

The Department of Defense and American Wind Power: Partners in Protecting National Security and Military Readiness

How the DoD Review Process Protects National Security and Military Facilities, and Case Studies that Demonstrate How the Process Works

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Source: A B-1 Lancer takes off at Dyess Air Force base near Abilene, Texas, with wind turbines in the distance. Photo credit: Abigail Vander Hamm, AWEA

Executive Summary

NATIONAL SECURITY IS PARAMOUNT. FORTUNATELY, THE GROWTH IN WIND ENERGY HAS BEEN AND WILL CONTINUE TO BE CONSISTENT WITH PROTECTING OUR NATIONAL SECURITY, MILITARY OPERATIONS, AND MILITARY TRAINING AND READINESS.

Affordable, reliable wind power is the largest source of U.S. renewable energy generating capacity. At the end of 2017, there were over 54,000 wind turbines operating in 41 states plus Guam and Puerto Rico and enough installed capacity to power more than 27 million American homes. Wind power is poised to grow as a mainstream, reliable and affordable energy resource with a substantial pipeline of projects under construction and in advanced development.

American wind power's growth strengthens national security. Congress established a formal review process for the Department of Defense (DoD) to evaluate proposed energy projects that could affect DoD facilities, assets and missions in the Fiscal Year (FY) 2011 National Defense Authorization Act (NDAA). This process has been revised periodically, including in the FY18 NDAA to strengthen the process from the DoD, local base and state perspectives.

The existing process includes rigorous project-specific analysis, including reviews by local bases and the DoD Siting Clearinghouse. These reviews encompass detailed technical information unique to each specific base (its assets and missions), and the details of a proposed wind farm (turbine layout, number, height, location, etc.), with the goal of understanding potential impacts to specific

military assets in the area.

Any findings of potential adverse impact on military operations and readiness legally triggers discussions on potential mitigation options with bases and project developers.

Private developers have signed mitigation agreements to address DoD concerns. In some cases, developers have made changes to their proposed projects, including limiting the number of turbines or changing their heights and proposed locations; deploying night-vision compatible lighting; or agreeing to stop ("curtail") turbines under certain conditions. In other cases, developers have agreed to pay for upgrades to existing radars or purchase new radars to improve DoD capabilities.

If mitigation options cannot be found or agreed upon by DoD, local bases and project developers, DoD objects to proposed projects.

The reality is wind farms about which DoD may have concerns are either not built or have been mitigated in some way. Bases have not lost any missions as a result of nearby wind farms.

The first part of this report summarizes the existing DoD review process and recent improvements to it in the FY18 NDAA signed into law by President Trump. It also highlights flaws with proposals to implement arbitrary exclusion zones that that would override project-specific and base-specific analysis; and summarizes efforts to expand the mitigation options available to address potential impacts.

The second part of this report provides more than a dozen case studies across a six states, demonstrating project developers' willingness to resolve DoD concerns through changes to their proposed projects, funding technical solutions for DoD, or canceling development of projects if DoD concerns cannot be addressed.

OVERVIEW OF DOD REVIEW PROCESS FOR PROPOSED ENERGY PROJECTS

The compatibility of wind energy facilities and military facilities has periodically come under scrutiny.¹ Concerns have been raised about impacts to radar systems, military operations areas, and low-level military training routes in particular. The need for a formal and coordinated Department of Defense (DoD) evaluation process that ensures proposed energy projects are aligned with military interests led to the creation of the DoD Siting Clearinghouse in the Fiscal Year 2011 National Defense Authorization Act (NDAA, Section 358 of Public Law 111-383)². The Clearinghouse subsequently issued rules under Title 32, Part 211 of the *Code of Federal Regulations* to implement Section 358.³

EXISTING DOD REVIEW PROCESS COMPREHENSIVELY PROTECTS MILITARY AND BASE INTERESTS

The DoD review process has worked well to protect national security, military and base operations, and military training and readiness. The points below summarize key elements of the existing process:

