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**Statement of**

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**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 to 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.