in.

So you have situations where a military facility is engaged by a single developer. The military facility makes a recommendation

that there will not be an adverse impact, and it isn't until 2 or 3 years later, when a formal review process by the FAA is undertaken, that a differing opinion by a different entity within the DOD says, "Actually there is an impact." By that time millions, if not billions, of dollars have been invested in that asset. And then, of course, you clearly have a national defense question in mind, so it creates an automatic tension between the stakeholders that could have been resolved if there had been a process in place.

Mr. KISSELL. Thank you, sir. Thank you, panel. And thank you, Mr. Chairman.

Mr. CONAWAY. Thank you, Mr. Chairman. Welcome. I appreciate you being here. Just to set the record, I represent a district that is in the top three or four in the Nation on wind power generation. So please don't interpret anything I am saying as being anti-wind because it is—some of my wind friends have thin skins sometimes.

Mr. Webster, are all of the sites across the United States fully developed and the only ones left to develop are the ones that potentially interfere with military operations?

Mr. WEBSTER. No. There is a variety.

Mr. CONAWAY. We have had this conversation this morning as if the only ones left out there to be developed were the ones that have this potential problem with military readiness. I just want the record to show that there are zillions of sites, for lack of a better phrase, that have no interference whatsoever, that are available for development for the industry.

Dr. Robyn, you mentioned a very interesting phrase or concept. What are the barriers to the system? As an example, you have got a developer that wants to put some wind towers in a particular place; it gets in front of an older radar set and that radar would need to be upgraded to mitigate.

Are there barriers to allowing the developer to say, in order to move this project forward, I will pay to have the radar upgraded or whatever mitigation costs are needed to eliminate the problem that the military is having? Can that investor or developer group fold those costs in, or are there barriers to letting that happen?

Dr. ROBYN. I think the biggest barrier is that most people haven't thought about it that way. We are not used to thinking of operating that way. There may be a technical/legal barrier to us accepting money from a developer. But I think it is—

Mr. CONAWAY. I do, too. It is something that a business would do all the time. It is not a foreign concept.

Mr. Webster, you might have your group look at that concept. Obviously if the radars are doing the job that we want them to do, and a developer comes in and wants to interfere with that, it shouldn't be the responsibility of the taxpayers to upgrade the existing facility to meet the need of that developer. I would think that if that site is worthy, then it could fade the costs of the other development.

General, throughout the NDAA [National Defense Authorization Act], there is immense emphasis on the Department of Defense single-handedly eliminating our need for foreign oil. We spend a lot of money that way on wind generation, alternative sources, all kinds of things. It would be helpful to us as decision makers—because I think the Department of Defense budgets are going to start

looking a lot flatter than they have in the last 7 or 8 years—to know what that delta is. In other words, what would we pay for energy the traditional way versus this emphasis that we have gone across DOD, what is that delta and what are we trading? Are we trading MRAPs [Mine Resistant Ambush Protected Vehicles]? Are we trading body armor? Are we trading a second engine? What is it, so as a policy we can say, okay, this cost, these extra costs to the system, that doesn't have to be there; it is there only because of something else. What are we trading for that? What can we use that dollar for? Do you have that number, by chance, or is there a way to get at it?

General STUTZRIEM. Sir, I don't. And, of course, at the combatant command, we establish requirements that are processed by the Pentagon. I can take that question for the record and route it and get you an answer on that.

[The information referred to can be found in the Appendix beginning on page 75.]

Mr. CONAWAY. I do think that the Secretary is looking for 100 billion over the next 5 years, and we ought to know what we are trimming out of the 100 billion.

I had a report yesterday that the Air Force is going to mothball the B-1 bombers and 250 fighters under this cost saving hat, not for defense, not for capacity, not for anything, just a cost saving hat.

It would be helpful for us as policymakers next year to know what the Department is spending on energy that they don't have to spend, but for requirements under the NDAA, particularly in the last 3 years. With that, I yield back.

Dr. ROBYN. Sir, is your question how much are we spending on energy? The delta—

Mr. CONAWAY. Between what we would have spent but for all of this emphasis on renewables and the Department of Defense doing a lot of stuff that they don't have to do.

Dr. ROBYN. Oh, I would disagree. I was with you up until that.

Mr. CONAWAY. So you would trade wind power for body armor?

Dr. ROBYN. We very much look at this. I believe it was General Mattis during the Iraq War said, "Please release us from the tether of fuel." And that prompted a Defense Science Board report which said we are losing lives and we are spending enormous amounts of money to get fuel to forward operating bases. And the cost that we pay for fuel is the tip of the iceberg. The real cost is—and our soft underbelly is the logistics tail to get that fuel to forward operating bases.

Insofar as we can use renewable in forward operating bases, which we are working on, we can reduce that. And in domestic bases, which I oversee, we are vulnerable to disruption of the commercial electricity grid and renewable energy combined with energy efficiency, smart microgrids, can increase mission assurance.

Mr. CONAWAY. And that comes in front of other requirements that DOD has. We are not making a rational decision because the folks out there have just said—that the majority has said over the last 3 years, this is an important deal. So you guys have gone down that path.



I have had four-stars tell me that they have to come out of hide for all of these extra costs, so they can look green; that it is not mission-critical to what they are doing. You are not going to power an MRAP with a battery or with a wind——

Dr. ROBYN. You are not going to power an MRAP, but renewables have an important——

Mr. CONAWAY. You argue with me that the fuel in the battlefield is what you are worried about, and I am just saying that is not what we are talking about.

Dr. ROBYN. Generate—a significant amount of the fuel that is transported to forward operating bases is used to power generators, to heat and cool tents, to operate——

Mr. CONAWAY. So we are going to build wind towers in Iraq?

Dr. ROBYN. I don't know if it will be wind, but we are absolutely spending——

Mr. CONAWAY. More money on energy than we would otherwise have to spend.

Dr. ROBYN. We have been running a 270-megawatt geothermal plant in China Lake for 20-some years.

Mr. CONAWAY. And it costs more to do that than to buy the energy out of the grid.

Mr. ORTIZ. You can go ahead and answer——

Dr. ROBYN. I think we disagree here. I think it will cost the Department money up front to develop renewables. It will cost the country money up front. Part of that is because we don't put a price on carbon. So we do need to——

Mr. CONAWAY. And the science is settled on that, that it is an issue?

Dr. ROBYN. Putting a price on carbon?

Mr. CONAWAY. Yes. The science is settled on that?

Dr. ROBYN. I think that is an economic question. There are huge externalities from carbon emissions which aren't captured in the price of fossil fuels. But there is the Quadrennial—I point to the QDR, the Quadrennial Defense Review, which says that our dependence on fossil fuels, it is a national security issue and it is an issue for domestic installations. Renewables are not the silver bullet, but they have an important place.

Mr. CONAWAY. But you will get me the difference in costs that the Department incurs between what they could have done normally versus——

Mr. ORTIZ. I think we are going to have time, because we have got other members and we will have to have, probably, a second round of questions and we will come back to you.

Mr. GARAMENDI. Thank you very much, Mr. Chairman. The RAND Corporation estimates that about 16 to 18 percent of the total defense budget is specifically designed for the purpose of protecting the sea lanes in the Gulf of Hormuz so that we can have oil. We are at great risk at any moment of that strait being shut down, in which case we would have a very serious problem in America. So 16 percent—let's just say 15 percent. So \$120 billion a year for that one purpose, according to the RAND Corporation.

With regard to the issue that we just heard about, it is imperative of every one of our bases to become as self-sufficient for energy as possible so as to avoid the problem of a shutdown of the grid.

This committee has heard testimony on cyberwarfare and the potential problems that it presents to us. It is a very significant issue. And spending money on renewables at the base, conservation at the bases and other ways of making our bases both domestic and international, self-sufficient and not dependent upon the importation of oil arriving at the appropriate moment, is of utmost importance.

Now, to the issue at hand, which happens to be wind turbines and the bases. First of all, I want to thank the industry for the work that you are doing in the Travis area, the Fairfield area, and the wind energy that is extremely important in that area. You have undertaken a joint operation with the Air Force at Travis to find ways of dealing with the interference that the wind turbines provide, and you are also providing money to fund the studies, and that is the way it should be done. So I thank the industry for that.

I also want to, Dr. Robyn, if I might, just ask you about efforts that are underway to ameliorate the problem that exists with regard to the Travis domestic flight. We are not talking about long-range radars here, but rather those that are specific for flight control at the bases.

Could you just comment on the work that is being done, some studies that are underway? I understand Raytheon and the United Kingdom has a study underway. I think there is a Jensen or Jansen report.

Dr. ROBYN. I am not sure I can speak to Travis in particular. The work with Raytheon, you may be referring to the CRDA [Cooperative Research and Development Agreement] that I mentioned in my opening remarks. It was something the Air Force entered into just recently, a cooperative R&D agreement, the aim of which is to identify hardware and software improvements in radar that can reduce wind interference.

I think that the U.K.—that may be a reference to the TPS, the TPS-77 radar, which is a radar that the U.K. feels—it is a Lockheed Martin radar, I believe. There is some evidence to suggest that it deals fairly well with wind turbine interference. We have not yet looked at that closely.

Mr. GARAMENDI. If I might just interrupt. It is my understanding that the radar systems at Travis are being significantly upgraded to deal with the wind turbine—with the wind farm nearby, and that it is possible to use enhanced software to achieve the necessary air traffic controls for that. So if you could deliver to me and perhaps to the committee a display of the various activities that are going on.

[The information referred to was not available at the time of printing.]

Mr. GARAMENDI. Most of the testimony we have had here today concerns long-range radar systems which are quite antiquated in most cases. It is pretty hard to move the wind from one location to another. But it may be easier to move the radar, particularly if it is an older system that is going to get replaced sometime in the future, perhaps with the NextGen [Next Generation Air Transportation System] system of traffic, air traffic control coming up.

So I would like to have some comments on that as well as the upgrading and the role of the industry in helping to pay for it, the

concept that was developed here a few moments ago. I think it is an appropriate one.

So, General, if you would start and then the industry and then FAA. And we have 3 seconds.

General STUTZRIEM. Yes, sir. We work very closely right now with a number of Federal agencies, with the developers; when we find through our operational risk assessment there is a problem, there is kind of conflict. Some of those methods—and I think there are a number, besides relocating wind turbines outside of line of sight. That would be the most effective. But we can change the sighting, the geometry, the spacing to assist in reducing those effects.

Yes, some tuning of the radars are possible based upon a growth in clutter across time and the environment. So simple maintenance may help. And, of course, we are seeing more and more, especially in the urgencies of looking at technology, that there are probably software and hardware fixes that can be inserted in these older radars that could reduce the impact of the wind turbine interference.

Mr. WEBSTER. Largely there has been some dialogue by the stakeholders with respect to moving radars. My understanding is that it is largely about as feasible as moving the wind projects themselves, which is the other mitigation solution that has often been talked about, both of which I suppose are possible but not probable in terms of being effective both cost-wise, as well as technology-wise.

The radar systems were put in place where they were, because they optimized our field of vision from a national defense perspective as well as from an air traffic control perspective. In a similar vein, we put the turbines where we do because of the wind being present.

Again, however, there is a number of opportunities that have been discoursed for the past few years that allow us the ability to upgrade those radars, and possibly R&D technology that can be inputted onto the turbine side of the equation to ameliorate the problems.

Mr. GARAMENDI. FAA.

Ms. KALINOWSKI. Thank you for the question, Congressman. It is very expensive to move a long-range radar. Not very feasible at all. I think both gentlemen made very good points about that. I think our future lies in either a software upgrade, a hardware upgrade, or finding other alternatives to essentially mitigate the project.

Mr. GARAMENDI. Mr. Chairman, in 30 seconds, I do want to just make a final comment that the U.S. Air Force together with the wind industry, three developers in the Solano area have made significant progress on accommodating additional turbines and the safety and the air traffic control at a major, major base, probably with flights taking off every 90 seconds or so.

So it can be done. It is software and it is location of the radars; and also, most important of all, a willingness to work together. And I thank you for what you have been able to accomplish there.

Mr. ORTIZ. Thank you. Before I go to the next Member who is visiting with us today, let me ask a question now. We were talking about at Kingsville a few moments ago. And I know that some of you are mitigating some of the circumstances. But I was just won-

dering, Dr. Robyn, can you explain what steps the Department of Defense is taking to preserve military readiness across the Nation, specifically in Kingsville—and we appreciate the energy that you, Mr. Webster, are providing. We need it. God knows that.

But my two bases hit right in the middle of them. If you are flying in from San Patricio County, I think you see at least, if not 200, maybe more windmills. And then when you go south going to the valley, South Padre Island, you see maybe 3- or 400 of them.

What is the Department of Defense doing to come up with answers as to how we are going to protect our readiness? Yes, ma'am.

Dr. ROBYN. I don't—we have not—I was not aware of the Kingsville situation until recently. We have not had—leaving—I will come back to that one. But I am not aware that we have had an issue with wind turbines and training routes.

Most training routes, most low-level training routes are on public land. The process is easier when it is public land. We get advanced warning from BLM [Bureau of Land Management] typically, or the public land holder. So we have not—I am told by our personnel and readiness folks, that has not been an issue.

Kingsville, clearly we need to look at that. The process seems to have broken down there because the FAA was not—the Navy did not object to the proposed turbines as part of the OE/AAA process. Nancy can say more about—apparently those radars there are not even part of the National Airspace System. They are not in the system at the FAA. So the process broke down. I would like to look at it more closely, number one; see whether there are some lessons from Travis that we can bring to NAS [Naval Air Station]-Kingsville.

Mr. ORTIZ. Ms. Kalinowski, would you like to respond or give us any input or, Mr. Webster, to the same question?

