




Renewable Energy for Military Installations:

2014 Industry Review

American Council On Renewable Energy (ACORE)






RENEWABLE ENERGY FOR MILITARY INSTALLATIONS: 2014 INDUSTRY REVIEW

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AMERICAN COUNCIL ON RENEWABLE ENERGY (ACORE)

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ACORE, a 501(c)(3) non-profit membership organization, is dedicated to building a secure and prosperous America with clean, renewable energy. ACORE seeks to advance renewable energy through finance, policy, technology, and market development and is concentrating its member focus in 2014 on National Defense & Security, Power Generation & Infrastructure, and Transportation. Additional information is available at: www.acore.org.

NATIONAL DEFENSE & SECURITY INITIATIVE

ACORE is working alongside the Department of Defense (DoD) and the military services to meet the challenge of increased renewable energy deployment by drawing on the collective expertise and experience of ACORE members: renewable energy leaders involved in manufacturing, project development, finance, end-use, and professional services. The National Defense and Security Initiative recommends specific policy, finance, contracting, technology, and siting-related strategies to improve the military's procurement process for renewable energy. Dialogue is structured around industry forums, issue-focused roundtables, monthly teleconferences, joint industry comments and letters, member-authored white papers, and other deliverables.

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American Council On Renewable Energy (ACORE)
1600 K St. NW, Suite 650
Washington, DC 20006
202.393.0001

Questions or Comments: info@acore.org

INDUSTRY REVIEW AUTHORS

ACORE
Lesley Hunter (Lead Editor), Michael Brower & Todd Foley
info@acore.org

Acciona Energy North America
Lucas Michelini
info@acciona-na.com

Akin Gump Strauss Hauer & Feld LLP
Elliot Hinds & Ian Shavitz
ehinds@akingump.com

Andrews Kurth LLP
Roger Feldman
rogerfeldman@andrewskurth.com

Bostonia Partners LLC
Peter Flynn
pflynn@bostonia.com

Eaton Corporation
The Honorable William C. (Bill) Anderson
williamcanderson@eaton.com

EverPower Wind Holdings, Inc.
Harry Benson
hbenson@everpower.com

National Association of State Energy Officials
Julia Friedman & Stephen Goss
energy@naseo.org

Reed Smith LLP
Amy S. Koch
AKoch@ReedSmith.com

Siemens Government Technologies, Inc.
Joseph Bonnin

SunEdison
Nate Butler & Scott Provinse
nbutler@sunedison.com

SunPower
Kevin Prince & Morgan Adam
kevin.prince@sunpower.com

TechVision21
Anita Balachandra
abalachandra@techvision21.com

Wilson Sonsini Goodrich & Rosati LLP
Taite McDonald
tmcdonald@wsgr.com

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SETTING THE SCENE

RENEWABLE ENERGY FOR NATIONAL SECURITY

As the single largest consumer of energy in the U.S., the Department of Defense (DoD) has embarked on an ambitious program of expanded renewable energy generation on bases and in the field, with a goal of producing 25% of its energy from renewable sources by 2025.

Renewable energy is not just a "policy objective" for the armed forces, but also an "operational imperative." The deployable and decentralized energy production possibilities offered by renewable sources, and by enabling technologies like microgrids, have tremendous implications for the safety, security, and effectiveness of the military. Renewable energy and efficiency improvements can increase warfighter capability, enhance the energy security of its installations, and cut operational and military base energy costs.

MILITARY FACILITY ENERGY USE

Twenty-percent of the U.S. military's energy consumption occurs at its installations. DoD pays around $4 billion annually to provide power to its 300,000 plus facilities in the U.S. and around the world. DoD has made improvements in installation energy systems and management a priority, driven by the desire to provide maximum mission support through improved security of supply and reduced costs.

DoD is uniquely positioned to serve as a platform to develop and install new technologies. The Army, Navy, and Air Force are each implementing detailed plans to achieve ambitious renewable energy and energy efficiency targets at military installations (Figure 1). These plans include a one gigawatt (GW) per service target of renewable power capacity at military facilities, primarily via third-party financing.

PURPOSE OF THIS REPORT

There are several lessons to be learned from the private sector as DoD becomes an increasingly significant player in the renewable energy industry. This report contains a series of industry perspectives about the business considerations associated with renewable energy installations at military facilities, including:

- **Policy:** State regulatory hurdles for military use of renewables, and best practices in collaboration with state energy offices
- **Contracting and Financing:** An overview of the existing procurement landscape with insight and recommendations about creating financeable third-party-owned projects
- **Siting and Technology:** Siting effective renewable energy projects at military bases and making use of innovative technology options
- **Energy Security and Microgrids:** The importance of energy-secure technologies, like microgrids, to enhance the use of renewable energy at military installations and ensure reliable power for critical infrastructure

The report is intended to be a resource for the Department of Defense and military service officials as they design and amend renewable energy programs, for renewable energy companies and investors as they navigate the military's procurement processes, and for other interested parties.

A group of prominent renewable energy developers, energy service companies, financiers, law firms, and other groups working with the military authored the

twelve articles in this report. The articles generally provide insight about present business opportunities for third-party-owned renewable electricity projects at military installations. It should be noted that the military employs renewable energy through a number of diverse applications that continue to expand, and this report does not attempt to give a comprehensive overview of every renewable energy technology or procurement option available.

Renewable Energy for Military Installations: 2014 Industry Review is a product of the American Council On Renewable Energy's (ACORE's) National Defense and Security Initiative, which defines the opportunities for the expanded use of renewable energy in support of national defense by drawing on the collective expertise and experience of ACORE members: renewable energy leaders involved in manufacturing, project development, finance, end use, and professional services.

The views and opinions expressed in this report are those of the authors and do not necessarily reflect the views of ACORE.

FIGURE 1: SELECTED MILITARY SERVICE GOALS, PRIORITIES AND REQUIREMENTS FOR RENEWABLE ENERGY

AIR FORCE	ARMY	NAVY
▸ Increase facility consumption of renewable or alternative energy to 25% of total electricity use by 2025 ▸ Deploy 1 GW of on-site capacity by 2016 ▸ Ensure all new buildings are designed to achieve zero net energy by 2030, beginning in 2020 ▸ Increase use of cost-competitive drop-in alternative aviation fuel blends for non-contingency operations to 50% of total consumption by 2025 ▸ Certify 100% of the aviation fleet for a bio-based alternative aviation fuel blend by 2013 ▸ Increase alternative fuel use in ground vehicles by 10% compounded annually, through 2015 (2008 baseline)	▸ Derive 25% of total energy consumed from renewable energy sources by 2025 ▸ Deploy 1 GW of renewable energy on Army installations by 2025 ▸ Reach net-zero energy consumption by 2030 ▸ Launch a "Green Warrior Convoy" of vehicles in 2013	▸ Derive 50% of total energy consumption from alternative sources by 2020 ▸ Deploy 1 GW of renewable energy on Navy installations by 2020 ▸ Produce at least 50% ashore-based energy requirements from alternative sources; goal of 50% of installations to be net zero by 2020 ▸ Demonstrate a Green Strike Group in local operations by 2012 and deploy a "Great Green Fleet" in 2016

THE POLICY CONTEXT FOR MILITARY RENEWABLES

RETHINKING STATE REGULATORY ISSUES

Amy S. Koch
Reed Smith LLP

For any renewable energy project development, regulatory risk can often be one of the more frustrating issues that energy developers face. State regulatory risk is an issue that U.S. Department of Defense (DoD) officials have addressed conservatively – perhaps for good reason – in the requests for proposals (RFPs) that have been issued for renewable energy power purchase agreements (PPAs) because state utility regulation of retail electric sales can be complicated. However, the regulatory risks are generally quantifiable and manageable once the nuances of state utility regulation are understood. The purpose of this paper is to shed some light on these nuances and to provide some suggestions on approaches to address the state utility regulatory risks.

In renewable energy project development, regulatory risk can often be one of the more frustrating issues that renewable energy developers must address. To date, U.S. Department of Defense (DoD) officials, in particular, the U.S. Army Energy Initiatives Task Force (EITF), have taken a conservative approach to state regulatory risk by including requirements in requests for proposals (RFPs) that the bidder comply with all state utility laws. Understanding the nuances of state regulation may provide an opportunity for power purchase agreements (PPAs) to be executed that might otherwise not be considered readily feasible.

Federal regulation of public utilities by the Federal Energy Regulatory Commission (FERC) is relatively well-understood, and therefore is not the focus of this article.