- The existing process includes rigorous project-specific analysis, including reviews by local bases, using detailed technical information unique to each

specific base (its assets and missions) and the details of a proposed wind farm (turbine layout, number, height, location, etc.) to understand potential effects on specific military assets in the area;

- “Any adverse impact upon military operations and readiness, including flight operations; research; development; testing; and evaluation and training that is demonstrable and likely to impair or degrade the ability of the armed forces to perform warfighting missions” triggers a discussion on potential mitigation options through changes to the wind farm, technical solutions that can be implemented with radars, and/or changes bases can make in their procedures.
- If mitigation options cannot be identified or agreed to by DoD, local bases and project developers, DoD objects to proposed projects that (1) Endanger safety in air commerce related to the activities of the DoD; (2) Interfere with the efficient use of the navigable airspace directly related to the activities of the DoD or (3) Significantly impair or degrade the capability of the DoD to conduct

¹ See for example this report to Congress from the Department of Defense published in 2006: <http://archive.defense.gov/pubs/pdfs/WindFarmReport.pdf> and this report from JASON/Mitre Corporation commissioned by the Department of Homeland Security/Department of Defense Long Range Radar Joint

Program Office, which was published in January 2008: www.dtic.mil/get-tr-doc/pdf?AD=ADA480068

² Available at: <https://www.gpo.gov/fdsys/pkg/PLAW-111publ383/pdf/PLAW-111publ383.pdf>

³ Available at: <https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=284108d7dca87a6bea95165fd1c1b0be&ty=HTML&h=L&r=PART&n=32y2.1.1.1.16>

training, research, development, testing, evaluation, and operations or to maintain military readiness.

- In practice, wind farms about which DoD may have concerns DoD are either not built or mitigated in some way. Bases have not lost any missions as a result of nearby wind farms:
 - For proposed projects DoD initially has concerns about, either (1) more detailed site-specific analysis by DoD has shown no need for concern, (2) mitigation is agreed upon that ensures compatibility or (3) mitigation is not possible or cannot be agreed to, and the developer stops pursuing the project.
 - Private developers have signed mitigation agreements⁴ to address DoD concerns. In some cases, developers have made changes to their proposed projects, including, but not limited to changing turbines heights, proposed locations or the number of turbines; deploying night-vision compatible lighting; or agreeing to stop (“curtail”) turbines under certain conditions. In other cases, developers have agreed to pay for upgrades to

⁴ Copies of a dozen mitigation agreements between project developers and DoD are available at: <https://www.acq.osd.mil/dodsc/about/library.html>

⁵ A copy of the DoD objection is available at: <https://www.acq.osd.mil/dodsc/library/USA006599->

existing radars or purchase new radars to improve DoD capabilities.

- DoD has formally objected⁵ to one wind project proposed in Southern Maryland because of a potential impact to a radar at the Patuxent River Naval Air Station. The project developer agreed to cancel development of the project.
 - While some point to the fact that DoD has only formally objected to this one project as a flaw with the existing system, it is in fact evidence of its success.
 - The system is designed to weed unworkable projects out before DoD has to formally object.
 - Developers do not spend millions of dollars to advance a project if there is a strong likelihood DoD will formally object based on project-specific analysis once it enters the Clearinghouse process.

DoD REVIEW PROCESS WAS RECENTLY STRENGTHENED

The DoD review process for energy projects has been revised by Congress on several occasions to strengthen DoD, local base and state interests, most recently in the Fiscal Year 2018 NDAA (Section 311 of Public Law 115-91).⁶ Due to specific revisions made in the FY18 NDAA,