What I really want to know—and things are moving pretty fast. When you say that hundreds of thousands of them are requesting authorization to do that, how long will it take for all four of you to get together and to come up with a plan? Can you do that? Because this is moving too fast, and it is very costly and readiness is at stake.

But you think you all can get together and come up with maybe a solution? I know it is going to be expensive when you talk about upgrading or buying new radars. It is going to be very, very expensive.

When Chairman Gates came down, he says, "You know what? We are going to cut down on defense to the point whether it is going to be research and development and other items that we need, or whether we are going to have to cut down on health care for our service people." So this is a very serious, serious problem.

How much time do you think you would need to come up with a plan that we all can work and sing from the same page, for all of you?

Mr. WEBSTER. From the industry standpoint, we have been advocating for 4 years now that a process of earlier engagement that meets the needs of all the stakeholders be developed. I think that largely the conversations that we have had with the other stakeholders, both in the public and private sector, have resulted in a good laundry list, if you will, of elements that would be contained

within such a process. And now it is just a matter of actually implementing—more fully developing and implementing that process.

Dr. ROBYN. Congressmen, the National Security Council initiated an interagency process in the wake of the controversy over Shepherds Flat. Shepherds Flat was an unfortunate controversy, but it was useful in galvanizing attention. And that is an ongoing process, looking in particular at the FAA siting review process and whether and if that needs to be—whether and how that needs to be updated to take account of current national security needs and operations.

I think there is a legitimate question as to whether the FAA has—whether its authority would include issues related to our training and testing routes. So that is something that we are looking at on an interagency basis.

But I don't think—I mean—I co-chair a group, a standing group focused on protection of our ranges. I don't think we are—a lot—I don't think this is a big problem in terms of maintaining readiness. I agree that there is a situation at Kingsville that we need to look at closely. But I don't think you will find many examples of that.

Mr. ORTIZ. Let me see if I can get somebody to put the map on the screen so you all can see it. And she is going to hand out some copies so you can see how it is impacting on at least Kingsville for now.

And another issue that is going to come up now, you see a lot of investors coming up and they look at solar panels and they say that when they fly, the reflection from these solar panels—and this is going to be another issue—impacts on those that are training up in the air. So that is going to be another—and they are coming to the United States. And, of course, we need all this energy.

But as you can see—the map that we have and how we are impacted. But I think that the responsibility now lies on DOD, if you can come up with a plan, because you are the ones that are being impacted. And, of course as team players, we would like to work with the rest of you.

So do you think, Dr. Robyn, that 30 days would be sufficient to come up with something that you can give the members of this committee?

Dr. ROBYN. I would like to—there is an interagency process in place. I don't know exactly. So I am a little hesitant to commit to 30 days. But—

Mr. ORTIZ. You will try?

Dr. ROBYN. Within a fairly short period of time, I think this process will run its course and we can report back to you.

Mr. ORTIZ. After consultation with the minority, I now ask unanimous consent that Mrs. Halvorson be authorized to question the panel members of today's hearing. If there are no objections, I will now recognize Mrs. Halvorson.

Mrs. HALVORSON. Thank you, Mr. Chairman, and to the committee for allowing me to ask a couple of questions. And I also want to thank you for the work you have done on this issue.

I just wanted to ask a couple of questions on a proposed wind farm in my district, which is Kankakee County, Illinois, which is about 45 miles south of Chicago. And it is called K-4, which you

all know about. And it is close to a radar system located in Joliet, Illinois. As a lot of people know, it is a \$2 billion project with 310 proposed turbines. And it also has an ARSR-3 radar, which is the one just like Shepherds Flat. And I know that and I feel that the Shepherds Flat radar should not be the only site receiving mitigation work and receiving the software upgrades and physical improvements.

So my question is for Dr. Robyn. What upgrades can you make to the ARSR-3 radars nationwide in order for more wind farms and radars to coexist? As you know, we have been having major problems with this K-4 wind farm project, and you all have been so wonderful to work with us to try to make it work. So I am wondering, since we are having the same problems as Shepherds Flat, what can we do to make this somehow work with mitigation efforts?

Dr. ROBYN. Thank you, Congresswoman. And you have been terrific, too, to work with on this issue as well. I think what led to the response on Shepherds Flat that was somewhat different is the construction was due to begin on May 1, and there was not an opportunity for the Air Force and the developer to go through the process that they normally would have. And so that led to the Lincoln Lab study and some other things. We do have that time in your district and the RADES—Air Force is looking at how different configuration of the turbines could help the problem.

I agree that the technology has potential. I think we don't—the Lincoln Lab folks looked at a different radar. We can't assume that the same things would work, but it is encouraging. It suggests some things. And the pilot will offer us lessons for that.

Mrs. HALVORSON. So if these upgrades, though, are made, what is a realistic time for completion? Because we don't even hear that there are possibilities for upgrades.

And I think the other problem going forward that other people need to realize is this is not a process that anybody thinks of before they go and make the decisions with the leaseholders and anybody who decides to even put a wind farm in place.

Also, in regards to the FAA, Shepherds Flat wind farm in Oregon, the FAA originally issued a notice of presumed hazard in March. And when the DOD eventually withdrew its objections in it to the Shepherds Flat project in late April, a DOD spokesperson said that the impact of the project, to the Fossil ARSR-3 radar, was not as great as once thought.

So I think what my issue is—because we have been going back and forth with the same issue, the notice of presumed hazard—is it possible for this scenario to be the case again for other projects elsewhere? Because as you know, the fact is there has been an issue with the upgrades not being made since 1990. And that has probably been one of the biggest problems with K-4, is how up to date is the DOD's land covering the terrain model data?

Dr. ROBYN. I cannot speak to the terrain model data. I think it is certainly worth doing—taking a look at the—possibly having the Lincoln Lab folks look at the Joliet situation. This is the area next to Oregon, north central Oregon. This is the area that is of most concern. And as you know, this reached a crisis point in 2006 that led to some positive developments, but did not go far enough.

So I think it is worth looking at that. I think there are some improvements, short of the Service Life Extension Program, that may be suggested by the Lincoln Lab study. So I think it is worth taking a look at that, but also having the discussions about positioning of the turbines continue.

Mrs. HALVORSON. And my time is up, but I just want to reiterate that we are dealing with data from 1990, that it has not been easy to tell people that want to invest in communities and create jobs and do what they need to, and how do we go back and want to mitigate these? So I appreciate all of your help, but we need to do more.

Thank you. I yield back. And thank you so much for the courtesy.

Mr. ORTIZ. Thank you so much for you joining us today. And going back, if I understand correctly, the FAA—review process is 30 days now?

Ms. KALINOWSKI. The requirement, Congressman, is for it to be filed 30 days before construction begins; however, we strongly encourage all developers to file as early as possible with us, to begin the discussions and to begin the education process with the Department of Defense and DHS [Department of Homeland Security].

Mr. ORTIZ. So you are satisfied with the 30 days; you can get it running in 30 days?

Ms. KALINOWSKI. You made the suggestion earlier, Chairman, that we should consider a much earlier filing process and we very much wish to consider that.

Mr. ORTIZ. I would like for the DOD also to work with us, maybe get your team, Madam Secretary, to work and give us an interim report within 30 days; and maybe you can work on Kingsville and maybe give an additional 30 days, because the people there are concerned and rightly so. We have seen where there is a lot of jointness going on. And at one time, they would say that Kingsville got all the—open skies, you can train, you can do whatever you want to do.

That has changed now. We want to work together. This is why I said we can work as a team, those that are creating this energy. And rightly so. It has become a tourist spot because people like to drive and see all those windmills turning around. And I see people because between Corpus Christi and the valley, it is about 110 miles, and there is nothing but the windmills, cows and horses. So it has become an attraction. But at the same time, we don't want it to impact on readiness.

Let me yield to my good friend, Mr. Forbes.

Mr. FORBES. Thank you, Mr. Chairman. And again, I thank all of you for being here. And, Dr. Robyn, when I heard your colloquy with Mr. Conaway just a few minutes ago, I just sit back and I ask this question. First of all, I premise it the same way that he does, that all of us up here support wind industry and what we are doing with a lot of our alternative energies.

But 11 percent of the people in this country approve of this Congress and 89 percent of them disapprove. And the reason most of them disapprove is because we come in here and we are good at hitting lofty goals. We can state them, we can state them up and down here, we can state them from that witness stand; but they understand that the devil is always in the details, and over and

over what we are trying to get up here are the details. And we can't get them because all we get is a restatement of the lofty goals.

We sit back here, and the American people here, drafting legislation in the Senate now, where the drafter of the legislation says, "We don't know how it is going to work or the impact until we pass the legislation and get it into effect." And the American people are saying, "My gosh, what are they doing?"

This year the American people are saying, "Give us the details and a budget." And this Congress is saying, "No, no, no, no, we don't want to give the details, let us talk about lofty goals."

We won't do a budget and the American people, 89 percent of them are saying, "Are they crazy up there?" The budget is what shows the details.

Last year, the Department of Defense by law had to give us a shipbuilding plan so we could see on paper those details about how many ships we were building so we could see what actually came out last year, the Chinese had more ships than we had in our Navy, and we couldn't get those details from the Department of Defense.

What Mr. Conaway is asking seems like a simple question—let me finish and I will let you respond. You said you disagreed with him. He is not asking about which theory we pick or where we are going. He is saying, shouldn't the American people be entitled to know the cost differential between buying energy one way, and by putting something in a bill that is going to cost us more, so that we can determine how many planes we have to give up to do that, how many ships we have to give up, how many MRAPs we have to give up, how many guns and how many bullets we have to give up. Because our warfighters, when they come back, theories don't matter to them. It comes down to do they have that air covered, do they have those bullets and do they have these planes—and as the chairman said, we are getting realistic discussions now that we have got to cut out a lot of those real things, because there is not enough money.

And so the question I come back to is: Why is that such an unreasonable question to say, Can't we just come back and lay on the table the cost differential between doing it one way and doing it another way? Not policy. We can argue the policy.

Dr. ROBYN. Sir, we were—certainly. Can I give you a plan for how we will achieve our goal set by the Congress, codified by the Congress, of achieving 25 percent renewable energy consumption by our installations by 2025? That is a goal given to us by the Congress.

Mr. FORBES. Doctor, I am not arguing that the Congress is doing everything right. I don't think that is what Mr. Conaway—what we are just saying is—I am sorry. Still, you are giving us goals. And what we are saying—we understand we need goals. That is okay to have. But what is the—

Dr. ROBYN. No, sir. That is a goal that you gave us.

Mr. FORBES. I am not saying that I am going to rubber-stamp everything Congress does. I am simply saying what Mr. Conaway is saying, is whether Congress gives the goal or whether DOD picks



the goal, what is the cost of the implementation to try to get to the goal?

Because I think you would agree with me at some point—even if we look, all of these energy points at some point in time, we are coming down to a situation that I have got to pick doing this or cutting out airplanes.

That is what Mr. Conaway just said. The American people need to know this is a good goal. But how many ships is it going to cost us? How many planes is it going to cost us? Because you may get to the end of that goal and it might not have done what you wanted it to do, whereas we know those ships and planes might have.

So my question is not so much the plan, but the cost. Do you not feel that this committee and this Congress and the American people should have the right to know those cost differentials—

Dr. ROBYN. I would be happy to lay that out in the context of what we think it will save longer term. Last year in a budget briefing, the Army said to me, “We didn’t have enough money to invest in technology to reduce our utility bills, because we were so strapped just to pay our utility bills.” That is crazy. We should be making investments—not just renewable, but energy-saving technology to reduce—we consume 20 billion—we spent \$20 billion a year on energy, 4 billion of that on facilities.

Mr. FORBES. Dr. Robyn, I wrote a plan, the New Manhattan Project. The Wall Street Journal has seen it and Fox News; all thought that was the way we should go to get where you want to go. So I am not going to argue the goals. I understand those.

All Mr. Conaway was asking is: Can you tell us the cost differential between getting energy one way and getting it with all of the requirements that we have put in the defense authorization bill?

And I don’t think we are going to get that figure; any more than we got a shipbuilding plan last year, we are going to get a budget this year. But I am just simply saying as humbly as I think I can, I think it is a reasonable request, and all we get back is a repeating of what goals are.

Dr. ROBYN. No. I feel like—I am happy to do that if I can show you long-term savings and if I can also quantify the benefits to energy independence.

Mr. FORBES. I think my good friend from Texas would love to have you show him anything else if you would just give him the cost.

Dr. ROBYN. Good. The Defense Science Board said in its 2008 report two big things: One, you are not looking at the fully burdened cost of fuel on the operational side. The actual cost of fuel is the tip of the iceberg. You are ignoring the soft underbelly, the logistics tail that it takes to get there. On the facilities side, their big message was you are not taking into account the risk to mission assurance from the vulnerability of the electricity grid. And part of their recommendation was increase use of renewables in combination with several other things.

And they made the point, which I have made, that we don’t put—we don’t quantify the benefits to mission assurance of this increased energy security. That is a benefit that goes unmeasured.

Mr. FORBES. And I think—and I don’t want to speak for him. But I think my good friend from Texas would be delighted for you to

put down any other costs that you would want to put down, any other projections, as long as you provide the committee with the cost of the two differentials. And then argue any way you want to go. That is okay. That is fair. It is just sometimes we feel like all we get is a restatement of the goals. And nobody ever comes back with the detailed costs.

And that is what Mr. Conaway was asking, I think, fair, to be able to say, because at some point in time, at some point in time, this chairman is going to have to make a decision in his mark between planes and between bullets and between other things that we have in some of these things. And it just helps us to know if we can get those details.

And with that, Mr. Chairman, I yield back.