DOD'S PROCUREMENT AUTHORITY AND THE SUPREMACY CLAUSE

DoD has several grants of statutory authority by which it can enter into arrangements that will result in the procurement of renewable energy. One provision is especially helpful in that it allows DoD to enter into long-term PPAs 10 U.S.C. § 2922a (known as Section 2922a) grants the secretary of a military department the authority to enter PPAs with terms of up to 30 years "*for the provision and operation of energy production facilities on real property under the Secretary's jurisdiction or on private property and the purchase of energy produced from such facilities.*"[1]

DoD did not use Section 2922a to purchase electricity for nearly 30 years. Today, it is one of the main authorities which DoD intends to use to procure renewable energy to fulfill its renewable energy mandates. For example, Section 2922a is the statutory authorization on which the EITF is relying for its $7 billion under the Multiple Award Task Order Contract (MATOC).[2]

Contract purchases under Section 2922a are specifically exempted from another statute that was

[1] The provision was initially enacted as part of legislation for the construction of military housing and numbered as Section 2394 of title 10. It was renumbered Section 2922a by Pub. L. 109-364, div. B, title XXVIII, § 2851(b)(2), Oct. 17, 2006, 120 Stat. 2492.

[2] U.S. Army Engineering and Support Center, *Solicitation for Renewable and Alternative Energy Power Production for DOD Installations*, W9121DY-11-R-0036, dated July 30, 2012.

intended to require military installations, or more broadly, all federal agencies, to comply with state utility franchise laws. Section 8093 of the Continuing Authorization Act of 1988 (known as Section 8093), now codified as 40 U.S.C. § 591, prohibits Federal agencies from purchasing "*electricity in a manner inconsistent with state law governing the provisions of electric utility service.*" Section 8093 currently contains two exceptions for DoD. First, the secretary of a military department may enter into a contract under 10 U.S.C. §2394, now codified at 10 U.S.C. § 2922a. Second, the secretary may purchase electricity from any provider if he/she finds that the "*utility having the applicable state-approved franchise (or other service authorization) is unwilling or unable to meet unusual standards of service reliability that are necessary for purposes of national defense.*" DoD has interpreted Section 8093 as only allowing it to use authorized electric providers for electricity purchases unless the purchase is in a state with a competitive electricity market.[3]

Section 8093 has an interesting history. Prior to its enactment in 1988, "federal enclaves" were able to purchase electricity without compliance with state utility laws on the grounds that the U.S. Constitution prevented states from forcing federal agencies to contract with a specific utility, absent specific Congressional authorization.[4] In *Black Hills Power & Light Co. v. Weinberger* (*Weinberger*), the U.S. Court of Appeals for the Eighth Circuit held that Ellsworth Air Force Base, a federally-protected enclave, could procure electricity through a competitive-bid process rather than fall under state utility franchise regulation.[5] Section 8093 was "quietly slipped" into the Continuing Authorization Act of 1988, in light of the *Weinberger* decision, essentially to protect, among other things, established utility service territories.[6]

The problem is that Section 8093 was badly written. Once it became law, two local utilities renewed efforts to prevent Ellsworth Air Force Base from using a competitive-bidding process to purchase electricity. Consequently, in *West River Electric Association v. Black Hills Power*, the Eighth Circuit found that when Congress enacted Section 8093, it did not provide the necessary specific authorization to eliminate the Federal Government's exclusive jurisdiction over Ellsworth Air Force Base,[7] a "federal enclave."

The concept of federal supremacy with respect to "federal enclaves" is still relevant. However, as a practical matter, DoD appears reluctant to use the "federal enclave" doctrine or the exceptions granted in Section 8093 and perhaps wisely so. Absent a real need, overriding state utility franchise laws could create unnecessary problems for DoD on Capitol Hill and would not solve a concurrent problem. While the "federal enclave" doctrine and the Section 8093 exceptions may allow a DoD to except an installation from state utility law franchise requirements, it is not clear whether the exceptions would prevent an electricity seller from being subject to state utility regulation, although there is a logical reason why the exceptions and federal enclave doctrine should protect the electricity seller. If DoD's legal right to bypass state regulatory laws does not protect the retail electricity sellers to DoD, installations, that legal right may have somewhat limited value,

[3] John Conger, Acting Deputy Under Secretary of Defense (Installations and Environment), *Department of Defense Guidance on Financing of Energy Projects* at 3 (November 9, 2012).

[4] Federal enclaves are constitutionally created in to Art. 1, Sec. 8, cl. 17, which grants Congress the power ""to exercise exclusive Legislation . . . over all Places purchased by the Consent of the Legislature of [**8] the State in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings." U.S. Const. art. I, § 8, cl. 17. The grant of "exclusive" legislative power to Congress over federal enclaves, by its own weight, bars state regulation without specific congressional approval. *Paul v. U.S.*, 371 U.S. 245 at 263 (1962). *See* also *Black Hills Power & Light Co. v. Weinberger*, 808 F. 2d 665 at 668 (8th Cir. 1987).

[5] *808 F.2d 665 (8th Cir. 1987).*

[6] An interesting and entertaining exploration of the history of Section 8093 and subsequent efforts to protect it, may be found at "*Yet Another Industry on the Taxpayer-Subsidized Dole: Why Section 8093 of the Continuing Authorization Act of 1988 (40 U.S.C. § 591) should be repealed*," 65 A.F.L. Rev. 187 (2010). The author, Major Frank D. Hollfield, makes a compelling case for its repeal.

[7] 918 F.2d 713 (8th Circ. 1990).

resulting in state laws thwarting a federal law.[8] This is a classic question of "conflict preemption," a constitutional law issue, which is beyond the scope of this article.

THE ELECTRICITY SELLER'S RISK

Under traditional utility law, a regulated utility is granted an exclusive monopoly to serve retail customers within a specific franchise service territory. Under this model, state law generally defines an entity as a regulated utility by whether it holds itself out to the public as a provider of a utility service. For example, in Florida, a "*public utility is defined as every person, corporation… supplying electricity or gas… to or for the public within this state.*"[9]

Simply reviewing a state utility code will not reveal the nuances. However, there may be case law (either state utility commission or court cases) determining whether an entity selling electricity to one buyer is a regulated utility under state law. The strictest view is that any sale, even a single sale, can result in utility status. Florida is an example of this view. The Florida Supreme Court has upheld a state utility commission determination that the sale of electricity, to even just a single customer, made the provider a "public utility" pursuant to the Florida utility laws.[10] Other states have judicial or utility commission interpretations allowing for single sales. For example, in 2010, the Arizona Corporation Commission found that SolarCity Corporation would not be deemed a public service corporation (the term for an Arizona regulated utility) when it provides solar energy services to Arizona schools, governments, and non-profit entities, which included electricity.[11]

There are also specific statutory or regulatory exemptions from state utility regulation included in state utility laws. Generally, municipal utility systems and electric cooperatives are exempt from most state utility regulation. However, other entities may also be specifically exempted. For example, another Florida law specifically exempts a "non-utility" that provides electric vehicle charging from regulation as a public utility, by specifically finding that the provision of electric vehicle charging is not a retail sale of electricity.[12] Entities engaged in net metering also tend to be exempt from traditional utility regulation under the statutes providing for net metering.[13] In addition, at least 22 states, plus the District of Columbia and Puerto Rico, authorize third-party solar PPAs.[14]

Use of the traditional franchise model has begun to erode over the past couple of decades, as over fifteen states and the District of Columbia have moved to some sort of "retail choice" model that allows retail customers to choose their retail power supplier, while the traditional utility serves as a distribution utility, and often as the billing agent for the alternative supplier.[15] In retail access states,

[8] The North Carolina Utilities Commission staff thought it did not. Ft. Bragg encountered this problem when it began to examine the use of third party PPAs to comply with the Army's Net Zero Energy strategy. The Commission staff stated that the third party electricity seller would be considered a public utility under North Carolina law. See "*Barriers to Military Installations Utilizing Distributed Generation from Renewable Energy Resources: Third Party Power Purchase Agreements*," USDOE, Clean Energy Application Center, white paper published May 2011, at p. 7.

[9] Fla. Stat.Ch. 366.02.

[10] *PW Ventures v. Nichols*, 533 So.2d 281 (Fla. 1988).

[11] *In the Matter of the Application of SolarCity Corporation for a determination that when it provides solar service to Arizona schools, governments, and non-profit entities it is not acting as a public service corporation pursuant to Art. 15, Section 2 of the Arizona Constitution*, Decision No. 71795 (July 12, 2010) (2010 Ariz. PUC LEXIS 286).

[12] Fla. Stat. Ch. 366.94.

[13] *See e.g.*, *Nevada Public Service Commission, Investigation and rulemaking to adopt, amend, or repeal regulations pertaining to Chapters 703 and 704 of the Nevada Administrative Code . . .*, Docket No. 07-06024, *et al.*, November 26, 2008 (2009 Nev. PUC LEXIS 283).