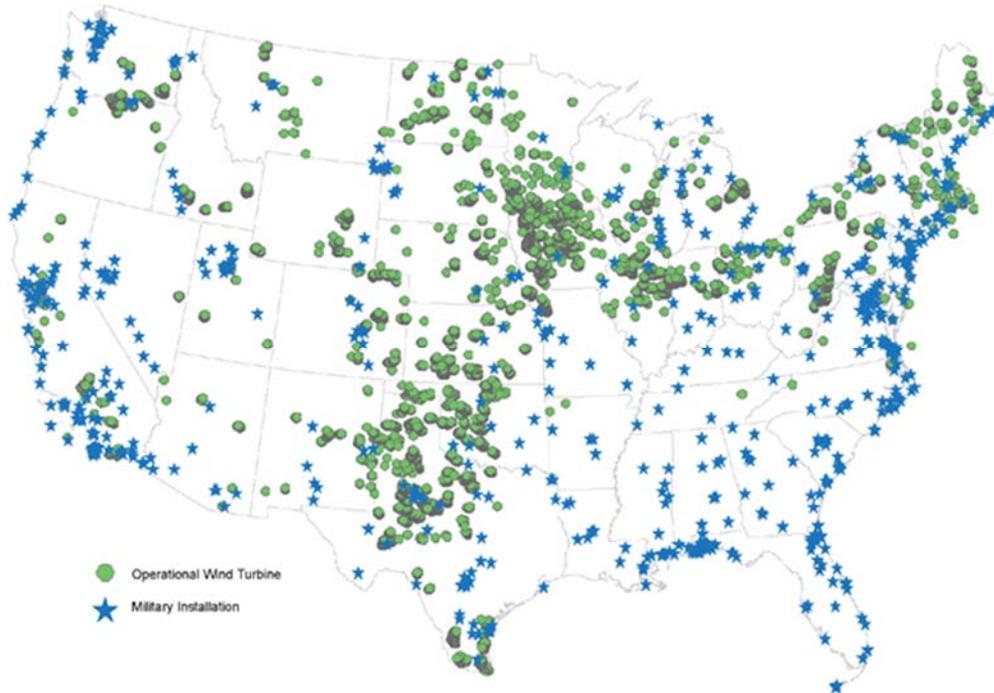
[14%20TAB%20B%20-%20Great%20Bay%20Wind%20Final.pdf](https://www.congress.gov/bills/115/2810/text)

⁶ Available at: <https://www.congress.gov/bill/115th-congress/house-bill/2810/text>

signed into law by President Trump, the DoD review process now:

- Requires project developers to vet proposals with the military at least one year prior to expected construction;
- Extends the deadline for preliminary DoD review to 60 days;
- Explicitly requires that local military installations are involved in the evaluation process;
- If a preliminary review identifies concerns, DoD will issue a “notice of presumed risk” to the project proponent, which triggers discussion on possible mitigation options. Such a notice will also need to be resolved by developers in order to move forward with wind farm construction because of the need to secure financing and insurance for proposed projects;
- The notice is also provided to states at the same time. DoD must formally solicit comments from states, evaluate and consider those comments when making a final decision, and forward them on to the Federal Aviation Administration for consideration as well;
- Reinforces that “any adverse impact” on military operations and readiness is the threshold for requiring mitigation discussions with project proponents;
- Authorizes DoD to establish maps of geographic areas in which energy projects could pose a concern, including potential impacts to military training routes;
- Authorizes DoD to evaluate projects proposed in such areas for six months, during which the FAA may not issue its own determination until DoD does so;
- Requires consideration of potential cumulative impacts of multiple wind farms when considering a proposed wind farm;
- Reinforces DoD’s ability to object to proposed energy projects in cases where they pose an “unacceptable risk to the national security of the United States,” while pulling in the expansive definition from DoD regulations to include significant adverse impacts to training, research, development, testing, and evaluation, military operations or to maintaining military readiness;
- Requires notification of the “appropriate state agency” of a determination of unacceptable risk;
- Eliminates a provision that set an objective for DoD to support robust deployment of renewable energy; and,
- Clarifies that DoD can request and accept funds from project proponents for mitigation.

35% of the current wind fleet operates within 50 miles of a military facility. Yet, these projects are not harming national security or changing base missions.