Mr. ORTIZ. And this is so important, and this is why I said earlier, we need to work as a team together. The State legislature in Texas, as you well know, they meet once every 6 months, every 2 years. So they knew that we were about to have a problem, but they are not in session. So I think that by working together, and my question would be to the FAA, what can we do as a committee to help improve the application review process on the length of time afforded so that you can review? Or do you have the necessary authority to get more time to thoroughly review applications to protect military readiness? I mean, do you think that the 30 days that you have gives you ample time to do that? Maybe by putting the resources together—but this is going to become, believe me, a very serious problem, because we haven't touched yet on solar panels. And that is going to become another issue as well.

And I know, because we have the wind in South Texas, and we have the sunshine, and today a hurricane, but investors are wanting to come in and invest on another system, the solar system. But can you all work and maybe give us something in 30 days, and if it is a little more complicated, maybe 60 days? Do you think we can work together on that?

Ms. KALINOWSKI. Sir, your guidance and your leadership to us is probably sufficient. We will certainly take this under consideration. It will take formal rulemaking, which, as you well know, takes a long time. But what we can do is put on our website and work with the proponents of the Wind Energy Association and the individuals who wish to bring in both solar energy and wind turbines, to ask them voluntarily to come to us as early as possible. We will also work with our partners in government to bring forth a proposal for the possibility of the ability to work with proponents in confidence to protect their ability to not communicate exactly where they want to put the wind farms or the solar energy projects to other proponents, but to work with us so that we can better analyze at a much earlier stage, as you have encouraged us to do, to determine what the impact on national readiness for defense would be.

Mr. ORTIZ. Madam Secretary Robyn, what can we do to help you? Because we are all in the same boat. We want to work with you and each member of the panel this morning. What can we do to help you?

Dr. ROBYN. I think, we are—to complement the FAA process, we are, as I described, standing up a clearinghouse, a central point of contact, a 1-800 Butterball Turkey number, if you will, something

that makes it easy for developers to come to us early on a voluntary basis.

We do feel we need, we think the FAA probably needs the formal explicit authority to take into account training and test—our training and test missions. We are not—it is not certain that their current authority includes that.

Nancy mentioned a rulemaking, but some statutory guidance, statutory language might help. That is something that this inter-agency group, led by the National Security Council, is very focused on. It is probably—it is one of the single biggest issues. So, certainly at a minimum, within 30 days let you know where that process stands. I think that is the most concrete—that, together with this clearinghouse.

But with respect to training routes in particular, this—give you a status report on our thinking on the need for statutory authority. We are—it may make sense to try to use the defense bill as a way to get that authority if the other relevant committees were willing to do that.

Mr. ORTIZ. And I can assure you that members of this committee and the staff will work with you. As you can see, this is the first time we had a hearing such as this, and it has been very interesting. I think I have learned a lot.

And I am going to ask, Mr. Webster, is industry prepared to provide proposals earlier, Mr. Webster?

Mr. WEBSTER. AWEA and its stakeholders have been working intimately with the public agencies to inform them as to where our abilities are present to be as transparent as possible, with the caveat that the industry is a highly competitive industry and, therefore, is not necessarily in unison all the time with each other. It is fair to say that this issue has become of prominent importance because of the frequency and intensity of the conflagrations that have occurred; Shepherds Flat being the most recent but not the only one that has reached national prominence.

The reality is that wind energy is a component to the national security of this country. It is a component of stabilization of a quickly destabilizing world that we are living in. Fossil fuel has become a major point of conflict that we are constantly and increasingly deploying resources to deal with, either directly or indirectly. And wind energy and solar energy and other renewables are a solution, not just for the United States, but for the world. Someone has to be the leader in that. The United States has a history of being a leader in such initiatives, and we will continue to do so.

To this particular point, the solutions that can be brought to bear today with the political and financial willpower to solve the wind industry's issues with respect to radars would also increase the effectiveness and the efficiency of those same radars to accomplish their mission with or without a wind turbine being impacted by it. To that end, the economic forces that the industry can bring to bear on this issue have been and will continue to be offered to the public agencies to resolve this issue, both in a policy framework as well as a technological solutions framework.

Mr. ORTIZ. Thank you so much.

You know, in the beginning, when we saw the first windmills, the concern was for wildlife. Do you remember that? The birds.

Now, it has moved to another level, readiness. And we are very concerned.

But let me thank each panel member for giving us some great insight, that input that you have given us today. And you and us are going to work together because this is an urgent matter that we need to address. And thank you so much.

And there being no further questions, this hearing stands adjourned.

[Whereupon, at 12:38 p.m., the subcommittee was adjourned.]

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# **A P P E N D I X**

JUNE 29, 2010

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**PREPARED STATEMENTS SUBMITTED FOR THE RECORD**

JUNE 29, 2010

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**CHAIRMAN ORTIZ OPENING STATEMENT**  
**IMPACT OF WIND FARMS ON MILITARY READINESS HEARING**  
**READINESS SUBCOMMITTEE**  
**June 29, 2010**

This hearing will come to order. I thank our distinguished witnesses for appearing before this subcommittee today.

Today the Readiness Subcommittee will hear about wind farm development and its impact on military readiness. Overall, I am committed to renewable energy and the benefits it provides to the environment, the economy, and the country.

However, these projects should not be pursued at the expense of military readiness. Wind energy is a prime example of renewable energy, and although it is currently only 2 percent of domestic electricity supply, it is the fastest growing source of new energy generation in the country.

According to the Department of Energy, "The United States has enough wind resources to generate electricity for every home and business in the nation – but not all areas are appropriate for wind energy development."

Today, the industry is generating 14 times more wind energy across the United States than only 10 years ago. This increase is only expected to continue.

There are a variety of factors that contribute to the growth of wind energy, one of the most prominent being federal subsidies and stimulus money available to the industry.

A Department of Energy grant program entitles developers of renewable energy to 30 percent reimbursement of the cost of building a facility. Wind power projects were the largest sector, receiving 86 percent of the nearly \$2.6 billion that was disbursed. But, what stipulations are attached to that funding to protect military readiness interests?

The rise of wind farms could not be more apparent than in my home state of Texas. We lead the country in wind power capacity and generate one quarter of the nation's entire production, or approximately 9,000 megawatts.

This is enough electricity to power more than 2.5 million homes for one year. In my district alone, the Stimulus Bill provided more than \$440 million in direct contributions to wind farms. With the rise of wind energy, industry continues to seek attractive development locations – some of which are close to military installations.

A great example of this type of development is in my district at the Naval Air Station in Kingsville, Texas.

As one can see in the slide showing on the screen, wind farms will significantly impair the ability of the Kingsville radar system to monitor and detect small aircraft like those flown at the Naval Air Station.

Is this a problem? Yes.

Is there anything that we can do to preserve the military capabilities threatened by wind farm developments at Naval Air Station Kingsville and other military bases? In the short term, no. Am I concerned? You bet I am.

The Department of Defense has increasingly engaged to express reservations or objections to potential energy projects based on military readiness issues, specifically identifying conflicts with radars and existing training routes.

Each application for wind farm development is reviewed by the Federal Aviation Administration in coordination with the Department of Defense. However, I am deeply concerned about the lack of a coordinated, well-established review process within the Department of Defense to provide timely input for these green energy projects.

As a Committee, we address this concern in the Fiscal Year 2011 National Defense Authorization Act and look forward to working with the Senate to refine the final language in conference.

I don't consider it to be in our government's best interest to stunt the growth of this critical industry nor to expand wind farm development at the expense of military readiness.

There are many different facets of the issue and a variety of stakeholders. As subsidies continue and the industry expands exponentially, it is imperative to increase coordination between the Department of Defense and the Department of Energy on these efforts.

Beyond government coordination, industry as a whole needs to take ownership of their role in diminishing the impacts of wind farms on military readiness, and increase innovation to reduce conflicts with military radars and training routes.

To that end, I want to hear what specific actions the government and industry partners are taking to:

1. Improve the review process;
2. Identify mitigation efforts; and
3. Invest in research and development solutions.

I want to conclude my opening statement by restating my commitment to pursue all energy solutions in partnership with the Administration, but not at the expense of military readiness.

Ladies and gentlemen, I think that we have a lot to discuss today and I look forward to hearing you address these important issues.

The Chair recognizes the distinguished gentleman from Virginia, Mr. Forbes, for any remarks he would like to make.

Today, we have a panel of distinguished witnesses representing a cross-section of views including the Department of Defense, the Federal Aviation Administration, and industrial perspectives.

Our witnesses include: Dr. Dorothy Robyn, Deputy Under Secretary of Defense for Installations and Environment, Department of Defense; Major General Lawrence Stutzriem, Director of Plans, Policy and Strategy for North American Aerospace Defense Command and U.S. Northern Command; Ms. Nancy Kalinowski, Vice President for System Operations Services of the Air Traffic Organization in the Federal Aviation Administration; and Mr. Stu Webster, Co-Chair of the American Wind Energy Association's Siting Committee. Without objection, the witnesses' prepared statements will be accepted for the record.

HOLD UNTIL RELEASED  
BY THE COMMITTEE

**Statement of**

**Dr. Dorothy Robyn**  
**Deputy Under Secretary of Defense**  
**(Installations and Environment)**

**Before the**  
**House Committee on Armed Services**  
**Subcommittee on Readiness**

**Impact of Wind Farms on Military Readiness**

**June 29, 2010**

Thank you for the opportunity to testify about the impact of wind turbines on military readiness. As the Deputy Under Secretary of Defense for Installations and Environment, I co-chair a standing group whose charter is to protect the Department of Defense test, training and launch ranges. I am accompanied by Major General Lawrence Stutzriem, the Director of Strategy, Policy and Plans for the North American Aerospace Defense Command (NORAD) and the U.S. Northern Command (USNORTHCOM). As you know, NORAD is a U.S. and Canadian organization co-located with USNORTHCOM and charged with providing aerospace warning and control and maritime warning to protect North America; USNORTHCOM's primary mission is homeland defense. Together with the Department of Homeland Security (DHS), NORAD and USNORTHCOM oversee a worldwide system of long-range radars and sensors that support their closely linked missions. Gen. Stutzriem and I both have spent considerable time dealing with the issue that is the focus of today's hearing, and we are gratified by the Committee's interest.

### **Introduction**

I would like to begin with a recent example of the challenge and opportunity the Department of Defense faces. On March 1, 2010, the Federal Aviation Administration (FAA) issued a Notice of Presumed Hazard for a proposed 338-turbine wind farm in north central Oregon, based largely on an objection from NORAD and USNORTHCOM. The two agencies were concerned that the proposed project—on top of the 1800 turbines already constructed and the others already approved for construction in that region—would create electromagnetic interference sufficient to impair the effectiveness of the long-range surveillance radar near Fossil, Oregon.

The FAA decision brought to a halt a major renewable energy project, Shepherds Flat, that had been underway for five years (construction of the turbines was set to begin in May) and that had attracted several hundred million dollars in investment. The ensuing controversy led to extensive discussions between DoD and both project advocates (Caithness Energy and General Electric) and other federal agencies. It also prompted a great deal of analysis and discussion within the Department. Among other things, in late April, we commissioned a 60-day study by the Massachusetts Institute of Technology's Lincoln Laboratory to identify measures that could mitigate the electromagnetic interference.

On April 30, DoD withdrew its objection to the project based largely on two considerations. One, internal DoD analysis indicated that the impact of the additional turbines would not be as severe as initially thought. Two, the Department was optimistic that Lincoln Lab would be able to identify mitigation measures—measures that could be implemented during the 18 months it would take the developer to construct the turbines.

DoD's (initial) objection to the Shepherds Flat project was something of an exception: the vast majority of all wind turbines proposed through the OE/AAA process raise no concerns for the Department, and for those that do raise concerns, we can generally find a way to mitigate the problem. Objections by the Department could become more common, however. Some areas such as the Mojave Desert in which DoD does significant radar-dependent testing and training are prime areas of interest for wind energy developers. And in a growing number of regions such as the Columbia River Gorge and the Great Lakes, the cumulative impact of turbines is

reaching a threshold point for the surveillance radars that NORAD, USNORTHCOM and DHS maintain. (Soon after DoD withdrew its objection to the Shepherds Flat project, the FAA issued a Notice of Presumed Hazard on another proposed wind farm near the Fossil, Oregon, long-range radar based on a similar objection by NORAD and USNORTHCOM.)

This creates a dilemma for the Department. Above all, we must maintain the capabilities needed to defend the nation, including our surveillance network and our irreplaceable test and training ranges. At the same time, the Department strongly supports the development of renewable energy and is a recognized leader in the use of solar, geothermal, wind and other renewable sources. The use of renewable energy at forward operating bases can reduce the need for electricity powered by fuel, which costs lives as well as dollars to transport to theater. (One commanding general in Iraq famously challenged the Department to “unleash us from the tether of fuel.”) Greater reliance on distributed renewable energy sources can help our domestic installations maintain mission-critical activities in the event of disruption to the commercial electricity grid. More broadly, the development of clean energy can reduce our country’s dependence on fossil fuels and mitigate the effects of global climate change which, as our Quadrennial Defense Review made clear, are themselves national security challenges.

My fundamental message today is that the Department of Defense believes that it can and must minimize the occurrence of incidents like Shepherds Flat, where DoD’s mission needs conflict with the development of renewable energy. Although individual conflicts may be unavoidable, the country should not and does not have to choose between national security and the development of renewable energy.

Three steps are key. First, the federal government needs to improve the renewable energy project siting process, so that potential interference can be identified early and mitigated more easily. Second, DoD and other key agencies need to realign their research and development priorities so as to give more attention to this issue, recognizing that a critical protection for our mission interests is the ability to mitigate potential interference by technological means. Third, DoD and other agencies should look at the current plan for upgrading older surveillance radar with an eye to whether the schedule is sufficiently aggressive and the improved technology will adequately mitigate wind turbine interference.