[14] Database of State Incentives for Renewables & Efficiency, 3rd-Party Solar PV Power Purchase Agreements Map 1, DSIRE SOLAR, available at http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf.

[15] According to the Federal Trade Commission (FTC), as of July 2013, states that have adopted broadly available retail customer choice for electricity services in the service territories of investor-owned utilities include Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New

generally the old public utility laws remain in place, but are either amended or supplemented with new provisions that allow for non-utility electric service providers. While these types of entities are not subject to rate regulation, they generally must register with their state utility commission and show and maintain some financial ability to meet their commitments.

Retail competition states may not always provide the necessary latitude to a power seller or buyer that is generally assumed. For example, retail competition may be limited to specific customer classes or to some percentage of the incumbent utility's overall load. California is a good example of both of these limitations. It initially moved to retail competition, called "Direct Access" in 1998 as part of the entire California electric utility sector restructuring, but then suspended the program for new contracts in 2001. In 2009, the California legislature enacted new legislation to allow non-residential retail customers (commercial and industrial) to acquire electricity from electric service providers through the phase-in of authorized increases to the historic maximum level of direct access in each utility service territory.[16] Michigan limited retail competition to 10% of total electric use per regulated utility in 2008.[17]

PARSING THE REGULATORY ISSUES

In order to maximize its renewable energy procurement opportunities, DoD could reconsider whether its interpretation of Section 8093 as applying to purchases of electricity as a commodity unnecessarily limits its ability to contract for renewable energy. As noted, contracts executed pursuant to Section 2922a are specifically exempted from Section 8093, as are contracts for unusual reliability needs that cannot or will not be addressed by the local franchised utility. In addition, the federal enclave doctrine is still a valid law, so in the case of DoD installations that are deemed federal enclaves, Section 8093 arguably should not be applied at all.

Although a DoD installation can be protected under the exceptions set out in Section 8093 and the federal enclave doctrine, there is a question whether its selling counterparties would be. Assuming that DoD would rather execute power purchase agreements than litigate the Constitutional law issues surrounding that question, examination of actual state law requirements may be useful.

In traditional utility regulation states, statutory and judicial exceptions to the definition of "public utility" or whatever term is used to denote a state-regulated utility may provide an exception to regulation. A potential power supplier could seek a declaratory order at the state utility commission as to its status during the pendency of the bidding process; although, there may be no guarantee that the commission would act in a timely manner, particularly if the local utility opposed the petition. Specific statutory or administrative exemptions could also be reviewed for their applicability to power sellers. Finally, innovative contracting arrangements with the local franchised utility may provide a solution. In New Mexico, Ft. Bliss and El Paso Electric Company (El Paso) at one point planned that El Paso would (i) select the developer of a 20 MW solar project through a competitive bidding process, (ii) purchase the output of the facility from the developer under a long-term PPA, and (iii) resell the output to Ft. Bliss.

York, Ohio, Pennsylvania, Rhode Island, and most of Texas. The District of Columbia has also adopted electricity customer choice. Some customers have some degree of electricity retail choice in California, Michigan, Montana, and Oregon. Recently, Illinois, Ohio, and Pennsylvania have undertaken substantial revisions of their retail choice rules to support increased competition. Expansions of retail customer choice (to include customers that currently do not have this choice) were under consideration in California, Arizona and Michigan. Arizona Corporation Commission, *In the Matter of the Commission's Inquiry Into Retail Electric Competition*, Docket No. E00000W-13-0135, Comment of the Staff of the Federal Trade Commission at 4, fn 11 (July 11, 2013).

[16] CA. Pub. Util. Comm'n, Decision 10-03-022, *Decision Regarding Increased Limits for Direct Access Transactions* (issued March 15, 2010).

[17] Michigan H.B. 5524, P.A. 286 (2008).

In most retail access states, the electricity seller will be very lightly regulated, which will present nominal or no regulatory risk for the seller. However, in California, a DoD installation could be limited to the amount of electricity it can purchase directly from an alternative provider because of retail access restrictions based on the traditional utility's load. If a significant portion of an installation's load is already receiving service from an alternative supplier, the installation can switch suppliers to contract with renewable energy developer on a long-term basis because the load already counted in the Direct Access program. Even if the Western Area Power Administration (WAPA) is already serving as a conduit for electricity purchases from alternative energy suppliers, there should be contracting mechanisms in place to allow for DoD load to be served by new alternative suppliers, albeit, perhaps, at the expense of existing suppliers.

Finally, as DoD continues its drive to increase energy security at its installations, new arrangements with electricity suppliers using microgrids and energy storage could add another layer of regulatory risk. Sales of excess electricity, including excess electricity produced from demand-side management, would be subject to the jurisdiction of FERC, as would the sale of ancillary services to a transmission provider or Regional Transmission Organization.

CONCLUSION

In the short term, DoD's conservative approach to regulatory risk is certainly understandable, given its objective to increase the amount of renewable energy it uses as expeditiously as possible. However, even in the short term, a thorough understanding of state utility regulation may provide opportunity for purchases under PPAs with renewable energy developers that might otherwise not be considered feasible. In the longer term, if DoD reconsiders how it interprets the exceptions to Section 8093 and the federal enclave doctrine, it may find even greater opportunities to purchase renewable energy.

ABOUT THE AUTHOR

Amy S. Koch is the Regulatory Team Leader for Reed Smith LLP's Energy & Natural Resources (ENR) Group in Washington, D.C. She advises clients on federal and state energy regulation, industry transactions, electricity market regulation, and on the development, management, and operation of electric generating facilities. Reed Smith's ENR Group is multinational and multidisciplinary, providing regulatory, transactional and litigation legal services for clients operating in energy & natural resources and related industries around in the world.

WIN-WIN: COLLABORATION AMONG STATE ENERGY OFFICES AND THE U.S. DEPARTMENT OF DEFENSE

Julia Friedman and Stephen Goss
National Association of State Energy Officials (NASEO)

The nation's 56 State and Territory Energy Offices are uniquely positioned to support the Department of Defense's (DoD) energy objectives. DoD has identified fixed military installations as an immediate opportunity for promoting energy efficiency, renewable energy, and energy security improvement measures. Like the federal government, State Energy Offices (SEOs) have a vested interest in ensuring the economic viability, environmental stewardship, and energy security of these bases. This article reviews the positive economic impacts of military installations on local economies across the country and the ways in which the roles and responsibilities of the SEOs align with DoD objectives. Because the SEOs are government entities responsible for policy development, long-term energy planning, and the administration of programs and funding to deploy renewable energy, energy efficiency, and alternative fuels, there are ample opportunities for collaboration with the military. Four examples of cooperation among SEOs and military leadership are provided to demonstrate the range of ways in which the two entities can partner for mutual benefit.

THE OPPORTUNITY

According to the *Annual Energy Management Report for Fiscal Year 2012*, DoD accounts for 80% of total Federal Government energy consumption at a cost of $20.4 billion.[18] Over 25% of this energy is attributed to DoD facility energy used to power more than 500 fixed installations and 160,000 non-tactical vehicles.[19] Operating in an era of budget constraints and recognizing opportunities for more strategic energy consumption, DoD launched initiatives at installations across the country to promote energy efficiency, expand the supply of renewable energy and alternative fuels, enhance the security and resiliency of installations, and leverage investment in advanced-energy technologies.[20]

Ensuring the economic viability of these bases is of great concern not only to the federal government, but to state policymakers as well. In FY 2010, military installations in Oklahoma contributed $9.6 billion to state GDP and accounted for 5% of all salary disbursements in the state.[21] In Massachusetts, military bases supported over 45,000 jobs in FY 2011 and added $13.7 billion to the state's economy.[22] Similar statistics highlighting the positive economic impacts of military installations on local economies exist across the country. While collaboration between SEOs and DoD is not new, in the aftermath of the 2008 financial crisis, there is an increased desire to ensure the successful integration of renewable energy, energy efficiency, and alternative fuels into military facilities to promote both economic growth and environmental stewardship.

Established after the 1973 oil embargo, SEOs are important change agents, advancing state energy efficiency and renewable energy policy through technology research, demonstration, and deployment. As such, SEOs have a vested interest in the economic, environmental, and security elements of energy efficiency, renewable energy, and

[18] http://www.acq.osd.mil/ie/energy/energymgmt_report/FY%202012%20AEMR.pdf
[19] Ibid.
[20] Ibid
[21] http://stateimpact.npr.org/oklahoma/2011/11/11/ok-military-installations-9-6-billion-impact-5-of-all-wages-and-salaries/
[22] http://www.mass.gov/governor/pressoffice/pressreleases/2012/2012626-lg-releases-military-bases-report.html

alternative fuels deployment on domestic military installations. Many SEOs have a history of partnership and collaboration with the military bases located within their state, and opportunities for future partnerships abound.