KEY MEMBERS OF CONGRESS AGREE THE EXISTING PROCESS HAS BEEN STRENGTHENED

Press Statement from House Armed Services Committee Chairman Thornberry (R-TX)⁷: “[The FY18 NDAA] includes language to tighten evaluation process of energy projects close to military installations to help ensure that bases and training ranges are not adversely impacted.”

Press Statement from Senate Armed Services Readiness Subcommittee Chairman Inhofe (R-OK)⁸: “Inhofe helped author language that

improves DoD procedures for reviewing potential national security implications of future energy projects, specifically reviewing encroachment on military installations, aerial military training routes, airports, drop zones, and ranges. This bill makes great strides to ensure our military maintains its combat readiness and protecting the quality of military training that has made Oklahoma an indispensable asset to our military and our overall national security.”

Press Statement from Senate Armed Services Committee Member Senator Cruz (R-TX)⁹: “...Sen. Cruz led a bipartisan effort to develop

⁷ Available at: <https://thornberry.house.gov/news/documentsingle.aspx?DocumentID=398302>

⁸ Available at: <https://www.inhofe.senate.gov/newsroom/press->

[releases/inhofe-votes-to-advance-national-defense-authorization-act-](https://www.inhofe.senate.gov/newsroom/press-releases/inhofe-votes-to-advance-national-defense-authorization-act-)

⁹ Available at: https://www.cruz.senate.gov/?p=press_release&id=3492

an equitable process for energy projects by improving the notification process, establishing the means for governors to express concerns, and ensuring that the cumulative impacts of potential energy projects are considered in a fair and non-partisan manner. This amendment is critical for Texas installations located in close proximity to wind turbine farms.”

DOD DOES NOT WANT ONE-SIZE-FITS-ALL EXCLUSION ZONES BECAUSE THEY AREN'T NECESSARY AND DON'T WORK

Some policymakers have proposed exclusion zones around military facilities. According to DoD, such one-size-fits-all exclusion zones are not effective in protecting DoD or base interests. They also infringe on the private property rights of landowners who wish to host wind turbines. The existing evaluation process to understand potential affects, using the detailed technical information unique to each specific base (its assets and missions) and the details of a proposed wind farm (turbine layout, number, height, location, etc.) is more effective at guaranteeing protection of a facility's missions and capabilities than arbitrary exclusion zones.

In its March 2015 report¹⁰ to Congress, DoD wrote that such exclusion zones are “not useful.” The report elaborates on DoD's concern, saying “Due to the wide variety of missions and the variability of impacts on different types of obstructions, it is not possible to apply a ‘one-size-fits-all’ standoff distance

between DoD military readiness activities and development projects.”

In other words, DoD says that proposing arbitrary distance-based exclusion zones will not ensure military readiness. Drawing a circle around a facility at an arbitrary distance does not guarantee protection of that base's mission. On the other hand, DoD objections informed by detailed, site-specific technical analysis based on the mission and assets at a given military facility is a much more comprehensive approach and does guarantee protection of that facility's mission and viability.

The fallacy of establishing distance-based exclusion zones is demonstrated by the varying distances chosen by bill sponsors. They are purely arbitrary (bills have been proposed with distances as varied as 25 miles and 50 miles) and are not based on any technical, scientific, or mission-based analysis.

Under these zones, proposed projects would be blocked and private property rights for landowners diminished, even if project-specific technical analysis proved projects would have no impact on a local base or mission, and regardless of whether any potential impact could be mitigated.

DOD, OTHER AGENCIES EXPANDING MITIGATION OPTIONS WITH COOPERATION FROM INDUSTRY

While there are existing, proven mitigation options for several potential impacts, including

¹⁰ Available at:
<https://www.acq.osd.mil/dodsc/library/CY14%20RTC%20n%20MCE%20BOD%20Final-%20ES%20Clean.pdf>

some radar-related impacts, DoD and other agencies have researched and field tested additional mitigation options to deal with radar-related impacts.