Below, I briefly discuss the technical problem posed by wind turbine interference. I then review concerns with the process for federal approval of wind projects, which exacerbates the conflicts between wind energy and military requirements and makes them more difficult to mitigate. Finally, I outline what the Department is doing to address these problems.

### **The Technical Problem**

Wind turbines can interfere with the effectiveness of radar and other electromagnetic systems that are critical to national security. Although solar towers and even buildings can cause interference, wind farms are the most common source of the problem. Wind turbines interfere with radar in two ways. One is blockage, which results when wind turbines keep the radar system’s microwave signals from reaching their intended targets. The other form of interference



is “clutter,” which is created by unwanted reflections of the radar signals from wind turbine towers and their moving blades. The blockage and clutter that turbines create reduce the sensitivity and performance of the radar, producing shadowed areas and false targets that make it difficult or impossible for the radar operator to see an actual target.

For DoD, the problem arises in two different contexts. The first involves the long-range radars managed by NORAD and USNORTHCOM to maintain airspace surveillance and air defense. These FAA radars are decades old and many still use analog signal processors, which are inherently less effective at removing wind turbine clutter. Although all long-range radars lose targets and have tracking problems in the vicinity of wind turbines, advanced digital signal processors on newer radar systems perform better than their analog counterparts and can be upgraded more easily through improved software.

Second, wind turbines can affect DoD’s test and training missions. When DoD tests a new weapon system, it must have an electromagnetically pristine environment in which to collect baseline data about the performance and characteristics of the weapon. Interference from nearby wind farms can compromise the telemetry, tracking radar and other electromagnetic systems used to conduct these tests. Likewise, the Department’s training mission can suffer when air traffic control radars used to train pilots are degraded by wind turbine clutter and shadowing.

Although scientists have a reasonably good understanding of the technical problem, more research is needed to identify technological means to mitigate the impact of wind turbines on radar systems. One promising avenue is advancements in signal processing, which allow the removal of known false targets when the raw data collected by the radar is transformed into a visual display. The federal government also needs more sophisticated tools for estimating the impact of a proposed wind farm on specific radar systems. Current tools have low fidelity and are inherently subjective; at best, they are blunt instruments.

#### **Concerns with the Siting Review Process**

DoD relies primarily on the FAA’s Obstacle Evaluation/Airport Airspace Analysis (OE/AAA) process to identify and prevent potential interference problems. The OE/AAA process was established in the 1960s primarily to identify proposed towers, buildings and other objects that could reduce airspace safety, and it has not been updated to reflect current national security needs and operations. Under the OE/AAA process, a developer must give the FAA only 30 days notice of the start of construction. This timing reflects the FAA’s principal concern with air safety and air space conflicts: the FAA needs to know the exact coordinates of a proposed object, which may not be finalized until close to the start of construction. Moreover, most air space conflicts can be resolved relatively easily and thus need not hold up construction. By contrast, when DoD raises a concern at this late stage, particularly on something like a large wind farm project, which has by then secured environmental permits and substantial capital backing, it can create serious financial and execution challenges for the developer.

To help avoid this problem, DoD has posted a red-yellow-green map on the OE/AAA web page to notify developers of potential conflicts with long-range radars. (For example, the region

around Fossil, Oregon, has for several years been shaded yellow, which indicates that additional turbines may pose a conflict.) In addition, military base and range commanders try to identify planned renewable projects well before they reach the FAA, by engaging with local and regional planning officials and development approval authorities among others. These outreach efforts do not always succeed, however, because of developers' desire to protect proprietary information. Moreover, communication between an installation and a developer is not always adequate. In the Shepherds Flat case, the developer received a green light from a local Air Force base and mistakenly interpreted that to be an Air Force-wide position.

Even when DoD learns of a project only after it has been filed with the FAA, we work with the developer to alleviate conflicts. To date, these efforts have been largely successful. Absent the kind of changes discussed below, however, the number of projects raising DoD concerns will likely increase, as developers take advantage of time-limited grants and tax subsidies and as the number of turbines in specific areas reaches a threshold impact.

In addition to the timing problem, the Department may have another concern with the OE/AAA process: the underlying statutory and regulatory language may not be sufficiently broad or explicit to handle concerns related to our test and training mission. To date, the FAA has supported DoD's interests, as is appropriate given that the Department of Transportation's mission includes protection of national security. Nevertheless, the two departments need to work together to ensure that the OE/AAA process adequately covers all of our missions.

Finally, it is worth noting that the siting review process is most conducive to early cooperation and successful mitigation if the project—or a right-of-way-access to the project—is to be built on public land. First, there is a single landowner, which simplifies the process. DoD has a Memorandum of Understanding with the Department of Interior's Bureau of Land Management (BLM), the largest federal landholder, to evaluate and resolve conflicts on the land it manages, and we anticipate entering similar agreements with other federal agencies. Second, because the developer must get a right of way or lease from the public landowner well before it goes to the FAA, DoD gets what amounts to an early notification of the proposed project.

By comparison, early identification and resolution of conflicts is more difficult when the project is to be built on private land and requires no right-of-way on public land. In some counties and states, developers and landowners do not have to file a land-use permit or notification prior to going to the FAA. Thus, DoD may not learn of a project until shortly before groundbreaking. (In the case of Shepherds Flat, the county required that the developer have a green light from the FAA before it would grant the necessary permits. Nevertheless, NORAD and USNORTHCOM did not learn of the project until the developer filed with the FAA.)

### **Fixing the Problem**

The problems described above are serious but solvable. Along with other federal agencies, the Defense Department needs to move out on several parallel tracks. Let me first describe what is needed, conceptually. Then I will summarize some of the concrete steps that DoD and other federal agencies are taking.

First and most immediately, the federal government needs to improve the process for reviewing renewable projects, so that potential interference can be identified early and mitigated more easily. One, there needs to be a mechanism for early and confidential consultation between individual energy developers and the Department of Defense. Two, to facilitate that consultation and negotiation process, the Department needs to have a single point of contact on renewable energy siting. Three, the scope of the OE/AAA process may need to be expanded to address national security concerns that are not currently covered. Some federal officials have suggested that DoD institute its own regulatory process rather than rely on the FAA and other federal agencies that review proposed renewable energy projects. However, the Department does not want to become a regulator, nor does the wind energy community want us to take on that role.

Second, the key federal agencies, including DoD, need to realign their research and development priorities to give greater attention to this issue. Even with an improved renewable energy siting process, DoD will have to contend with potential electromagnetic “encroachment” from wind turbines and other structures. Technology must become one of the military’s primary means of protection in this domain as in other domains. The R&D should address modeling tools to estimate the impact of proposed structures as well as mitigation technology itself.

Third, federal agencies should look at the current plan for upgrading the older surveillance radar. At least two question merit analysis. One, is the current schedule for upgrading the radar sufficiently aggressive (e.g., the Service Life Extension Program, or SLEP, for the Fossil, Oregon, long-range radar is scheduled for 2014)? Two, will the technology slated for insertion as part of the SLEP do an adequate job of mitigating wind turbine interference?

DoD and other federal agencies are taking a number of concrete steps along these lines, partly in response the Shepherds Flat controversy. With respect to improving the project siting review process, three developments are worth noting. First, the National Security Council (NSC) recently initiated an interagency process to review the OE/AAA process and consider options for improving it and updating it with an eye to current and future national security interests. This interagency effort is examining both short-term and longer-term changes to the review structure.

Second, within the Department, I am working with the Deputy Under Secretary of Defense for Readiness and the Principal Deputy Director for Operational Test and Evaluation to establish a central clearinghouse for DoD’s evaluation of proposed wind energy projects. Although the clearinghouse will cover other forms of renewable energy as well, we anticipate that wind energy will be its major focus. Our goal is to create a streamlined, transparent and “layered” process—i.e., one that can approve easy cases quickly and apply increasingly sophisticated tools to the harder ones.

We are currently defining the organizational and management requirements to implement this clearinghouse. A key requirement is to do outreach to the energy industry to encourage developers to come to us early in the development process. Toward that end, we are looking at whether we need statutory or other authority to protect proprietary project information. In addition to outreach, we will need to conduct “in-reach” to let military service and defense

agency staff know that this DoD office is available to support their mission in the broader context of our nation's goal to expand renewable energy resources.

Third, we plan to hold a multi-session "dialogue" with outside groups, including the wind industry and its major trade association, the American Wind Energy Association (AWEA); conservation and environmental groups; landowner representatives; and state and local groups. Our proposed changes to DoD and interagency processes should not occur in a vacuum but rather be developed based on input from interested parties. We are already collaborating with a number of these groups: for example, we are working informally with conservation and environmental organizations among others to develop a set of voluntary siting criteria for permitting authorities to use in their project review process. Our planned dialogue will formalize and expand this collaborative process.

With respect to research and development, we are pursuing multiple initiatives as well. First, as one immediate offshoot of the NSC-led interagency committee described above, the White House Office of Science and Technology Policy has convened an interagency group to develop a plan for R&D on the wind turbine-radar interference problem. The plan will include mitigation technologies such as advanced digital signal processing as well as models and metrics with which to better estimate the impact of a proposed wind farm on a specific type of radar.

Second, DHS will soon award a contract to develop an iterative, three-dimensional model to characterize the impact of wind turbines on long-range radars. The model's specifications were developed by a wide range of stakeholders, including DoD, the National Oceanographic and Atmospheric Administration, the FAA and AWEA.

Finally, the Department is taking steps to make the turbine-radar issue a research priority. For example, NORAD/NORTHCOM has included its surveillance mission on its Integrated Priority List, which provides guidance for how the Services should allocate their R&D resources. This is a necessary step in getting the Air Force Research Laboratory and other DoD R&D offices to see the turbine-radar issue as mission-relevant.

### **Conclusion**

To maintain military readiness and homeland defense, the Department must protect its irreplaceable test and training ranges and maintain its radar-based surveillance network. At the same time, we support the development of wind energy as a means toward greater energy security goals, among other goals. These two sets of goals can and should be compatible, and I have identified the broad changes necessary to reduce current conflicts. We look forward to working with the Congress to implement these changes.

STATEMENT OF NANCY KALINOWSKI, VICE PRESIDENT, SYSTEM OPERATIONS SERVICES, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION BEFORE THE HOUSE ARMED SERVICES COMMITTEE, SUBCOMMITTEE ON READINESS ON THE IMPACT OF WIND FARMS ON MILITARY READINESS, JUNE 29, 2010.

Chairman Ortiz, Congressman Forbes, Members of the Subcommittee:

Thank you for the opportunity to appear before you today. My name is Nancy Kalinowski and I am the Vice President of System Operations Services for the Federal Aviation Administration (FAA). In that capacity, I am charged with overseeing the process by which we evaluate the impact of proposed construction on the navigable airspace. Any proposed structure that could potentially interfere with navigable airspace must be evaluated by my office. The evaluation results in an agency finding of whether the proposed structure is a hazard for air navigation. During the evaluation, our Obstruction Evaluation Services office works with the individual or entity that submits the proposal, as well as other interested FAA offices and government agencies, as required. In recent years, as the need for alternative energy has become a major focus of government and industry, the volume of proposed wind turbines submitted to the FAA for review has increased dramatically. As such, it is certainly fitting to discuss how we review these proposals to understand the process and evaluate potential improvements.

The FAA is vested with broad authority to manage the navigable airspace and develop plans and policies for its use. Whether by regulation or agency order, the FAA ensures the safety of aircraft and efficient use of the airspace. Navigable airspace is a limited national resource and the FAA's primary mission in this context is to preserve that

resource for aviation; however, we are also called upon to negotiate equitable solutions to conflicts over the use of the airspace for non-aviation purposes. There is a statutory requirement that a person or entity (a “proponent”) give adequate public notice of the construction, alteration, establishment or extension of any structure when such notice would ensure the safety of air commerce as well as the efficient use and preservation of navigable airspace and/or airport capacity. Generally, public notice is required if the structure is more than 200 feet in height above ground level, near or on an airport (military or public use) or heliport, or if such a notice is specifically requested by the FAA. The notice provides the FAA with the opportunity to identify the potential aeronautical hazards to minimize any adverse affects to aviation. It is the proponent’s responsibility to propose mitigation in response to identified hazards. If the FAA can take action to address the hazard, that action can be part of the mitigation plan, but the cost of mitigation, including upgrading navigational aids, if required, is borne by the proponent. Mitigating actions could also include revising published data or issuing a Notice to Airmen (NOTAM) to alert pilots to airspace or procedural changes made because of a structure. In addition, mitigation could include recommending appropriate markings and lighting to make the structure visible to pilots or depicting structures on aeronautical charts to inform pilots and improve safety.

Structures that require notice may include buildings to antenna towers – essentially anything that meets the criteria noted above. This would include wind turbines and the new generation of wind turbine generators, which can be more than 400 feet in height and have blades that spin up to 200 miles per hour. Each wind turbine is evaluated

separately, but the cumulative effect of the wind turbines on navigable airspace will obviously be more significant based on the total number of turbines grouped together. The number of wind turbine cases handled by the FAA has increased from 3,030 in 2004 to 25,618 last year. To date in 2010, we have 18,685 wind turbine cases. One concern that the wind turbines raise is that the blade tips rotate above the radar, thus affecting the capability of the target to be received on the radar equipment. Additionally, they reflect radio waves, and exceed the line of sight protection criteria. To give you an idea of the impact of wind turbines on long range radar, there is a radar cross section spectrum that identifies how clearly a range of objects are picked up on the radar. Insects and birds are at the low end. Conventional cruise missiles are in the mid range. Most aircraft are a little higher in the spectrum, with large aircraft (e.g., a Boeing 747) and the space shuttle at the highest end of the spectrum. Wind turbine blades spinning, in some instances, at more than 200 miles per hour are picked up by radars with a signal strength greater than a Boeing 747. Because the radar repeatedly sees this large return, the radar will not pick up actual aircraft in the same area.