THE ROLE OF STATE ENERGY OFFICES

Today, 63% of SEOs are cabinet-level agencies within a governor's administration and they continue to develop policies and programs that support energy-related economic development. On average, these offices employ at least 15 staff dedicated to policy development, advanced and alternative energy deployment programs, and long-term comprehensive energy planning.

The SEOs work with the governors and legislators to develop and implement policies ranging from renewable energy standards to building energy codes. To support clean and alternative energy technology deployment, the offices fund and administer a range of financing and incentive programs. As of January 2014, the National Association of State Energy Officials (NASEO) found that 48 SEOs operated and/or funded 86 renewable energy and energy efficiency financing programs, representing over $2.5 billion in available public financing.[23]

As largely non-regulatory entities, SEOs serve as conveners of the public and private sectors, aligning the interests of the public sector (from the federal government to the local and tribal levels) with those of the business community and other industry stakeholders. The convening power of the SEOs can, perhaps, most prominently be seen through a state's comprehensive energy planning process, for which these offices often serve as the primary author. More than 30 states have operational energy plans, which are roadmaps for achieving each state's long-term energy goals in the transportation, liquid fuels, and power generation sectors.[24] Typically these plans serve as the governors' and/or the legislatures' foundation for policy development. In states with a large military presence, comprehensive energy planning represents an opportunity to align a state's energy strategy with that of the military to achieve shared goals.

Through each of these roles, SEOs can be valuable resources to military leaders seeking to deploy clean and alternative energy projects on domestic military installations. The following examples illustrate the varied ways in which states have, and continue to, partner with military bases to provide technical assistance, funding, training, and education.

Technical Assistance and Funding

In January 2013, the Massachusetts Department of Energy Resources (the SEO) announced plans to procure a contractor to conduct comprehensive energy assessments at six military bases. The $1.5 million state investment will include assessing the energy use of each base, identifying opportunities for energy efficiency and renewable energy installations, explore technology piloting options, and prepare top-priority projects for procurement. The initiative is part of the work of the Military Asset and Security Strategy Task Force created by Governor Deval Patrick and former Lieutenant Governor Tim Murray in 2012. In March 2013, Governor Patrick filed a bond bill seeking up to $177 million over five years to support a wide range of military infrastructure projects across the state. If passed later this year, bond bill resources can be committed to support one or more projects developed through the assessments.

In Hawaii, the SEO provides ongoing assistance to the military to deploy clean and alternative energy in a number of ways. The SEO provides technical assistance and coordination services to the U.S. Pacific Command's Green Initiative for Fuels Transition Pacific (GIFTPAC), which aims to displace at least 25% of the petroleum-derived aviation and marine fuels used by the DoD in Hawaii with cleaner

[23] State Energy Financing Programs. NASEO. Accessed October 21, 2013. http://naseo.org/state-energy-financing-programs

[24] "An Overview of Statewide Comprehensive Energy Plans." NASEO. July 2013. http://naseo.org/stateenergyplans.

fuels. Beyond GIFTPAC, the SEO works with DoD to support the siting of renewable energy projects on military lands by providing developers with guidance in the siting decision-making process and helping developers obtain the necessary federal, state, and local permits, among other activities. The Hawaii SEO has developed a number of publicly available, web-based tools to facilitate coordination between the public and private sectors.[25]

The California Energy Commission (CEC) (the SEO) has been very involved with funding energy projects on military installations throughout the state. The CEC invested $1 million for 50 non-tactical vehicle conversions to electric vehicles (EVs) for the Los Angeles Air Force Base and provided funding for energy efficiency and demand response demonstrations on the San Diego Naval Base. The CEC also funded a multi-year study of energy efficiency, smart grid, and EVs on the Beale Air Force Base, as well as a lighting and appliance retrofit in the base's kitchen. In addition to funding, each of these projects required a significant amount of technical assistance, further strengthening the relationship between the SEO and military.

Facilitation and Education

The Utah Office of Energy Development (the SEO) provides a clear example of how SEOs can serve as facilitators and conveners to aid military leaders in meeting their clean energy deployment goals. Created and operated out of the Office of Energy Development, the Military Installations Energy Collaborative (MEIC) brings together the state's five military installations and other stakeholders to raise the level of energy education among military leadership and ensure collaboration across the military bases.

Under the auspices of the MIEC, but outside of official MIEC meetings, the SEO coordinated with the Tooele Army Depot (the Depot), the Army's Energy Initiatives Task Force (EITF), and the local utility to explore how a new state law (2012's Senate Bill 12) potentially created options for large-scale generation at the installation that could be sold to other military installations or to private parties.

Through the MEIC, the SEO also brokered an introduction between the Depot leadership and the solar developer, Infinia. Ultimately, Infinia installed a 1.5 MW solar array at the Depot. Although the installation is not large enough to take advantage of Senate Bill 12, it will off-set load at the installation and is expected to reap $260,000 of annual energy cost savings for the military.

CONCLUSION

As demonstrated nationally, SEOs support the deployment of energy efficiency, renewable energy, and alternative fuel resources on military installations in a number of ways. These projects and programs serve as examples for officials seeking ways to improve communication between policymakers and military leadership within their state. From formalizing an in-state working group, to raising the level of energy education among military facility managers, to engaging military leadership in state comprehensive energy planning, opportunities exist to leverage the experience, resources, convening power, and policy objectives of the SEOs. Enhanced collaboration will aid both parties in achieving their near- and long-term energy efficiency, renewable energy, and alternative fuel goals.

ABOUT THE AUTHOR

National Association of State Energy Officials (NASEO) is a membership nonprofit founded 1986 and is the only national non-profit organization whose membership includes the governor-designated energy officials from each of the 56 states and territories. Members are senior officials from the State and Territory Energy Offices, as well as affiliates from the private and public sectors.

[25] Developer and Investor Center.Hawaii State Energy Office. Accessed October 28, 2013. http://energy.hawaii.gov/developer-investor

States Energy Offices develop state policy initiatives and manage and invest more than $2 billion of their own funds derived from appropriations and system benefit charges each year in energy-related economic development.

GUIDANCE ON CONTRACTING AND FINANCING

THE MATOC AND BEYOND: DEPARTMENT OF DEFENSE RENEWABLE ENERGY PROCUREMENT LANDSCAPE AND OPPORTUNITIES

Taite McDonald
Wilson Sonsini Goodrich & Rosati LLP

Roughly a year after hundreds of companies submitted Multiple Task Order Contract (MATOC) applications, the U.S. Army Corps of Civil Engineers (USACE) Engineering and Support Center, Huntsville (HNC) issued fifty-eight original awards on behalf of the U.S. Army Energy Initiatives Task Force (Army EITF) and many yet-to-be announced follow-on awards. While it initially appeared as though many key players did not receive awards and only a small percentage of MATOC applicants would be permitted to bid on upcoming requests for proposals (RFPs), this has already proven far from true. This article provides insight and clarity for renewable energy developers, financiers, and technology providers on the process to date, the landscape of upcoming opportunities, and the state-of-play in effective strategies for working with the U.S. Department of Defense (DoD) moving forward.

Specifically, this article will include: (1) feedback on structures and strategies that proved successful in MATOC applications; (2) an update on the expanded scope of potential opportunities likely to become available through the MATOC; (3) an update on the other service strategies moving forward; and (4) upcoming technology demonstration opportunities that can be utilized to enhance a company's presence in working with the DoD.

MATOC OVERVIEW AND INSIGHT INTO 2014 PROJECT PIPELINE

Beginning with geothermal in May 2013 and ending with biomass in October 2013, Army EITF, through contracting agent USACE-HNC, awarded the initial round of MATOC awards. This section provides additional insight into the award-making process throughout 2013 and an overview of the landscape of upcoming opportunities for MATOC awardees.

2013 MATOC Award Process

Prior to the public announcement for each technology sector, USACE-HNC issued each applicant an award letter, denial letter, or request for more information letter. Applicants receiving ***denial letters*** were offered the opportunity to request a debriefing letter. Applicants receiving debriefing letters could file a letter to protest the USACE-HNC's decision in a defined time period. If the letter contained an argument deemed successful by USACE's legal counsel, the initial denial decision was often overturned by USACE. Applicants who did not choose to file a protest letter or were unsuccessful in their efforts are to be provided an opportunity to submit a new application when an on-ramp opportunity is announced. On-ramp opportunities are expected to be announced approximately eighteen months after the initial contracts were announced.

Alternatively, ***request for information letters*** provided some applicants an opportunity to cure deficiencies deemed minimal by USACE-HNC. Minimal deficiencies were typically clarifying questions surrounding an applicant's partnerships or Small Business Plan structure (Volume IV). As USACE-HNC cannot issue an award to an applicant with noted deficiencies of any kind, applicants were given a short period of time to amend proposals and cure

their respective deficiencies. USACE reviewed applicants' amendments throughout 2013 and is still in the process of making follow-on awards to a limited pool of amended applicants.