From April 2012 to April 2013, DoD, Department of Energy, Department of Homeland Security, and the Federal Aviation Administration conducted an interagency field test and evaluation of off-the-shelf wind turbine-radar interference mitigation solutions. During this time, three field tests against different wind farms were conducted that e tested 8 different technologies (software upgrades, in-fill radars, and new radar technologies). The summary report¹¹ from MIT Lincoln Labs and subsequent multi-agency strategy document¹² found that: “Several mitigation technologies showed great promise” and “Several technologies succeeded in detecting and tracking aircraft over wind farms.”

DoD is considering some of these technologies during mitigation discussions with developers under its pilot mitigation program (PMP).

The next section of the paper presents more than a dozen case studies across six states that demonstrate how the process works to protect DoD and local military bases interests.

¹¹ Available at: http://energy.sandia.gov/wp-content/gallery/uploads/dlm_uploads/SAND2014-19003.pdf

¹² Available at: <https://www.energy.gov/sites/prod/files/2016/06/f32/Federal-Interagency-Wind-Turbine-Radar-Interference-Mitigation-Strategy-02092016rev.pdf>

CASE STUDIES THAT DEMONSTRATE THE EXISTING REVIEW PROCESS WORKS AND THAT WIND ENERGY AND MILITARY FACILITIES WORK TOGETHER

Texas

Case Study 1

During development of a wind project in Texas, a company contacted Naval Air Station Kingsville (NASK) to discuss the location of the project and if there appeared to be any issues. They replied that they did not have concerns. When the company entered the Clearinghouse process, the Navy spent six months evaluating the cumulative impact that the proposed project would have on their radar and replied that it wouldn't have an impact.

Case Study 2

A proposed wind project in Texas consisting of more than 120 turbines raised concerns with DoD and DHS due to potential impacts on an air route surveillance radar-4 (ARSR-4) system. ARSRs are long-range radars with a range of at least 200 nautical miles. They are used to help control air traffic while planes are in route and have the capability to also detect aircraft flying low to avoid detection.

DHS had filed objections to a portion of the project with the Federal Aviation Administration, and the DoD had communicated that the project could have an adverse impact on military operations and readiness.

In response, over a two-year process, a mitigation option was identified. The developer agreed to fund construction of a supplemental radar unit that addressed the DoD and DHS concerns about potential reduction in functionality of the ARSR-4. This agreement was written up in a memorandum of understanding (MOU), with the developer paying \$2.8 million to fund the mitigation. As a result, the DoD and DHS lifted their objections.

Case Study 3

When developing the Patriot and Chapman Ranch projects in coastal Texas, Apex Clean Energy worked closely with the U.S. Navy to ensure the projects' turbines would not negatively impact local Naval air operations. Both projects are located between the Kingsville and Corpus Christi Naval Air Stations. The initial review revealed slight degradation to the effectiveness of the radar facilities located at the air stations. In response, Apex arranged through a Memorandum of Agreement to fund fusion of the two radars that provides overlapping coverage of the wind farm area, increasing the detection rate of both radars. Apex also agreed to curtail project operations should the upgrades not achieve the desired result. Additionally, the mitigation agreement includes a requirement that Apex curtail project operations when certain air training/testing operations are underway. These agreements highlight how innovative mitigation agreements can solve problems and, in the case of the developer-funded radar upgrades, provide solutions that may be better than the status quo.

Case Study 4

During the development of a wind farm in Texas, the developer approached the Naval Air Station Kingsville (NASK) about the project. The Navy informed the developer that they had a military training route along the eastern side of the proposed project. In response, the company agreed to put a buffer on either side of the centerline of this route in which they would not build any wind turbines.

During the development of a subsequent phase, the company entered into a Memorandum of Understanding with the Navy regarding their DASR-11 radar and agreed to provide the Navy sufficient funds to alter their post-processing radar returns with respect to the location of the turbines.

Case Study 5

In 2006, EDPR, then Horizon Wind Energy, purchased development assets from Renewable Energy Systems (RES) northwest of Abilene, TX. Part of their combined late-stage development effort included engaging with Dyess Air Force Base, located in the southwest corner of Abilene and approximately 20 miles from the wind farm. The two phases of the Lone Star Wind Farm, comprising 200 2.0 MW turbines, have now been operational for more than a decade.