The clutter that is created by wind turbines can result in a complete loss of primary radar detection above a wind farm. When that clutter occurs, it appears at all altitudes, so simply directing the aircraft to a different altitude does not solve the problem. Similarly, on the Next Generation Weather Radar (NEXRAD), wind farm activity looks remarkably like storm activity, thus complicating the communication of precise weather information by controllers to pilots. (Wind turbine impacts on NEXRAD, which are owned and operated by the National Oceanic and Atmospheric Administration, are not currently

considered in FAA's evaluation process.) Existing FAA radars have limited capability to filter out clutter. The radar can be modified by increasing the sensitivity to reduce clutter from the wind turbines, but in doing so, what the radar can see is also reduced, to the point where actual aircraft targets can drop off. Consequently, there are real and significant issues that must be evaluated by the government prior to the approval of wind turbines.

Although not an issue of consideration in the evaluation process, another issue of some concern is that there is competition for the land which both the radars and the wind turbines need to occupy. Lease holders who currently have primary radars are now being offered substantial financial incentives not to renew their leases with the FAA and instead, lease to companies that want to install wind turbines. This puts the FAA in the undesirable position of having to condemn property at fair market value to avoid losing the use of the navigational aid. The call for the FAA to simply move its radars to accommodate requests to install wind turbines fails to take into account that this is not a realistic option for a number of reasons. The FAA cannot take down a radar without an unacceptable loss of coverage. Even assuming an acceptable, alternate site could be identified, the radar could not simply be moved. Rather, a new radar would have to be installed at the new location. The reality is that the FAA does not have extra radars available for replacement and there are no spare long range radars. Even if a new radar were available, moving the radar site would require changes to the national airspace system. Airways, reporting points, and airspace fixes are parts of the airspace system that could be impacted. Depending on the situation, such changes could require regulatory



action. The bottom line is that moving radars around the country is a costly, disruptive, unacceptable, and unworkable proposition. It may sound simple, but in fact, it is not something the FAA can accommodate or the taxpayers can afford.

So having set forth the complexity and concerns of locating wind turbines near primary radars, let me now turn to how we attempt to strike the balance between the need for an uninterrupted radar signal and the clean energy that wind turbines supply. The current regulatory requirement is that the proponents must file notice with the FAA as early in the planning process as possible, but no later than 30 days prior to the date the proposed construction is expected to begin. The 30 day timeframe has been in place for 45 years and was appropriate for single, stationary structures that the FAA largely dealt with at that time. Wind turbines have a cumulative effect, so the evaluation of their impact is significantly more complicated than single, stationary structures.

Ninety-seven percent of the notices the FAA receives are sent electronically, where the proponents simply fill out a form online. The FAA acknowledges receipt of the notice and, after an initial study, issues a determination of whether or not a hazard exists. The initial study normally takes 30 days, but as noted, a wind turbine's cumulative implications can require more extensive evaluation within the FAA, the Department of Defense (DoD), and the Department of Homeland Security (DHS). Each time the status of the applicant's proposal is changed, the applicant will be notified by FAA of the change. The initial evaluation includes review by FAA's Offices of Airports, Flight Standards, Frequency Management, and appropriate military organizations. The offices

typically respond online with whether they have an objection and what the objection is. It is then incumbent on the proponent to propose mitigation.

The FAA's authority to issue hazard determinations is limited to the scope of Part 77 of Title 14, Code of Federal Regulations. The FAA lacks the authority to evaluate impacts to airspace not within our jurisdiction. For example, if wind turbines are located more than 12 miles offshore and, therefore, are not in U.S. territorial waters, the FAA lacks the authority to declare them a hazard, even if the military has concerns with the placement or cumulative impact of those wind turbines.

Our role in making hazard determinations can require the FAA to facilitate the exchange of information between the proponent and the objecting governmental entity. This process can take a considerable period of time depending upon how well negotiations proceed between the parties.

In conclusion, the FAA has an efficient means of processing wind turbines proposals, which includes evaluating all valid aeronautical comments, reviewing all pertinent analytical reports, and issuing determinations that take into account all comments and findings. Although we believe the process works well, we are always considering potential improvements and modifications, including whether the 30 day review is realistic when considering the latest highly complex structures, a grouping of which can have an unwanted cumulative effect. We are open to discussion of how to improve the process.

Thank you for the opportunity to describe FAA's role in this very important process.

This concludes my statement. I will be happy to answer your questions at this time.

**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  
June 29, 2010**

**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<sup>1</sup> - 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.

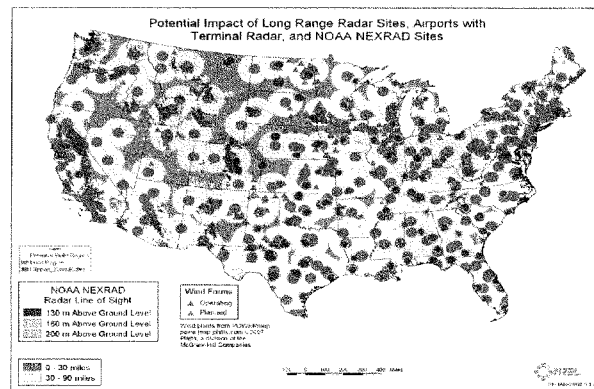
However, we have concerns with language proposing the establishment of military mission impact zones in which it would be difficult, if not impossible, to site wind farms. In my written testimony is a map with red/yellow/green areas. The red represents circles drawn around radar assets at 30 miles. The 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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<sup>1</sup> 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**

A. Auld, *Options for mitigating the impacts of wind turbines on NERL's primary radar infrastructure*, January 31, 2007.

BAE Systems, Inc., *Stealth Technology for Wind Turbines*, December 2007.

Blackman, Geoff, *Candidate Solutions*, presented to the National Wind Coordinating Collaborative State of the Art Wind Siting Seminar, October 2009.

Concurrent Technologies Corporation, *Wind Turbine Impacts on Military Operations and Mitigation Strategies Report*, for the U.S. Air Force, April 28, 2010.

JASON, *Wind Farms and Radar*, Report No. JSR-08-125, January 2008

G. Poupart, *Wind Farms Impact on Radar Aviation Interests – Final Report*, September 2003.

Lok, Dr. Francis and Peter Drake, *Raytheon Wind Farm Mitigation Update*, presented to the National Wind Coordinating Collaborative State of the Art Wind Siting Seminar, October 2009.

M.M. Butler, D.A. Johnson, *Feasibility of Mitigating the Effects of Wind Farms on Primary Radar*, 2003.

**DISCLOSURE FORM FOR WITNESSES  
CONCERNING FEDERAL CONTRACT AND GRANT INFORMATION**

**INSTRUCTION TO WITNESSES:** Rule 11, clause 2(g)(4), of the Rules of the U.S. House of Representatives for the 111<sup>th</sup> Congress requires nongovernmental witnesses appearing before House committees to include in their written statements a curriculum vitae and a disclosure of the amount and source of any federal contracts or grants (including subcontracts and subgrants) received during the current and two previous fiscal years either by the witness or by an entity represented by the witness. This form is intended to assist witnesses appearing before the House Armed Services Committee in complying with the House rule.

**Witness name:** Mr. Stu Webster

**Capacity in which appearing:** (check one)

☐ Individual

☒ Representative

**If appearing in a representative capacity, name of the company, association or other entity being represented:** American Wind Energy Association

**FISCAL YEAR 2010**

federal grant(s) / contracts	federal agency	dollar value	subject(s) of contract or grant
Grant	DOE	\$50,000	Small wind

**FISCAL YEAR 2009**

federal grant(s) / contracts	federal agency	dollar value	subject(s) of contract or grant
Grant	DOE	\$21,189	Small Wind/Transmission

**FISCAL YEAR 2008**

Federal grant(s) / contracts	federal agency	dollar value	subject(s) of contract or grant
Grant	DOE	\$70,373	Small Wind Transmission

**Federal Contract Information:** If you or the entity you represent before the Committee on Armed Services has contracts (including subcontracts) with the federal government, please provide the following information:

Number of contracts (including subcontracts) with the federal government:

Current fiscal year (2010): \_\_\_\_\_;  
 Fiscal year 2009: \_\_\_\_\_;  
 Fiscal year 2008: \_\_\_\_\_.

Federal agencies with which federal contracts are held:

Current fiscal year (2010): \_\_\_\_\_;  
 Fiscal year 2009: \_\_\_\_\_;  
 Fiscal year 2008: \_\_\_\_\_.

List of subjects of federal contract(s) (for example, ship construction, aircraft parts manufacturing, software design, force structure consultant, architecture & engineering services, etc.):

Current fiscal year (2010): \_\_\_\_\_;  
 Fiscal year 2009: \_\_\_\_\_;  
 Fiscal year 2008: \_\_\_\_\_.

Aggregate dollar value of federal contracts held:

Current fiscal year (2010): \_\_\_\_\_;  
 Fiscal year 2009: \_\_\_\_\_;  
 Fiscal year 2008: \_\_\_\_\_.

**Federal Grant Information:** If you or the entity you represent before the Committee on Armed Services has grants (including subgrants) with the federal government, please provide the following information:

Number of grants (including subgrants) with the federal government:

Current fiscal year (2010): \_\_\_\_\_ 1 \_\_\_\_\_ ;  
 Fiscal year 2009: \_\_\_\_\_ 1 \_\_\_\_\_ ;  
 Fiscal year 2008: \_\_\_\_\_ 1 \_\_\_\_\_ .

Federal agencies with which federal grants are held:

Current fiscal year (2010): \_\_\_\_\_ DOE \_\_\_\_\_ ;  
 Fiscal year 2009: \_\_\_\_\_ DOE \_\_\_\_\_ ;  
 Fiscal year 2008: \_\_\_\_\_ DOE \_\_\_\_\_ .

List of subjects of federal grants(s) (for example, materials research, sociological study, software design, etc.):

Current fiscal year (2010): \_\_\_\_\_ Small Wind \_\_\_\_\_ ;  
 Fiscal year 2009: \_\_\_\_\_ Small Wind/Transmission \_\_\_\_\_ ;  
 Fiscal year 2008: \_\_\_\_\_ Small wind/ Transmission \_\_\_\_\_ .

Aggregate dollar value of federal grants held:

Current fiscal year (2010): \_\_\_\_\_ \$50,000 \_\_\_\_\_ ;  
 Fiscal year 2009: \_\_\_\_\_ \$21,289 \_\_\_\_\_ ;  
 Fiscal year 2008: \_\_\_\_\_ \$70,373 \_\_\_\_\_ .



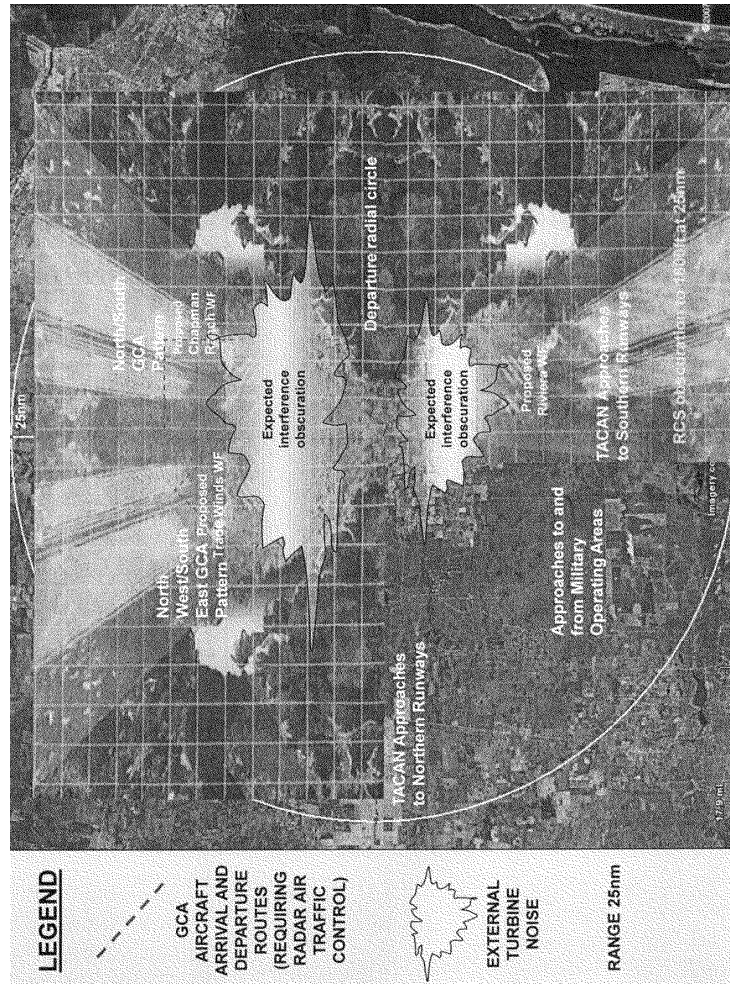
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**DOCUMENTS SUBMITTED FOR THE RECORD**

JUNE 29, 2010

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**WITNESS RESPONSES TO QUESTIONS ASKED DURING  
THE HEARING**

JUNE 29, 2010

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#### **RESPONSE TO QUESTION SUBMITTED BY MR. ORTIZ**

Ms. KALINOWSKI. Although the FAA does not gather or track information on proximity of wind farms to military bases or military installations, we have conducted a review of our obstruction evaluation automated system records. This review indicates that during the last 5-year period, 19,972 determined wind turbine/met tower proposals were located within a 5-nautical mile radius of long-range radars, military and joint use airports, military facilities and military radars, and/or have exceeded the parameters of the Military Conflicts program. The Department of Defense sets up its own parameters on which information in our automated system it wishes to receive, and is also solely in control of the notifications it requires and receives. [See page 12.]