Overall, initial awardees typically had the most straightforward and direct team structure; however, we expect strong offeror teams that proactively structured themselves as Special Purpose Entities (SPEs) or that partnered with more established government contractors on project teams were generally awarded contracts in the final round of announcements. Moreover, despite an initial learning curve and the prolonged release of awards, USACE-HNC was fair, expedient, and agreeable to work with by broad consensus.

Post-MATOC Army Energy Contracting

Army EITF officials have been educating the recent awardees on both the current and expected processes and the pipeline of opportunities. These communications, to the extent possible while remaining competitive, contain insight into the near-term projects at Fort Stewart via Georgia Power, Fort Huachuca via Tucson Electric Power, and Redstone Arsenal, evaluation of the pipeline of long-term projects, and clarity into how projects will be released structurally, dependent on each base's specific needs and requirements. Although the MATOC announcements did not trigger an outpouring of project opportunities as many hoped, there have been significant positive developments. These developments include nearly a half dozen expected project opportunities to be issued from EITF throughout 2014; the utilization of projects sole sourced to utilities and paired with a U.S. General Services Association (GSA) area-wide service contract (GWAC) as a contracting model; the expansion of project opportunities to include hybrid technologies, energy storage, electrical infrastructure, and/or firming natural gas in a single procurement offering; and the evaluation of generation assets on adjacent parcels as capable of providing energy security.

In executing projects for Army EITF, both USACE-HNC and the Defense Logistics Agency – Energy (DLA-E) will continue to serve as contracting agents for the pipeline moving forward, and there is significant benefit to industry and EITF in utilizing both agents where best applicable. Although we have seen varying review processes and priorities, as well as regulatory interpretations between USACE-HNC and DLA-E, we expect Army EITF's role in overseeing these entities and the demonstrated need for two contracting options will provide the resources necessary for a steady flow of project opportunities and timely review for industry.

ADDITIONAL DOD ENERGY PROCUREMENT OPPORTUNITIES

Navy

Over the past six months, there have been several significant developments in the procurement of energy for Navy facilities. First, the Navy is in the process of concluding its review of industry responses to its June 2013 Request for Information (RFI) regarding the purchase of renewable energy generation from offsite sources for fifteen Navy and Marine Corps sites in California. With over 1.2 million MWh in annual demand, these sites comprise a significant potential off-take for existing or pipelined projects. Additionally, the Navy has expressed interest in contracting projects through the USACE-HNC MATOC; however, this vehicle will likely remain unutilized until initial projects released from Army EITF prove it successful. It is unlikely that the NAVFAC would utilize the USACE-HNC's MATOC until the first half of 2015 at the earliest, given EITF's contracting timelines for delivering its first tranche of projects. Lastly, five Navy sites will be contracted through the Naval Facilities Engineering Command (NAVFAC) Southwest's preapproved solar Multiple Award Contract (MAC), only eligible to five already awarded solar developers for an initial 40 MW of generation. However, we expect other bases with high load in California will require additional competitive solicitations to develop utility-scale generation in line with the goals of the California RFI,

and additional opportunities in Hawaii may see competitive solicitation as well, dependent on the structure of the existing Hawaii Solar MAC currently utilized by NAVFAC for project opportunities in Hawaii.

Air Force

As anticipated by Wilson Sonsini Goodrich & Rosati (WSGR) in previous legal alerts, the consolidation of several engineering, contracting, and property agents into a single entity, the Air Force Civil Engineering Center (AFCEC), is a significant step towards gaining contracting efficiencies and building out its total pool of project opportunities.[26] Although it has taken some time to transition to the new structure, we still believe this remains a strong development due to more recent changes within the organization. Specifically, the team overseeing the development and execution of Air Force enhanced use lease (EUL) renewable energy opportunities will now be tasked with the development and execution of power purchase agreement (PPA) Air Force projects.[27] We believe this will increase opportunities in the coming year for two reasons: (1) their already experienced team has now recent experience both with the EUL at Davis-Monthan Air Force Base (AFB) and with a PPA solicitation through DLA-E for Otis ANGB; and (2) the team is already working with Army EITF to leverage existing synergies. For example, the expected 10 MW solar PV projects at Vandenberg AFB in California and Laughlin AFB in Texas will likely utilize DLA-E for contracting a PPA directly, whereas Moody and Robins AFBs will rely on EULs from AFCEC and PPAs from Georgia Power's Advanced Solar Initiative, a model led by EITF through its Fort Stewart solicitation.

Base-Level Opportunities

In addition to the AFCEC-planned renewable energy projects, AFCEC officials are actively seeking potential project opportunities proactively vetted by industry. To date, the Air Force team overseeing the EUL project pipeline has proven receptive to industry feedback and innovative project ideas. We expect this to continue, and AFCEC officials will now also be interested in further evaluating potential PPA opportunities brought to their attention by industry representatives.

UPCOMING DOD ENERGY DEMONSTRATION OPPORTUNITIES

DoD: Environmental Security Technology Certification Program (ESTCP)

The ESTCP program issues annual solicitations for a variety of technologies the DoD sees as ripe for funding demonstrations using installations as a proving ground. The program has served as a launching point for microgrid, energy management, waste-to-energy, and high-efficiency thermal systems. With annual awards to experienced DoD contractors, DoD and Department of Energy laboratories, and innovative small businesses alike, this program is a significant in-road to working on base quickly and collaborating with DoD more broadly. *ESTCP Energy and Water topics are expected in early 2014.*

Air Force: Advanced Power Technology Office (APTO)

Headquartered at Wright Patterson Air Force Base in Ohio, APTO's annual budget is directed to fund energy demonstration projects at Air Force bases,

[26] http://www.wsgr.com/WSGR/Display.aspx?SectionName=publications/PDFSearch/wsgralert-PPA-RFI-MATOC.htm

[27] 2014 AFCEC Energy Directorate and Project Overview: http://www.afcec.af.mil/shared/media/document/AFD-140107-039.pdf

such as vehicle-to-grid systems and hybrid renewable energy systems to provide baseload power. *A Broad Agency Announcement (BAA) solicitation was released in late-November 2013, and we anticipate another round of opportunities in late 2014.*

Navy: Naval Expeditionary Warfare Center (NEXWC)

The newly reestablished NEXWC has a similar mandate as APTO, but utilizes its broad reach to focus on a variety of technology needs specific to the Navy's installations. With energy as a key focus of NEXWC's funding opportunities, topics in the past year have included waste-to-energy and ocean conversion technologies, as well as energy storage systems at portable and installation scale. *The Navy is likely to solicit further energy demonstrations through NEXWC throughout 2014, and we expect its efforts to be complimented through the Hawaii Energy Excelerator and joint funding with agencies like the California Energy Commission.*

Other Opportunities to Strengthen DoD Relationships

Other solicitations, such as service-specific BAAs, technology-specific calls for proposals, or Small Business Innovation Research Program (SBIR) solicitations, fund dozens of energy projects each year across each component of the Army, Navy, Air Force, and DLA. In addition to the millions of dollars available under these solicitations and significantly more in follow-on funding when applicants are able to establish relationships with energy-focused agencies like APTO and NEXWC, these opportunities can demonstrate a willingness and ability to deliver on government timelines and at military specification. *Energy-related SBIR topics for the services are released every fall, and additional service-specific BAAs are expected in the coming months.*

ABOUT THE AUTHOR

Taite R. McDonald leads the Government Initiatives Practice in the Washington, D.C., office of Wilson Sonsini Goodrich & Rosati. Taite works with energy and clean technology companies to develop and execute strategies to access government grants, loans, and contracts across multiple states and federal agencies. She has been successful in helping companies obtain millions of dollars of government funding, and forge key partnerships for research and development through procurement and acquisition.

With over 400 energy and cleantech clients, includes emerging and mature energy technology companies, project development enterprises, and major public corporations leading the world's efforts in energy and clean technology, Wilson Sonsini Goodrich & Rosati is uniquely positioned at the forefront of energy and clean technologies. The firm also represents many of the leading venture capital firms, private equity firms, and energy project investors and lenders critical to the development and commercialization of these technologies.