There was no DoD Clearinghouse process in place at the time of Lone Star's development and construction, yet the industry proactively engaged with the base and resolved concerns.

The project developers reached out to personnel from Dyess Air Force Base to inquire about any issues that might affect base operations. They learned that NEXRAD (next-generation radar) interference was their primary concern, as they own a unit from which radar signals emanate at a point northeast of Abilene and span the area toward Abilene and the Base. The proposed wind farm was located directly between the NEXRAD unit and the Base. The unit is utilized by the National Weather Service, and the parties were concerned that weather forecasting would be adversely impacted if wind turbines were placed in the radar beam path.

RES and EDPR worked closely with Dyess Air Force Base, as well with as the National Weather Service, to brainstorm mitigation possibilities. Several accommodations were made by industry during the process:

- RES stopped leasing land in the south part of the project area;
- The companies agreed to remove planned turbine locations in certain areas;
- The parties developed NEXRAD radar beam path maps to overlay with the project layout;
- The project layout was modified substantially both through the removal of the southernmost turbines and the placing of remaining turbines within existing lines of interference;
- RES and EDPR continued to consider radar issues during micro-siting and construction;

The developers were able to mitigate the potential impact on Dyess and National Weather Service radar. Notably, the project was never considered to pose a risk to Air Force training. Both Dyess and NWS were satisfied with the resulting mitigation.

Oklahoma

Case Study 6

During the development of a wind project in Oklahoma, Sheppard Air Force Base in Wichita Falls, TX, was contacted as part of the Clearinghouse process. They asked the developer to modify its FAA filings to reduce the height to below 500 feet to prevent interference with their training mission. The developer agreed to do so and were subsequently issued Determinations of No Hazard.

Case Study 7

Tradewind Energy met twice beginning in March 2010 with Vance Air Force Base in person to discuss the proposed Chisholm View Wind Project in Grant and Garfield Counties. As a result of these meetings, Vance Air Force Base issued a 'no objection' letter for the Chisholm View Wind Project to satisfy Metropolitan Area Planning Commission requirements around Enid, OK. Construction on the project began in early 2012. In 2013, Vance AFB confirmed in an email to Tradewind that the base was not seeing issues with military radar as a result of Chisholm View.

Case Study 8

In 2017, Tradewind Energy discussed the proposed "Galaxy" Wind Project with Altus Air Force Base. At that point, the project was in early stage development as the developer had only filed wind meteorological tower installation notifications with the Federal Aviation Administration. Military bases receive notifications about FAA turbine and meteorological tower filings. The base expressed concerns about potential radar impacts and military training routes in the area. In response, Tradewind made the decision to voluntarily stop development of the "Galaxy" Wind Project.

Case Study 9

In 2017, Tradewind Energy met with Vance Air Force Base and discussed several projects including the proposed "Gallop" Wind Project. The base expressed concerns about proximity to the base and potential radar impacts in the area from the proposed project. In response, Tradewind made the decision to voluntarily stop development of the "Gallop" Wind Project.

Virginia

Case Study 10

In May 2016, EDP Renewables (EDPR) filed 22 wind turbine locations with the FAA for its Poplar Camp project in Wythe and Carroll Counties, Virginia. These were located on a prominent ridge at an elevation of almost 3,000 feet, and the proposed turbines were 591 feet tall at their highest point. In November 2016,

the FAA issued Notices of Presumed Hazard (NPHs) for all of these turbine locations due to: 1) height over 500 feet; and 2) potential interference with the local airport. It was also noted that the Department of Defense (DoD) would also need to be consulted. Preliminary evaluation by EDPR had determined that there was an overlap between the project and mapped military training routes.