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#### **RESPONSE TO QUESTION SUBMITTED BY MR. FORBES**

Mr. WEBSTER. According to the AWEA 2nd Quarter 2010 market report (<http://www.awea.org/publications/reports/2Q10.pdf>), over 33,700 wind turbines were installed in the U.S. as of June 2010. With respect to the second part of the question, the number of additional wind turbines over the next five years is impossible to predict. The number will depend greatly on market demand and government policy. Over just the last few years, installations have varied from 2,385 megawatts in 2005, to 10,000 megawatts in 2009. Installations in 2010 are expected to be below the 2009 numbers. Therefore, I can only give a wide range of possible installations over the next five years. This is merely illustrative and is not a prediction: the U.S. could install anywhere from 3,000 to 6,000 additional turbines per year. Though, it could be less or maybe more depending on market demand and turbine size. [See page 14.]

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#### **RESPONSE TO QUESTION SUBMITTED BY MR. CONAWAY**

General STUTZRIEM. The Department's investment in renewable and other alternative energy sources is the second part of a twofold strategy. The first part is reducing the demand for traditional energy through conservation and energy efficiency; investments that curb demand are the most cost-effective way to improve an installation's energy profile. The second part—investments designed to expand the supply of renewable energy sources on base—is also important. Although the payback period is significantly longer than that for energy efficiency projects, renewable energy is key to energy security. When combined with microgrid technology and energy efficiency investments that significantly reduce demand, distributed renewable energy sources will allow installations to carry out mission-critical activities and potentially serve as mini-islands that can support restoration of the grid in the event of disruption.

A report of the Defense Science Board highlighted the importance of energy security to the Department. According to the report, DoD's reliance on a fragile commercial grid to deliver electricity to its installations places the continuity of critical missions at serious and growing risk.<sup>1</sup> Most installations lack the ability to manage their demand for and supply of electrical power and are thus vulnerable to intermittent and/or prolonged power disruption due to natural disasters, cyberattacks, and sheer overload of the grid.

The changing role of the military's fixed installations accentuates this concern. Although in the past these installations functioned largely to train and deploy our combat forces, increasingly they have a more direct link to combat operations, by providing "reachback" support for those operations. For example, we operate Predator drones in Afghanistan from a facility in Nevada and analyze battlefield intelligence at data centers in the United States. Our installations are also becoming more important as a staging platform for homeland defense missions. This means

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<sup>1</sup>"More Fight-Less Fuel," Report of the Defense Science Board Task Force on DoD Energy Strategy, February 2008.

that power failure at a military base here at home could threaten our operations abroad or harm our homeland defense capability.

Notwithstanding the importance of energy security and the relationship between energy security and renewable energy, the DoD in fact spends less per MBTU for renewable energy than for electricity from the grid. In 2009, the Department spent a total of \$3,784 million to buy 220.6 trillion BTUs of facility energy. This averages to \$17.15 per MBTU. In the same year, the Department spent \$62.9 million to buy 3,726 billion BTUs of renewable energy, which averages to \$16.89 per MBTU.

The figures above for renewable energy do not include production from Government-owned sources of renewable energy, nor do they include production of geothermal energy at China Lake.

The 270 megawatt geothermal plant at China Lake is one example of a renewable energy project that has significantly reduced the Department's facility energy costs. The plant is operated by a private firm under a lease that provides funding back to the Navy, which is used to purchase additional power and to invest in other energy efficiency and renewable energy projects. Another example of a highly advantageous renewable energy project is the 14 megawatt photovoltaic plant at Nellis AFB. The Nellis solar array was installed by a private company; under the terms of the agreement with the company, DoD purchases power from the plant at a steep discount as compared to the prevailing energy rate (\$22/MWH compared to prevailing \$78/MWH). [See page 20.]



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**QUESTIONS SUBMITTED BY MEMBERS POST HEARING**

JUNE 29, 2010

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#### QUESTIONS SUBMITTED BY MR. ORTIZ

Mr. ORTIZ. Is the Department willing to accept decreased military readiness to support national energy initiatives?

Dr. ROBYN. No—but it doesn't have to. According to the data we've collected to date—primarily centered on the southwestern US—the Department has raised no objection to more than 93% of proposed projects.

Mr. ORTIZ. In Shepherds Flat, Oregon, the FAA, acting in response to DOD's concerns, issued a proposed notice of hazard with regard to the impact to an air defense radar at Fossil, Oregon. After public concerns were considered, the FAA reversed the warning and allowed the wind farm development to continue. What is the impact to military readiness and operations as a result of the wind farm development at Shepherds Flat? What are the lessons learned from the Shepherds Flat wind farm project in the review of future wind farm proposals?

Dr. ROBYN. After extensive study, we concluded that the risks presented by Shepherds Flat would not be as severe as initially thought. We've looked at all the known projects that could impact the Fossil radar and have concluded those risks are manageable—but we must review future development case-by-case to ensure we can continue to manage the operational risk. The major lesson learned is that the current regulatory and permitting process for wind farms was not designed with homeland defense or military testing and training in mind; we must move to an early voluntary notification process so the Department can work with developers and localities to find win-win siting and technical solutions.

Mr. ORTIZ. In response to a wind farm application, how is the Department currently organized to provide timely feedback to the FAA? Which organizations review the applications for both readiness and operational equities? Will the Department take any steps to reorganize to better review and expedite applications to provide timely feedback to the FAA?

Dr. ROBYN. Until recently, the process was ad hoc, involving case-by-case coordination among the Offices of the Deputy Under Secretaries of Defense for Installations and Environment and for Readiness, the Assistant Secretary of Defense for Homeland Defense, the Director of Test and Evaluation, the Joint Staff, the Service Secretariats, and the Service Staffs. To streamline and institutionalize the process—and to facilitate timely communication with the FAA, other governmental entities, and industry—we are creating an Energy Siting Clearinghouse to manage the review process and serve as a "one-stop shop" for all inquiries and staff actions regarding utility-scale generation and transmission projects. I hired the director on July 26, and in mid-September we executed contracts to hire staff, procure IT support, and draft the departmental instruction that will govern clearinghouse processes.

Mr. ORTIZ. Considering the FAA elects not to implement their statutory review authority to protect military training routes, what is the Department's response to an obstruction in a military training route corridor? Does the Department need additional authority to protect military training routes or is a degradation in these military training routes an acceptable outcome to meet a national energy strategy?

Dr. ROBYN. The Department is concerned that the statutory and regulatory language underlying the FAA's authorities may not be sufficiently broad or explicit to handle concerns related to our test and training mission; the scope of the OE/AAA process may need to be expanded to address those concerns. To explore that issue, we're working with an NSC-led interagency group that includes all parties responsible for safety and security of our air domain. We don't want to rely solely on the FAA, however, nor does the Department want to become a regulator. Instead, we are reaching out to local, regional, and industry officials and are working to institutionalize an early voluntary consultation process.

Mr. ORTIZ. Are there radar improvements or other technological advancements that can mitigate the impacts of wind farm development? What are the costs of such systems? If the Department determines that an upgrade to a particular radar network is necessary to mitigate a wind farm development proposal, should the Department accelerate the upgrades of certain older radars that are proximate to potential wind farm developments on a priority basis, or should the wind farm industry be

responsible for including the costs associated with radar upgrades as an element of the overall wind farm project?

Dr. ROBYN. There are a number of technological solutions that promise to mitigate radar interference, and we're working with the FAA, Department of Energy, Department of Homeland Security, and the Office of Science and Technology Policy to determine the costs and relative benefits of various options. First, MIT Lincoln Laboratory identified near-term fixes for surveillance radars, including a new processor with an "adaptive clutter map" to edit out false returns. Second, we're looking at other existing technology, such as "gap-filler" radars and replacement radars like the TPS-77. Finally, we are increasing the level of R&D in this area and supporting an OSTP-led task force that seeks to baseline and harmonize the efforts of various agencies on wind turbine-radar interference. DoD will schedule improvements based on operational requirements, which are affected by existing and planned wind farms. However, given the long lead times associated with programming and budgeting, industry may choose to cost-share to accelerate radar upgrades or replacements.

Mr. ORTIZ. What level of research and development is the Department investing to reduce conflict with wind farm development? How much money is being spent in FY10 and FY11?

Dr. ROBYN. Over the last two years, the Department has spent several million dollars. As this issue has risen, we have worked to increase the Department's R&D spending in FYs 11 and 12, and we are working on a research and development plan with our interagency partners in an Office of Science and Technology Policy-led task force. The task force's initial report is due in December 2010.

Mr. ORTIZ. What guidance has the DOD given installation commanders regarding steps required to properly evaluate a wind farm application and what elements would be considered an obstruction?

Dr. ROBYN. In June 2010, the Air Force—as force provider for the majority of the homeland surveillance mission—issued interim guidance from the Assistant Secretary for Installations, Environment, and Logistics and the Deputy Chief of Staff for Operations, Plans, and Requirements to make installation commanders aware of the breadth of the issue and to refer them to its A3 Ranges and Airspace office for assistance. Simultaneously, DoD has notified all its Regional Environmental Coordinators, who represent installation commanders to state and regional planners and have been working renewable energy issues for the last two to four years, to immediately notify the new Energy Siting Clearinghouse of wind farm plans and applications. Those coordinators will meet in the Pentagon in late October to formalize that process.

Mr. ORTIZ. How does the proliferation of wind farms in and around the United States impact your air sovereignty mission? And, what is NORAD's strategy for adapting to the impacts of wind farms?

General STUTZRIEM. The air sovereignty/air control and air warning missions require NORAD to detect, identify, monitor, and if appropriate, intercept and engage potentially hostile aircraft. Wind farms within line-of-sight of radars make it more difficult to detect, identify, and monitor non-cooperative aircraft. The primary impacts to the radar vary from an increase in screening from the wind turbines themselves (towers, nacelles and blades) to increased false targets generated by the wind turbine blades' movement (the Doppler motion component), as well as reduced radar sensitivity where the severity depends upon the type of radar in question and the amount of radar clutter encountered. Each of these very complex impacts cumulatively affects the radar's overall picture. This picture is what is used to determine the "tracks" that allow us to detect, identify, track, intercept and defend North American airspace. Some specific operational impacts include:

- Reduced ability to detect/monitor "tracks"—both friendly or with hostile intent
- Reduced reaction times—diminished detection capability results in earlier decision points for senior leaders and a high potential for zero possibility of affecting an outcome
- Negation of response options—lack of detection capability results in decreased air safety capability and a reduced capability to affect air defense intercepts

Our strategy is to maintain an acceptable level of air domain awareness by:

- Better understanding the true impact of wind farms on radars
- Developing an overall depiction of the impact of existing, developing, planned and potential wind farm air domain awareness
- Working with the FAA to review wind farm project submissions. During the review process, the 84th Radar Evaluation Squadron analyzes whether the new wind turbines will interfere with the local air surveillance radars. If the wind

farm project poses a significant degradation to the radar, mitigation recommendations are made to the builder

- Weighing the risk of individual projects within the context of location and magnitude of the risk and making appropriate recommendations
- Working with the technical community to identify and assess potential mitigation, and with OSD, the Joint Staff and other partners to gain recourses for required mitigation

For years, NORAD and USNORTHCOM have worked to maintain wide area surveillance capabilities and improve them to meet future threats. We fully support OSD and interagency efforts to improve the coordination process for new wind energy development, as well as the development of new technologies to help us better define the operational impacts of wind turbines on our radar systems.

Mr. ORTIZ. In your estimate, should the Department accept a reduction in military readiness to obtain energy production goals? Should the Department accept any risk in the air defense mission? How should the Department balance these potentially diverging goals?

General STUTZRIEM. A complete avoidance of risk in any DOD mission, including air defense, is not feasible from either a cost or technical perspective. Moreover, risk discussions largely fall in relative terms—a large decrease in overall national security risk due to greater energy independence might justify a very small increase in air defense risk against a limited threat. Thus, it is important to develop a clear understanding of the impact of and potential mitigations for wind energy projects, and we will be vigilant in identifying projects we assess as carrying unacceptable risk.

We believe it is possible to obtain alternative energy sources while simultaneously conducting our national air defense mission. To do so, multi-department cooperation is required to pool our resources to develop the policy and future surveillance infrastructure that will provide national security and renewable energy at the same time. We should also continue to explore technical solutions to mitigate wind turbine effects on our current radars.

Mr. ORTIZ. In testimony before the House Armed Services Committee, the Commander of Northern Command has warned this committee of the potential hazards associated with wind farms and other types of obstructions. If current rates of wind-farm development are sustained for the next five years, what is your assessment of the impact of these developments on national defense?

General STUTZRIEM. The current pace of wind farm development increases the potential that radar signals vital to our ability to protect the national airspace will be obstructed. Currently, nearly half of our 200 radars are impacted to some degree by wind turbines and 13 experience moderate or significant degradation substantial enough for 84 RADES to recommend that NORAD and USNORTHCOM perform a more detailed operational analysis. This analysis could result in a request for a determination of hazard through the Federal Aviation Administration's Obstruction Evaluation/Airport Airspace Analysis Review Process. The actual impact to national defense of these radars is dependent upon the location of each radar and support that it provides.

Mr. ORTIZ. What, if any, is the most reasonable method to mitigate wind farms and other similar encroachments?

General STUTZRIEM. DOD's Report to Congress in 2006 identified the best approach as "avoid locating the wind turbines in radar line of sight of such radars. These mitigations may be achieved by distance, terrain masking or terrain relief and requires a case-by-case analysis." In addition, based on recent reporting from the Massachusetts Institute of Technology's Lincoln Laboratory, there are also technical modifications that can mitigate wind farm effects on our radar infrastructure. These include re-optimization of radar settings, modifications to the auxiliary processor with detection editing and adaptive clutter map, and installation of new transmitters/receivers with coherent processing.