CREATING FINANCEABLE POWER PURCHASE AGREEMENTS FOR MILITARY RENEWABLE ENERGY PROJECTS

Elliot Hinds and Ian Shavitz
Akin Gump Strauss Hauer Feld LLP

The "build it and they will come" philosophy is not endorsed either for renewable energy projects or for the military. Instead, renewable energy projects are built on a "made to order basis" and must be viable on a stand-alone basis, both technically and financially. Central underpinnings to a project's financial viability are the clarity, predictability, and thoughtful risk allocation contained in the project's main revenue contract, which is typically a power purchase agreement, but could also be a solar lease. Because "financeability" fundamentally requires making the various parties comfortable, this article will start with a discussion of how the major participants' sensitivities impact financeability. Also discussed in this article are political risks, conditions to effectiveness, enforceability concerns, access rights, and performance standards that are primary considerations for any project, but may be more so for a project where the federal government is the off-taker.

PROJECT PARTICIPANTS' SENSITIVITIES DUE TO TAX REQUIREMENTS

Perhaps the most significant sensitivity revolves around the fact that renewable energy subsidies are almost always critical to the financial viability of the project and have several touch points that require strict compliance. Many of these subsidies are driven through the federal income tax code, and therefore who owns the facility, in what manner, for how long, and other details are extremely relevant. The most notable impact this has to the off-taker (in this case, the military) is on the structure of the arrangement. A tax-paying entity needs to own the facility in order to obtain the most significant tax credits: the federal investment tax credit and the federal production tax credit. Therefore, the most commonly used structure involves the energy facility being privately built and owned and selling power pursuant to a power purchase agreement (PPA).

The tax requirements also affect other areas of the PPA or solar lease. In particular this article highlights the following:

- **Required Start Date:** While both the off-taker and the developer typically want clarity around the start date, the renewable project developers are pressured to meet tax rules for the start of operations (the tax term used is "placed in service") in order to qualify for tax credit. At the time of this writing, solar project developers are focused on the placed-in-service deadline of December 31, 2016 (after which the solar investment tax credit reduces from 30% to 10% of the project's original depreciable value), whereas the deadlines for wind, biomass, and geothermal tax credits expired at the end of 2013, except for developers who met the conditions of commencement of construction under the IRS rules and guidelines. While Congress historically has passed several extensions of the tax credit qualification deadlines, an extension is no longer considered automatic in the current environment, where both financial and political considerations affect this decision. However, if Congress amends the tax credit qualification rules, the developer will not only want the financial benefits for itself, but it will likely need to qualify for them to remain competitive in the financing markets against tax qualifying, non-military projects.

- **Assignment Restrictions:** While financing requirements generally dictate a 15-25 year term to ensure debt repayment, the tax ownership rules add a layer of restrictions. This includes restrictions, in the case of the investment tax credit, on the transferability of the facility during the first five years of operation and limiting transfers to persons meeting specific tax requirements. These requirements add to the natural tension between the military's natural desire to limit eligible transferees for reasons of trust and security, and the financier's heightened sensitivity to having multiple layers of transfer restrictions that limit its ability to sell the project and recover the value of its investment. This tension can be reduced by using clear and objective transfer requirements (such as automatically allowing transferees with a current clearance and providing clear timetables to state specific objections to proposed transferees).

- **Limited Buyout Rights:** The military off-taker's facility buyout rights will be limited to exercise within tight windows: after the sixth year and once or twice after that (often on the 10th year, the 15th year and/or at expiration or termination of the contract term). Furthermore, end-of-term facility buyouts for a nominal value are frowned upon, so the off-taker should be prepared to fund a buyout at fair-market value, which can be difficult to predict many years in advance of exercise.

ADDRESSING "POLITICAL" RISKS: PAYMENT

A variety of key "political" risks exist that will need to be addressed directly. This article has placed "political" in quotes because, when dealing with the federal government, the line blurs between what constitutes a change in law versus other political risks (such as a change in administration or priorities, a troubled economy, or leveraging issues such as the tax credit for political gain). One of the most notable "political" risks involves payment certainty, especially given the recent cycles of sequesters, government shutdowns, and base closures or downsizings (through the Defense Base Realignment and Closure Commission (BRAC) or other means). While confidence remains in the federal government's overall ability to pay, timeliness of payment has been called into question in our current political environment, as well as concerns about temporary or permanent reductions in use. Because financiers insist upon timely payment, they can be expected to require assurances from the military off-taker around the extent to which PPA payments are subject to annual appropriations. Financiers may also impose debt service reserve requirements on the facility owner that are higher than exist in a private commercial financing. Additional debt service requirements likely will have some impact on how the developer structures PPA payments as well. Strong assurances to the financiers from the military off-taker and developer will reduce barriers and the cost of the project (and consequently the PPA). As a result, the PPA will be a battleground for negotiating the relative responsibility for making those assurances.

A variety of tools may be used to address other concerns that relate to payment and political risk. One of these may be a fixed payment obligation should the base ever be closed or the payments under the PPA or solar lease no longer be allocated. The owners and financiers will likely also require capacity or availability payments to ensure that the facility achieves minimum revenue requirements, even if the off-taker's needs change due to changed use of the military site, troop reductions, or a BRAC closure. Changed site use or BRACs probably will not be an accepted force majeure excuse (or curtailment event) and even if it excuses the obligation to take power from the facility, it will not excuse the off-taker's minimum payment obligation. Many financiers may still remain uncomfortable with just the minimum payment obligation. In this case, a prepayment for power at or around the start of operations is a possible solution. The developer could use that prepayment to either fund its debt service reserve or to reduce the overall amount of debt it borrows. If the off-taker is concerned about

the project owner's bankruptcy risk, an escrow could be established for some of that prepayment. Still, another approach for mitigating off-taker payment risk would be to allow the facility to sell its unused power to a third party or into the merchant market; however, this approach may be feasible only in locations that are near to other large users or to interconnection points with the grid. Moreover, the military could seek to place strict limitations on such third-party sales in order to make certain that power is available to the military when needed.

ADDRESSING "POLITICAL" RISKS—CONDITIONS TO EFFECTIVENESS & ENFORCEABILITY

Other key elements of a viable PPA are the path to effectiveness and enforceability. The developer will naturally want clearly defined conditions to PPA effectiveness before investing significant funds toward development of the facility, and financiers will want verification that those conditions have been satisfied. The most significant conditions tend to involve interconnection, permitting, and final internal approvals. With respect to interconnection, the PPA or other deal documents will need to specify the interconnection responsibility so that the developer and financier can be certain about their scope of work and when the PPA term begins.

Similar to all renewable energy projects that require federal approval, receive federal funding, or are located on federal lands, a project on military lands will be subject to environmental review and permitting requirements. While a project on military lands will likely be exempt from state and local environmental review and permitting, federal laws continue to apply, including the National Environmental Policy Act (NEPA), the National Historic Preservation Act, and the Endangered Species Act. As with all renewable energy projects, delays resulting from permitting or environmental litigation could delay the delivery of power under a PPA. It is worth noting, however, that a project on military lands is less likely to be the subject of a "not in my backyard" -- or "NIMBY" -- lawsuit, given that the affected military installation will support the project.

The Army, in its $7 billion Multiple Award Task Order Contracts (MATOC) process, is seeking to absorb some of the environmental review and permitting risk by screening out environmentally problematic sites and completing some or all of a project's environmental obligations prior to awarding a contract. While this approach should allow for expedited project development and reduced costs, some important considerations that may impact project financing remain. First, a NEPA study that is inadequate could subject the project to increased litigation risks and therefore inhibit its financeability. Second, where the Army's completed environmental review and permitting processes established set obligations, a developer must ensure that the scope and cost of such mitigation or compliance obligations are calibrated to the project's overall economics. Financiers are notably conservative and are likely to require not only a showing of cash flow to support those mitigation obligations but also an additional contingency reserve. To identify and understand these risks for a particular project, counsel should conduct environmental due diligence with an eye toward financier concerns and economic impact of any mitigation measures. (It is important to note, however, that unlike a development on private lands between private parties, the information that the developer may receive during due diligence for a military project may be limited or otherwise barred from disclosure for security reasons.)

Once the conditions to effectiveness have been satisfied, the developers and financiers will be very focused on the PPA's overall enforceability. They can be expected to require limited waivers of sovereign immunity to ensure that the contractual provisions are enforceable. They also will strongly prefer an advance agreement on the process for handling disputes in a neutral forum.

ACCESS AND CONTROL RIGHTS

While developers and financiers recognize a military installation's need for security requirements, concerns will remain that these requirements could inhibit project construction or operations, and result in development delays or lost revenues. This especially will be the case with respect to site access. The PPA's start date will assume adequate and continuous site access to enable facility construction. The developer and its financiers will require remedies for access interruptions, even those that may be labeled force majeure (such as temporary adjustments in focus due to deployments, testing, or special projects) because such interruptions cost the developer money. These remedies will likely include liquidated damages and extensions of the overall PPA term, both of which enable the project to generate its expected revenue.