Upon receipt of these NPHs, EDPR requested further study from FAA to evaluate the height, airport, and military issues. A public notice was then generated by FAA to all potentially interested parties. Afterwards, EDPR met with representatives from DoD and the Air Force to discuss any potential impacts from these wind turbines. The military expressed an eagerness to work with EDPR on finding a solution, and ultimately determined that they would have no objection to the wind farm provided that lights were installed that would not interfere or “bloom” in their pilots’ night vision goggles. EDPR agreed to this.

On September 20, 2017, FAA issued Determinations of No Hazard for the entire project. It was found that these turbines would not have an adverse impact on flight operations at the local airport, or to the military.

North Carolina

Case Study 11

Avangrid Renewables started developing a project in North Carolina in late 2009. In early 2011, WR Systems, an affiliate of Raytheon, contacted the developer with concerns over

potential interference with the over-the-horizon radar (OTHR) array at the Northwest Naval Annex in Virginia. In October 2011, the DoD Siting Clearinghouse issued a letter indicating that while there may be some impact, DoD was comfortable that any interference would not rise to levels of concern. Accordingly, FAA issued its determinations of no hazard for 150 wind turbines.

In late 2012, the Clearinghouse announced that new analysis, using more conservative assumptions, was conducted and the expected levels of interference would be unacceptable. The Clearinghouse subsequently established a mitigation response team (MRT). Numerous meetings were convened and a variety of mitigation options were discussed and analyzed. After approximately two years of effort by all of the aforementioned stakeholders, the parties determined that a phased construction of the wind facility could proceed and any potential for interference would be limited and acceptable. A Memorandum of Understanding was negotiated and drafted in late 2014, construction began in the summer of 2015, and the project was commissioned in December 2016.

Case Study 12

DoD identified several issues with a proposed Invenergy project in North Carolina, including impacts to airspace used by the U.S. Coast Guard and the ROTHDR (relocatable over-the-horizon radar) used as a part of the drug smuggling monitoring mission (monitoring ships and planes in South America and the

Caribbean). This project was cancelled, in part, due to DoD's concerns.

Case Study 13

Invenergy worked with DoD, the local AFB, and local and state agencies regarding a 74MW wind project in North Carolina that was identified as having impacts to a training route. An agreement between Invenergy and DoD was reached to reduce the project footprint within the training route's area allowing the project and the training mission to coexist. While the project has not yet been built, this is a good example of a time where a developer and DoD were able to come to an agreement.

Pennsylvania

Case Study 14

Rausch Creek Wind Farm filed wind turbine locations with the FAA in early 2016 and the study was delayed waiting for DoD evaluation. In order to address DoD concerns, Tradewind met with Ft. Indiantown Gap (FTIG) Army Base in late 2016 to discuss the project. Base commander, flight operations personnel and county representatives were also present at the meeting. The FTIG Training Area overlies the project site and it is used for various helicopter tactical training operations. In short, FTIG's message to TWE was that their flight operations would be adversely impacted by Rausch Creek and there were no viable options for working together on mitigation. Rauch Creek was a complicated

project, but feedback from the DoD ultimately led to Tradewind terminating the project.

Maryland

Case Study 15

Several years ago, Apex Clean Energy explored the possibility of developing a wind project in the southern area of Maryland's Eastern Shore. The project had ideal site characteristics, with a strong wind resource and good transmission infrastructure. However, on initial consultation with the Department of Defense, the company was informed that the project would have negatively impacted radar installations at the Patuxent River Naval Air Station in a manner that likely could not be corrected by mitigation. After follow-up conversations confirmed that mitigation would not resolve the issue for the base, Apex elected to give up the project rather than risk creating a significant adverse impact to military operations. Though the project never received a formal objection, the likelihood of such an outcome kept the company from pursuing its development.

Conclusion

These case studies demonstrate that the DoD review process works well to ensure national security, military operations and military readiness are respected during wind power development. The review process works to identify potential concerns; conduct project-specific analysis to see if DoD and base concerns can be addressed and if so, how; which results in changes to proposed projects, deploying

other mitigation, or canceling projects to resolve DoD concerns.

National security is paramount. The wind energy industry has been and will continue to be a constructive partner in protecting national security, military readiness and training, and military operations.