Mr. ORTIZ. Considering the apparent indecision that a developer has with making permit applications, would the FAA consider moving the obstruction application deadline from 30 days before construction to possibly one year? This could allow the developer some certitude with the ordering of capital equipment.

Ms. KALINOWSKI. The FAA is considering separate regulatory guidelines for wind turbine development with notice requirements of 8 months to 1 year before construction. If we pursue regulatory action, it will take a minimum of three years to complete.

We note, however, that developers frequently wait until the very end of their multiyear process before they acquire land rights or leases, and, therefore, do not know the exact coordinates or layout of their wind farm. Even if the FAA requires

notice 1 year in advance, the developer may not be able to provide specific information to allow for an aeronautical study.

Mr. ORTIZ. How successful is the FAA in managing the deluge of wind turbine applications?

Ms. KALINOWSKI. The FAA believes that it has been successful in managing wind turbine applications. We have increased staffing to review the applications, and we work routinely with our partner agencies, such as the DOD and DHS, as well as with the developers, to reach compromises that do not interfere with aviation safety. However, the FAA recognizes there is always room for improvement and seeks to evolve our processes to better communicate and coordinate between our agency and other entities.

Mr. ORTIZ. In the FAA's assessment, how successful is the FAA in coordinating with the DOD? What is the current process that FAA pursues to seek DOD comment? How successful is the DOD in providing timely feedback? Considering the classified nature of certain DOD missions, how does the nature of these classified missions impact the FAA's ability to evaluate obstructions for their impact to the navigable airspace?

Ms. KALINOWSKI. The FAA is very successful in coordinating with the DOD. We have an automated system and each notification goes directly to the DOD for evaluation. The DOD sets up its parameters within the obstruction evaluation Web site, and controls who reviews and evaluates proposed construction. Current guidelines provide 2 weeks for review and response. However, extension requests are frequent, and response times can exceed 30 days for wind turbine evaluations that affect long-range radars. The FAA relies on evaluation and information provided by the DOD. Information that is considered classified is not shared with the FAA. The FAA bases its evaluation on all the available information and works with the DOD to resolve any gaps in information to the extent possible.

Mr. ORTIZ. In practice, should the DOD have regulatory authority to better manage their concerns and potential impacts to military readiness, in addition to FAA's regulatory authority? Why or why not?

Ms. KALINOWSKI. The FAA does not believe the DOD needs to have a separate regulatory authority to better manage its concerns and impacts to military readiness. A division of the regulatory authority would be unwieldy and create additional and unforeseen difficulties in managing and coordinating responses to the same proposals. The current process is able to account for both the FAA's and the DOD's separate missions, and continue to evolve our working relationships to improve the process when needed.

Mr. ORTIZ. Would the FAA consider alternative solutions such as a radar relay station in an additional location, or additional radar supplements on the far side of an offshore wind farm, to mitigate these issues?

Ms. KALINOWSKI. The FAA is not responsible for procurement of air defense radar systems. This responsibility was transferred to the DOD and DHS in 2003 when the Long-Range Radar Joint Program Office between the DOD and DHS was established.

Mr. ORTIZ. During the early stages of wind turbine/wind farm development, does the developer consider or take into account homeland defense and homeland security aspects that may become an issue in the development process? Or do they solely rely on the DOD process to advise them of a national security impact that may occur with this project?

Mr. WEBSTER. Wind energy developers have to take many factors into account when analyzing the viability of a given site, including (not necessarily in this order):

- (1) the wind resource;
- (2) being able to lease the land;
- (3) physical accessibility of the site;
- (4) land use compatibility;
- (5) environmental issues, including potential wildlife impacts;
- (6) access to transmission;
- (7) other resource conflicts, including airspace and radar, cultural resources etc.; and
- (8) finding a buyer for the power.

Any one of these issues can kill a project. Perhaps as few as one out of 10 sites a company considers developing will ultimately end up with turbines being constructed.

Developers generally do talk to local base commanders either directly or through specialized consultants, though I am sure there are exceptions, and most also consult DOD's online tool via the FAA Web site to find out if there are potential conflicts with DOD activities.

However, to date, the quality of the engagement varies by base. Some bases are open to discussions, including discussions of possible mitigation, and others are not. Some bases will provide an explanation of their concerns, which is a precursor to being able to discuss mitigation, and some will not. For example, Iberdrola Renewables consulted with the Kingsville Navy Air Station several years prior to constructing our Penescas Wind Project, and altered the project's layout to accommodate a military training route managed by the base.

Additionally, there is currently no DOD process, per se. Each developer is essentially attempting to determine whether there is an impact or not through various means such as those described above, as well as through consultation with contractors who have varying degrees of expertise in such matters.

In addition, the quality of information fed into the online tool varies. It is my understanding that the Army and Navy have fed only very limited data, if any, into the online tool. If industry is missing two-thirds of the picture, that is a problem. Additionally, developers are aware that the online tool has incorrect assumptions built in. For example, the assumption on the height of the structure is too conservative. Specifically, the tool assumes a 750' structure to determine line of sight impact when turbines are approximately 400–450' in height.

It would also be helpful for industry to be given access to GIS shape files that would provide an additional layer of detail to more fully understand the potential impacts of development and to consider mitigation options on the wind farm side.

Mr. ORTIZ. How does your organization coordinate renewable wind energy concerns on homeland defense requirements? And, do you have any suggestions for balancing wind farm developments with the military readiness and operational impacts that have been discussed in today's hearing?

Mr. WEBSTER. One of AWEA's missions is to educate the industry about issues of concern and to make sure developers are aware of potential resource conflicts like airspace and radar. In a variety of workshop and conference sessions over the last several years, AWEA has held discussions on issues related to radar and military operations, including having speakers from DOD and other federal agencies.

AWEA also issued a Siting Handbook in 2008, which is available for free on the AWEA Web site to anyone who is interested. The handbook contains information on the airspace and radar related reviews that are required for wind energy projects.

So, while AWEA generally does not get involved in individual project siting, AWEA does try to make sure our members have the tools they need to engage agencies and address concerns that may arise.

With respect to balancing, as I detail in my written testimony and in responses to some of these additional questions, the wind industry believes that wind turbines can and must co-exist with military operations. And, indeed, they have co-existed in the U.S. and around the world for many years. But, to improve the likelihood of that continuing into the future, AWEA recommends:

- (1) Developing an improved process for consulting agencies earlier;
- (2) Establishing a proactive plan for upgrading radars, which will not only benefit national security, but will also accommodate additional wind energy deployment; and
- (3) Investing in significant research and development to upgrade the surveillance technology currently in place, much of which is two decades or more old, as well as other impact-reduction opportunities such as stealth blades and radar gap filling technology.

Mr. ORTIZ. What is the industry's responsibility for upgrading air defense radars that are impacted by a proposed wind farm development?

Mr. WEBSTER. The wind industry is willing to share in the cost of some radar upgrades. However, the details need to be negotiated with the relevant agencies. And, they will likely have to be worked out on a case-by-case basis with the wind energy developers operating in a given area of concern to DOD.

Generally, from the industry's point of view, if DOD is already planning to upgrade a radar for national security reasons, and those changes also happen to benefit a specific wind energy project or projects, it would not be reasonable to require the project developer(s) to pay for the entire upgrade. On the other hand, if a radar upgrade is largely attributable to wind energy development and the developers are the primary beneficiaries of the upgrade, then a case can be made for a larger industry cost share responsibility.

One example from a different context: the interconnection queue process for energy generation facilities. When a generation facility seeks to interconnect to the electric transmission grid, the interconnecting utility determines what upgrades to the electrical transmission system are needed, and among those upgrades, the difference between which of these are solely benefitting the generation facility and

which are ‘network upgrades’ that benefit the whole system. The energy generation facility is then assigned the costs attributable solely to their project, and in some cases they are also assigned a prorated share of these network upgrades.

In some cases in the past, individual developers have offered funds to pay for a radar upgrade. But, DOD had concerns about whether they could accept resources from a private entity for this purpose. This legal authority may need to be clarified.

Finally, the industry has suggested a proactive effort on the part of the industry and the agencies to identify radars of concern that coincide with heavy wind resource areas and to come up with a radar-by-radar upgrade plan. The industry stands ready to assist in such an effort.

Mr. ORTIZ. Would the industry support an earlier review period by FAA, beyond the 30-day submission prior to construction, to ensure that the wind farm development has cleared the FAA regulatory review? What would be a better time period for the federal agencies to complete their regulatory review?

Mr. WEBSTER. Yes, the industry supports the ability to engage in voluntary consultations with federal agencies earlier than is required under FAA rules. Ideally, we would seek a preliminary analysis, including a discussion of mitigation alternatives. At the end of the process, the agencies would then provide their final input on a proposed project via the existing FAA obstruction evaluation process. However, the industry strongly recommends that such early discussions remain consultative and that they not be used as a regulatory decision point.

Specific suggestions for areas in which we think the review process could be improved are as follows:

1. Earlier engagement, including preliminary analysis

The agencies have tended to shy away from early consultations because the developers do not have final turbine locations established until very late in the development process and because the agencies are resource constrained with respect to conducting turbine evaluations. The agencies prefer to wait until developers’ plans have been finalized before they process applications.

However, if the agencies conducted a preliminary analysis, in which the developer submitted as much information as possible about the project, such as the acreage of the project, the “four corners” of the project using latitude and longitude, the approximate number of turbines, and the approximate turbine height, then potential problems could be identified much earlier, and solutions discussed. In order to conduct preliminary reviews of this type, the resource constraints at the agencies would still need to be addressed. The industry may be willing to pay some sort of application fee if that would help alleviate some of the resource burden. If the agencies are reviewing upwards of 100,000 individual turbine applications per year an application fee would certainly not seem unreasonable to cover costs to increase staff resources.

2. Include mitigation discussions in the preliminary analysis

In addition, the industry strongly recommends that mitigation discussions be required as a part of any early consultation process

3. Transparent decision making

In order for mitigation discussions to be meaningful, however, industry needs to know the rationale for the agency concerns. Some DOD officials have alluded that a primary reason for opposing a project is not an impact the project itself has, but rather the perception that once one project encroaches on an asset of concern then controlling that space from further encroachment is made more difficult. While this concern is understandable, the result is unsustainable and unproductive, and creates an unreasonable threshold when evaluating any one project.

4. Protect wind developers’ proprietary information

As DOD acknowledged in its written testimony, developers are concerned about the protection of proprietary information. This is a critical point given the highly competitive nature of the industry. Wind companies are extremely sensitive to the possibility that proprietary development plans could fall into the hands of competitors. Even worse, there have been instances where local DOD officials have taken information voluntarily provided by a developer in early consultations and subsequently used it to oppose the project with local permitting authorities before the consultations had run their course.

There needs to be protection for confidential business information that is shared with DOD and limitations on what DOD can do with such information.

Mr. ORTIZ. Should the DOD accept a degradation in military readiness to support national energy goals relating to wind development?

Mr. WEBSTER. The wind industry respectfully submits that this is a false choice. It is our position that there is no need for a trade-off between military readiness



and deploying wind energy, which itself has national security benefits. To the extent there are such concerns today, it is because insufficient resources have been invested in validating the technical mitigation options that would otherwise be available. The appendices in my written testimony detail several of these options that, once fully proven effective, should eliminate any concerns about trade-offs.

Mr. ORTIZ. What research and development is industry providing to support efforts to reduce military readiness conflicts?

Mr. WEBSTER. AWEA itself is not providing financial resources related to R&D, but individual companies are doing so. In addition, AWEA is supporting efforts in other ways.

AWEA has worked with a radar expert to prepare a priority list of R&D the industry would like to see done on a radar-by-radar basis. This list was included as an appendix to my written testimony. The list grew out of a meeting the industry led with the FAA, DOD, DHS, and NOAA on the sidelines of an FAA conference in Las Vegas in September 2008. At that meeting, industry suggested, and all parties agreed, that it would be useful to come up with a joint list of R&D, prioritize the list in a way that both industry and agencies agreed with, attach projected dollars needed for each item, and then figure out who would do the research and how it would be paid for.

Industry is willing to share some of the costs associated with R&D, but we would like the mechanism and amount to be negotiated with the agencies based on a jointly developed R&D plan.

In addition, several AWEA members are engaging in research of their own, including wind turbine manufacturers and radar companies. As one example, Vestas has been testing stealth blade technology. And, enXco and NextEra Energy Resources signed a cooperative research and development agreement (CRADA) with the U.S. military to study the impact of wind energy development on Travis Air Force Base. Iberdrola Renewables has provided access to operating projects for the Department of Energy's R&D efforts on gap filling radar technology testing.

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#### QUESTIONS SUBMITTED BY MR. NYE

Mr. NYE. Can you discuss any radar systems or upgrades to existing systems you are aware of today that could mitigate long range radar surveillance interference caused by wind farms across the country and off the coast of southeastern Virginia?

Dr. ROBYN. There are a number of technological solutions that promise to mitigate radar interference, and we're working with the FAA, Department of Energy, Department of Homeland Security, and the Office of Science and Technology Policy to determine the costs and relative benefits of various options such as software changes, "gap-filler" radars, "in-fill" radars, and replacement surveillance radars.

Mr. NYE. The UK's MOD recently purchased the TPS 77 radar to address its long range radar wind farm interference after significant research and analysis; do you feel that such a system would be suitable for addressing current defense concerns off the coast of southeastern Virginia?