PERFORMANCE TERMS

Under a PPA model, the facility owner will be responsible for operation and maintenance of the facility. Off-takers have a natural tendency to request output guaranties accompanied by liquidated damages for the failure to comply with those guaranties. However, if the PPA only requires energy payments (take and pay), both the developer and financiers will be resistant to output guaranties with meaningful liquidated damages. The key reason for this resistance is that liquidated damages would add to the "punishment" the developer is already receiving through reduced PPA revenue for its poor performance. On the other hand, output guaranties will be more acceptable in the context of a PPA with capacity payments to the facility owner. Any such guaranties (and the corresponding liquidated damages for breach) tend to be measured over one-, two-, or three-year periods and have explicit dollar caps. Consistent with the concept of having a high bar for PPA termination, breach of performance guaranties typically are not grounds for terminating the PPA unless that breach significantly exceeds the level of the dollar cap (such as 50% of expected output). Financeable performance standards strike a fair balance by taking into account the overall economic impact on the developer.

OTHER CONSIDERATIONS

In addition to all of the above, project developers and financiers will be subject to the various "strings" that attach to doing business with the federal government and operating on Department of Defense lands. Developers must understand the procurement rules and requirements associated with contracting with the United States government and the Department of Defense, which include labor requirements, subcontracting goals, and the utilization of qualified subcontractors. Financiers will insist upon assurances that the added associated costs have been factored into the project plan and PPA pricing. In fact, these considerations will likely lead financiers to request longer cure periods for PPA breaches by the power provider.

CONCLUSION

If the developer and military off-taker eliminate as much unpredictability from the project arrangement as possible, it will substantially increase the project's financeability. In addition, because the financing markets are themselves competitive, the parties need to remain abreast of external developments (especially with respect to tax credits and other incentives) that impact the project's financeability.

ABOUT THE AUTHORS

Elliot Hinds is a Partner at Akin Gump Strauss Hauer & Feld LLP. Mr. Hinds' law practice is focused in the areas of debt financing, mergers and acquisitions, project development and finance, and corporate and commercial transactions. Mr. Hinds has extensive energy experience, having structured transactions to develop, finance, purchase and sell renewable (including wind, geothermal, solar, and biomass), natural gas, cogeneration, and coal-fired electric power projects; LNG and bioethanol facilities; and transportation projects. He was selected one of the Top 25 Clean Tech Lawyers in California by the Daily Journal in 2011.

Ian Shavitz is Senior Counsel at Akin Gump. Mr. Shavitz's environmental and project development practice focuses on advising and representing clients in the development of large-scale infrastructure projects and regulatory programs; litigation in connection with the environmental review and permitting of development projects; and regulatory permitting and compliance under various federal, state, local, and tribal environmental; land use; and historic preservation laws.

DEVELOPERS' PERSPECTIVE OF CERTAIN RISKS IN LONG-TERM ENERGY CONTRACTS WITH THE U.S. DEPARTMENT OF DEFENSE

Lucas Michelini
Acciona Energy North America

The three largest branches of the United States Department of Defense (DoD) – the U.S. Army, U.S. Navy, and U.S. Air Force – have each set aggressive goals to acquire 1 GW each of on-base renewable energy by 2025. This capacity is to be distributed among several technology types, including solar, wind, biomass, and geothermal, with individual projects generally ranging from 10 to 50 MW.

Rather than soliciting engineering, procurement and construction (EPC) solutions from private contractors with the intention of taking ownership of the projects, which requires significant upfront capital and ongoing operational/managerial resources, the DoD has elected to take ownership of only the energy generated by such projects, funding them over time via long-term power purchase agreements (PPAs). This is most notably illustrated by the U.S. Army's Multiple Award Task Order (MATOC) initiative for $7 billion in total contract capacity to procure locally-generated renewable energy, primarily through long-term PPAs.

In this arrangement, for any given project, DoD agencies provide land, environmental and technical data, and interconnection studies, and leave it up to private developers to design, build, operate, manage, and finance the projects. This approach appears to be less administratively burdensome and more cost-efficient from the government's perspective, and presents attractive future opportunities for the renewable energy industry. However, developers must recognize that contracting with the government is not the same as contracting in the private sector; from policies affecting equipment procurement and labor to commercial term expectations, the opportunity comes with a resource intensive, significant learning curve.

This article seeks to analyze two topics in DoD PPAs known to be very relevant and that have been historical points of conflict between the government and private entities: appropriations risk and termination for convenience. Additionally, the article will discuss any mitigation measures offered by the DoD for each topic and analyze any other facts and circumstances that may alleviate such risks.

The DoD's procurement of energy with private sector assistance is nothing new – there are many differently sized projects across the technology spectrum, handled by various branches of the DoD, undertaken under a number of statutory authorities, and deployed using multiple structures: enhanced use leases (EUL), energy savings performance contracts (ESPC), and others.

The more recent development is the DoD's increased use of its authority to enter into PPAs under 10 U.S.C. 2922a to fund the deployment of renewable energy projects. Up until early 2011, no long-term (over 10 year) PPAs had been awarded under this provision. Then, over the course of 2011 to present, several individual projects proposed by the Army, the Navy, the Marine Corps, and the Air Force were approved by the DoD with reliance on this provision. In the same timeframe, the Army announced the Multiple Award Task Order Contract (MATOC) initiative, which is expected to drive the deployment of a majority of its proposed renewable energy projects – again, with significant reliance on PPAs to be issued under 10 U.S.C. 2922a.

These PPAs may be entered into directly with the private developer chosen to build, operate and own the project, but may also be entered into with the local utility serving the appropriate military

installation, in which case the utility may engage with a private developer to build, operate and potentially own the project. An example of the latter case is the still-in-development Fort Bliss 20 MW solar PV project, where the Army entered into a sole source energy service contract with El Paso Electric (EPE), and EPE in turn is seeking proposals from pre-qualified developers to build, own, and operate the project. It is expected that, eventually, a PPA would be negotiated between the developer and EPE, and the Army would enter into a PPA with EPE under 10 U.S.C. 2922a.

Each of these different options presents its own set of unique issues that must be explored on a case-by-case basis. For the purpose of this article, the focus will be primarily on the topics of appropriation risk and early termination as found in the Army Energy Initiative Task Force's (EITF) Renewable Energy Service Agreement Template (RESA) as of the time of this writing. The RESA is meant to be the starting point for each PPA that will be tailored for the individual circumstances of the request for proposals (RFPs) to be released under the Army MATOC. Due to the volume of PPAs expected to originate from this document, and the fact that it was used as a platform to obtain feedback from the industry earlier this year, the RESA and the Defense Logistics Agency's (DLA) form PPA documents are expected to be the best proxies for future DoD agency PPAs. Lastly, while these issues are relevant for the entire duration of the contract term, this article will focus on the period following the start of commercial operations.

It is important to keep in mind while reading this article that the DoD has strategic and economic motivations for using renewable energy, but its facilities' energy performance is measured against federal renewable energy goals. The DoD has in effect a mandate to procure energy from renewable sources – specifically, 42 U.S.C. 15852 calls for government agencies to source 7.5% of their energy consumption from renewable sources for fiscal year 2013 and thereafter to the extent economically feasible and technically practicable. Further, per 10 U.S.C. 2911(e) the DoD goal is to produce or procure energy from renewable sources (i) for no less than 25% of facility energy consumption during fiscal year 2025 and thereafter and (ii) whenever the use of such energy sources is consistent with the energy performance goals and energy performance master plan for the department. Lastly, Executive Order 13423 calls for government agencies to ensure at least 50% of statutorily required renewable energy consumption to come from projects placed in service after January 1, 1999.

Therefore, given the timing and scale of this mandate, and the DoD's preference for PPAs as the main vehicle of choice for deploying its renewable energy initiatives, the long-term involvement of the private sector is integral for the whole system to work. Government agencies should continue to work in good faith with the renewable energy industry in order to overcome any issues and in a manner that maintains credibility, predictability, and ensures a mutually beneficial relationship both for current and future opportunities.

APPROPRIATION RISK

The DoD has the authority to enter into PPAs for up to 30 years under 10 U.S.C. 2922a. Under this provision, the costs of a contract for any given year must be paid from annual appropriations for that year. Additionally, the RESA incorporates Federal Acquisition Regulation (FAR) clause 52.232-18 – Availability of Funds, which makes payments under the PPA contingent upon the availability of appropriated funds and states that the U.S. government shall have no legal liability for any payments that may arise until funds are made available.

Therefore, there is a risk to project owners and lenders/investors that the DoD will be unable to secure funds on future budgets in order to fulfill payments under the PPAs, whether they are payments for energy delivered or arising from other factors, such as termination fees or liquidated damages.