Dr. ROBYN. The TPS-77 is one of the options we're evaluating in conjunction with the Department of Homeland Security, the Department of Energy, and the FAA. We've sent teams to the UK to talk with the MOD, and we've had detailed discussions with Lockheed-Martin regarding the TPS-77. After comparing the TPS-77 to other mitigation options for wind farm interference, we'll determine a way ahead.

Mr. NYE. Will the DOD be willing to consider additional areas off the coast of Virginia for offshore wind development other than those previously identified for the Virginia RFI, if they were able to work with the developers on a case-by-case basis?

Dr. ROBYN. DoD is working with the Department of Interior's Bureau of Ocean Energy Management, Regulation, and Enforcement and coastal state agencies on the proposed siting of wind turbines on the outer continental shelf. DoD is a member of the Virginia Offshore Wind Task Force, and the Department has assessed and identified lease blocks off the coast of Virginia where, given appropriate restrictions, wind turbines would be compatible with Defense activities such as testing, training and operations. DoD also meets on an ad hoc basis with the Virginia Governor's Senior Advisor on Energy. We will work with these partners to consider any feasible proposal for offshore wind.

Mr. NYE. Some have suggested that the military should "train how they will fight"—considering that wind farms are popping up all over the world, it is inevitable that the U.S. military will need to know how to maneuver around them. Does this enter the DOD's consideration when looking at potential locations for wind farms off the Virginia coast?

Dr. ROBYN. The military services require realistic training scenarios, but this does not mean that every condition that may be encountered in battle has to be replicated in every training exercise and on every range. It's essential that our offshore ranges remain free of encroachment to allow our forces to train across the full spectrum of air and sea operations. Large areas of sea and air space are required to provide safety buffers and maneuver space for at-sea training. For example, we conduct live fire training in areas off the Virginia Capes (VACAPES), and placing wind turbines in these live-fire areas would not be compatible with our training activities. Additionally, wind turbines sited in our offshore ranges may create electromagnetic interference with training and testing activities. Through the Virginia Offshore Wind Task Force process we have identified areas where offshore wind can be developed without impacting our training and testing activities. It is true that we will have to develop tactics, techniques, and procedures for operations in the vicinity of offshore wind turbines, but we must also maintain sufficient unencumbered offshore ranges, such as the VACAPES, to accommodate essential training for our naval and air forces.

Mr. NYE. Is the FAA willing to look into new technologies that might be able to overcome the concerns that wind turbines might cause interference with radar?

Ms. KALINOWSKI. Yes, the FAA is investigating technologies that could reduce or eliminate the radar interference caused by wind farms. During FY 2010, the FAA sponsored a Systems Engineering Trade Study to examine the possible solutions to the interference problem. The research project is being conducted by the Georgia Institute of Technology and is nearing completion, with the final report due to the FAA by August 30, 2010. The purpose of the trade study was to identify all of the possible solutions to the wind farm problem and weigh them against cost, technical risk, and time to field. The project brought together technical experts from the U.S. Air Force, DHS, and the FAA to provide the technical expertise for the trade study.

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#### QUESTIONS SUBMITTED BY MRS. HALVORSON

Mrs. HALVORSON I wanted to ask about a proposed wind farm in my district in Kankakee County, Illinois, near Chicago, called "K4," that is close to a radar system located in Joliet, Illinois.

K4 is a \$2 billion project with 310 proposed wind turbines. The nearby ARSR-3 radar is the same as the one near Shepherds Flat. I feel the Shepherds Flat radar should not be the only site receiving mitigation work; receiving software upgrades and physical improvements.

My question for Dr. Robyn is: What upgrades can you make to the ARSR-3 radars nationwide in order for more wind farms and radars to co-exist? And, if these upgrades are made, what is a realistic timeline for completion?

Dr. ROBYN. The ARSR-3 radars are part of a nationwide upgrade—a Service Life Extension Program—to bring all FPS-series, ARSR-1, ARSR-2, and ARSR-3 systems to a common configuration. According to a study by Lincoln Laboratory, that configuration should be able to accept software changes to mitigate wind farm interference, and we're developing a test plan for the software. We plan to pilot-test the hardware-software combination in the next 12–18 months, using the Fossil, OR radar as a testbed. Lincoln Lab is currently on track to deliver hardware and software to FAA Oklahoma City for test by the end of January 2011; the lab's overall goal is to have a test system in place at Fossil by April 2011. If the pilot test is successful, we can deploy the adaptive clutter map during the Service Life Extension Program; Lincoln Lab has confirmed that the software will be compatible with the Joliet radar, and should mitigate wind farm interference from K4.

Mrs. HALVORSON How up-to-date is DOD's land cover/terrain modeling data? Is DOD looking at areas with the same land cover information as they were in 1990, not taking into account any of the new structures that have since been built between radar's line of sight and existing/proposed wind farm locations? If not, has there a reason prohibiting DOD from obtaining newer or more up-to-date land cover/terrain modeling data?

If you start using data from 2000 or later instead, do you think more wind projects would gain approval?

Dr. ROBYN. DOD has the most current terrain data available, and we're currently double-checking to ensure our wind farm impact modeling uses the most current data; we expect to have the re-look complete by the end of October, 2010. However, because radar interference is caused by complex factors such as the Doppler effect, we don't expect post-1990 land cover information to significantly change our assessment process.

Mrs. HALVORSON In regards to the Shepherds Flat wind farm in Oregon, DOD originally issued a “Notice of Presumed Hazard” in March. When DOD eventually withdrew its objections in to the Shepherds Flat project in late April, a DOD spokesperson said that the impact of the project to the Fossil ARSR-3 radar was not as great as once thought.

Is it possible for this scenario to be the case again for other projects elsewhere? Can you provide detail as to what information was available in regards to how this particular wind farm was originally thought to be hazardous, and what information later came to light that led DOD to retract their objections?

Dr. ROBYN. As we develop more robust modeling and assessment tools—something we’re doing internally and in conjunction with the Department of Homeland Security, the Department of Energy, the FAA, and the Office of Science and Technology Policy—our analysis will become more refined and our final assessments may therefore change. As we closely examined the project in April, we concluded that the risks presented by Shepherds Flat would not be as severe as initially thought, and extensive study by MIT’s Lincoln Laboratory and a number of DoD entities confirmed that conclusion. Furthermore, we were able to apply the Lincoln Lab results to eight additional wind farm applications in Oregon and Washington, and those wind farms can now receive FAA approval. We have already provided briefings on the Lincoln Lab study to various Members of Congress and staff members, and would gladly provide you with the same.

Mrs. HALVORSON More broadly, with the President’s commitment to renewable energy and growing number of wind farm project proposals nationwide, what is the department’s long term strategy for co-existence between the nation’s national security and renewable energy needs?

Dr. ROBYN. In my June testimony, I stated that first, the federal government needed to improve the process for reviewing renewable energy projects; second, the key federal agencies needed to realign their R&D priorities to give greater attention to the issue; and third, those agencies needed to look at the plan for upgrading the current surveillance radars.

Addressing the first point, the Department is standing up an office—an Energy Siting Clearinghouse—specifically to address the balance between military readiness (which includes operations, testing, and training) and energy independence, which are both important facets of national security. The Clearinghouse will coordinate among the Offices of the Deputy Under Secretaries of Defense for Installations and Environment and for Readiness, the Assistant Secretary of Defense for Homeland Defense, the Director of Test and Evaluation, the Joint Staff, the Service Secretariats, and the Service Staffs, and will serve as a “one-stop shop” for all inquiries and staff actions regarding utility-scale generation and transmission projects. I hired the director on July 26, and in mid-September we executed contracts to hire staff, procure IT support, and facilitate timely communication with the FAA, other governmental entities, and industry.

Regarding R&D priorities, we’re participating in an OSTP-led task force that’s examining the current state of play across the interagency. Its preliminary report—a five-page outline of current efforts—is due in December 2010, and will inform our future R&D efforts. Finally, we’re working with DHS on the upgrade plan. The first step will be to pilot-test Lincoln Laboratory’s recommended mitigation measures over the next 12–18 months, using the Fossil, Oregon radar as our “testbed” (this improvement would not otherwise occur until 2014–2015, as part of the scheduled CARSR upgrade of the Fossil radar). Lincoln Lab is currently on track to deliver hardware and software to FAA Oklahoma City for test by the end of January 2011; the lab’s overall goal is to have a test system in place at Fossil by April 2011.

Mrs. HALVORSON. Is there a possibility that DOD might be overestimating the capability of its ARSR-3 radar in its analysis of wind farm projects? If so, what efforts might be undertaken to compensate for these misgivings?

Dr. ROBYN. The ARSR-3 has been in service since the 1970s, and its capabilities are well understood. Our current efforts, in conjunction with those of our interagency partners, are focused on developing modeling tools for wind farm impacts and assessing a number of technological options for mitigating those impacts.

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#### QUESTIONS SUBMITTED BY MR. BLUMENAUER

Mr. BLUMENAUER. Wind energy projects not only supplement a growing demand for clean power, they also contribute billions of dollars to the tax base of rural counties in Oregon, create hundreds of jobs for local businesses, and generate income for landowners that often is critical to keeping their family farms alive. Unfortunately,

as demand for wind power continues to grow and more projects spring up around the country, conflicts have started to occur.

Earlier this year, the Department of Defense concerns led to the delay of two wind projects in my state due to issues relating to a radar in Fossil, Oregon. These two projects were weeks away from commencing construction and developers had already invested a great deal of funding in them when the Department raised these concerns. The Department's initial suggested mitigation proposal was for the two developers to move all of their turbines some distance away. This infeasible approach would have terminated the projects and resulted in devastating economic losses to our local communities. I was pleased to see that the Department allowed the projects (Caithness' Shepherds Flat and Iberdrola Renewables' Leaning Juniper II wind farms, both in Gilliam County) to proceed this spring.

Already there are several hundred additional megawatts of wind power planned to start construction before the end of 2010 in the same area of Oregon that has proximity to the Fossil radar. These projects must stay on deadline for eligibility in a grant program established by the ARRA. However, I understand that one of the projects slated to begin construction at the end of this year is now being held up for the very same concerns Defense Department originally raised when it opposed the Shepherds Flat and Leaning Juniper II projects. In particular, the developer of a nearby project (Iberdrola Renewables' Montague project) is being told that the only acceptable mitigation is to move all the turbines.

While I recognize and understand the importance of ensuring that military operations are not compromised, I believe we must find a way for the wind industry and the military to co-exist. In your testimony, you discussed the Massachusetts Institute of Technology Lincoln Laboratory study that identified and evaluated options for mitigating the impact of wind turbines on the QVN radar in Fossil, Oregon. This study helped increase the Department's comfort level with the Shepherd's Flat project and others in the area. Can the techniques recommended by the Lincoln Lab study also be used to mitigate the impact of the Montague project? If not, please describe the Department's justification for holding up these additional turbines and provide a timeline for addressing the situation. Please also provide my office with a full copy of the Lincoln Lab study.

Dr. ROBYN. At my request, Lincoln Lab analyzed the proposed Montague project using the same data/approach it used for Shepherds Flat (the two sites are within a mile of one another). The results were the same, and I informed your office of our recent decision to green-light Montague, five additional sites in Oregon, and two in Washington. The key Lincoln Lab recommendation (Option 2) calls for adding an auxiliary processor with an adaptive clutter map. As I said in my oral statement on June 29, we hope to do this on a pilot basis over the next 12–18 months, using the Fossil, Oregon radar as our "testbed" (this improvement would not otherwise occur until 2014–2015, as part of the scheduled CARSR upgrade of the Fossil radar). Lincoln Lab is currently on track to deliver hardware and software to FAA Oklahoma City for test by the end of January 2011; the lab's overall goal is to have a test system in place at Fossil by April 2011.

Mr. BLUMENAUER. The Defense Department has acknowledged the national security and strategic challenges associated with global warming and our dependence on fossil fuels. I have been impressed by the aggressive actions the Department is undertaking to reduce its own energy use and explore the use of renewable energy. It would seem that it is in the Department's interest to facilitate development of the nation's wind resources. Since wind-radar conflicts appear to be a growing problem, I am pleased that the Department is taking steps to minimize these conflicts, including altering and upgrading existing radars. I understand that funding may be a hurdle in completing these upgrades. Is there a mechanism for a wind developer to contribute funds to the upgrading or relocation of a radar if it will reduce or eliminate wind turbine-radar conflicts? If not, does the Department need statutory authority to allow contributions from project developers?

Dr. ROBYN. The Department is not certain it has clear legal authority to accept such contributions; we've been working with professional staff and NGOs to develop language that would clearly grant that authority.

Mr. BLUMENAUER. I understand that the FAA currently requires wind project developers to file separate applications for each turbine proposed to be included in a project. I'm also told that the FAA discourages developers from submitting applications until the developer has made a final decision as to the exact location of each turbine. If true, this approach seems not only burdensome for the FAA and project developers, but it doesn't give developers and the government enough lead-time to mitigate late-breaking concerns that are raised by the FAA or DOD. One way to provide flexibility and reduce the burdensome nature of processing applications for all parties involved may be for the FAA to accept one application per wind project

with an estimate as to the approximate location, number, and height of all turbines. Is this something that the FAA has considered? Would making this change in the application process require a change in statute?

Ms. KALINOWSKI. An aeronautical study looks at the exact coordinates and height of the proposed structure and determines if there are any impacts to radar cells. If the locations and height of the structure are changed, the impact could be more severe and must be analyzed again. If estimates were provided, the FAA and the DOD would not have exact data to perform a comprehensive analysis. Some turbines in an area may be acceptable and others may not because of the number of radar cells that may be affected. At present, the FAA needs to study each individual turbine and not proposed areas. In addition, the DOD cannot study geographic areas and must know exact locations to determine impacts to radar.

A change of this nature would require a regulatory change, as the current regulations require each structure to be filed separately with the FAA. A regulatory change would require a minimum of three years to complete.