Both the DoD and many other government agencies are aware this is a significant risk from a private developer's perspective. There is evidence the DoD may be attempting to incorporate language to alleviate the issue. For instance, under the Fort Irwin PPA, which was released by the DLA, the Army included FAR clause 52.217-2 – Cancellation Under Multiyear Contracts, which outlines a variety of costs a contractor may recover should the contract be terminated due to lack of appropriated funds. Generally speaking, a developer can expect to recover the same amount it would be entitled to if the government exercised its right to terminate the contract for convenience.

At the end of the day, appropriation risk is inevitable in contracting with the government, and while some procedural-type language may be added to the PPAs for additional clarity, a developer must assess the risk through due diligence and price its bids accordingly.

How susceptible are PPA payments to future budget cuts? The cost of buying energy from these projects will be offset by the savings from procuring the same energy from its current sources, resulting at best in savings over the long run and at worst in a marginal increase in the DoD's operational costs. Thus, the question developers should evaluate for each project opportunity is: is the military installation being served by this facility of sufficient importance to the U.S. defense infrastructure that it is likely to be around for the next several decades? An assessment of the importance of each military installation should give some indication of how vulnerable a PPA may be to appropriation risk.

EARLY TERMINATION

As is standard in any governmental procurement contract, the DoD PPAs will include a provision for termination at the government's request for any reason other than a default by the contractor – often referred to as termination for convenience. There are a number of FAR clauses which address this specific topic, setting forth requirements dealing with everything from what happens to inventory accumulated to the termination of subcontracts; most importantly, such clauses outline what type of compensation a private contractor is entitled to receive. The RESA relies on FAR 52.249-2, which is tailored for fixed price contracts.

This is an oversimplification, but generally speaking, the standard language in these clauses speaks to reimbursement of costs related to work completed prior to termination. While this may be an appropriate framework for the development/construction period, on the long run it is clearly an issue – a developer is relying on the full stream of payments to realize its return. Additionally, there will be financial obligations associated with any tax equity or debt structure which will be triggered by early termination.

Again, this has long been acknowledged by the DoD as a significant risk to developers, and the agencies have taken steps to address the matter. The RESA implements a make-whole mechanism triggered by exercise of this option after the project commences operation – essentially, the parties negotiate early termination fees for each year of the contract life upfront. These amounts, which are compiled in an early termination fee schedule, would presumably provide adequate compensation for the developer. The specifics of what will be included in such early termination fees will be subject to negotiation, but developers will clearly seek to ensure inclusion of future foregone profits on a discounted basis and coverage of any obligations arising from wind down of underlying financing.

It is useful to compare Army PPAs released subsequent to the RESA's drafting and open comment period to obtain some insight into the evolution of the DoD's approach to this issue. For instance, the Fort Irwin PPA incorporated a different FAR clause (52.212-4 – Contract Terms and Conditions – Commercial Items). Similarly to FAR 52.249-2, the standard wording states the government will pay a portion of the contract price, reflective of the percentage of work completed prior to the notice of termination, plus reasonable charges. Again, this wording does not appear

particularly fitting to compute payouts under a PPA for a project already placed in service, so the applicable termination for convenience subclause (FAR 52.212-4(l)) was customized to incorporate a substantially similar make-whole payment mechanism using an early termination fee schedule.

However, exercise of the termination option in this PPA explicitly entails decommissioning and removal of the project from the site. Additionally, this concept was intertwined with a separate provision, which is also on the RESA: the government's right to acquire the project at fair market value (FMV). Thus, in this case there are two possible outcomes resulting from early termination: the facility is either removed from the premises or purchased by the government, with the early termination schedule including two streams of payouts agreed upfront, each applicable to one of these outcomes. (It is worth noting that the "purchase option" stream of payments serves as a floor – at the time of sale, the greater of the pre-agreed amounts and a FMV calculation run at that point is used.) This is important to highlight because it is not immediately apparent in the RESA, and demonstrates the Army is finding ways to streamline the contract language. Another notable change was the deferral of the purchase option start period to the sixth anniversary of commercial operations, likely in recognition of the fact that developers seeking to take advantage of the investment tax credit (ITC) for eligible projects must avoid a change in control within the first five years of operation or risk triggering recapture under the ITC rules.

CONCLUSION

In conclusion, regardless of the specific approach used to memorialize the DoD's desired rights for termination, the fundamental issues are unchanged. Negotiating the magnitude and scope of the various factors to be accounted for in early termination values will be extremely important for both developers and financing institutions. If early termination post-commercial operations results in either decommissioning/removal of a facility or sale to the government, does this reinforce the notion that the government would not allow a developer to continue operating the facility on the premises under an alternate offtake arrangement? (The RESA currently states that termination of the PPA also results in termination of the underlying land lease.) These questions and many others will have to be tackled quickly and systematically to ensure the DoD and the private sector have a successful, long-lasting relationship.

ABOUT THE AUTHOR

Lucas Michelini is Manager of Structured Finance at Acciona Energy North America Corporation. Over the past five years, he has supported the due diligence and structuring of debt and tax equity financings for Acciona's North American projects, with expertise on wind and solar technologies. Additionally, he supports Acciona's Business Development, M&A and Power Marketing teams evaluate early to late stage development and EPC projects and offtake opportunities in the U.S., Canada and Puerto Rico. He holds a degree in Economics from Northwestern University.

ACCIONA is a 100-year-old, multi-billion-dollar global company with nearly 35,000 employees. We operate in thirty countries across the world and have pioneered renewable energy solutions for nearly twenty years. In North America, we are divided into three business divisions that allow for a specific focus: ACCIONA Infrastructures, ACCIONA Agua and ACCIONA Energy.

SELECTING SUCCESS – CHOOSING A PPA PARTNER

Nate Butler and Scott Provinse
SunEdison

The United States military is on the leading edge of renewable energy. According to the 2012 Annual Energy Management Report, the Department of Defense (DoD) has nearly 700 renewable projects operating across its bases, generating approximately 7% of the facility energy requirements of the Army, Navy, Air Force, and Marine Corps. Facing federally mandated targets for increasing renewable energy generation and usage, all branches of the military are aggressively pursuing additional projects.

The vast majority of DoD's installed projects were funded with appropriated money, and are owned and operated by the military. While the military continues to fund renewable energy projects, competition for appropriated funds is stronger than ever. With the sequestration budget cuts evolving from a short-term problem to a long-term reality, all services are looking for alternative ways to meet their goals while continuing to cut costs.

With the exception of the American Recovery and Reinvestment Act (ARRA) of 2009, which funded a significant number of renewable energy projects, the DoD is increasingly interested in purchasing renewable energy through long-term contracts, called power purchase agreements (PPAs) or renewable energy service agreements (RESAs), under legislative authorities that give military agencies the ability to enter into contracts for renewable energy of up to 30 years.

These long-term contracts are a win-win for the military because they save money by reducing energy bills and also help the services meet their aggressive goals for renewable energy. The added bonus is that because these projects are financed, owned, and operated by private companies, the military bases see immediate savings without investing any upfront capital or being responsible for ongoing operation and maintenance.

With a handful of these long-term contracts in place, all stakeholders (military agencies, developers, and financiers) are learning that these contracts are significantly different from the typical military construction or service contract, and require a level of commitment and partnering well beyond the norm. A successful 20- or 30-year contract requires capable, committed partners with the expertise and motivation to execute highly-complex projects and keep them operating at optimal levels for at least two decades.

THE RISE OF PPAS

PPAs and other long-term contracts are attractive to the military for several reasons. First, because the projects are financed through third-parties, there is no required capital outlay. This has the dual benefit of not requiring projects to go through the lengthy (three-to-five year) appropriations process, and also means that the agency realizes savings on day one of operation.

Secondly, because the projects are owned by private companies, they are able to monetize the full range of incentives that are available for renewable energy. These incentives, including the investment tax credit (ITC) and accelerated depreciation (known as the Modified-Accelerated Cost Recovery System (MACRS)), represent over one-third of the cost of renewable energy and would not be available if the government were to fund the project.

The third benefit of a PPA, which is often overlooked, is that the use of a PPA shifts all performance risk of the project from the government to the contractor. Unlike funded

renewable energy projects (where the government buys the assets and is then responsible for operations and maintenance), in a PPA, the contractor owns the asset and is responsible for maintaining optimum operation and production. The risk to the government is very limited—if power is not supplied by the contractor, the government is not required to pay.

The implementation of PPAs enables the Army, Navy, Air Force, and Marine Corps to save money and make progress towards their goals while maintaining focus on their core mission. This realignment of risk better serves the military and the PPA contractor, since the PPA contractor is financially motivated to design, build, and operate the project for optimal performance.

HOW PPAS ARE DIFFERENT

Typical military construction (MILCON) contracts last from a few months up to several years. Federal contracting officers and technical personnel have developed extensive expertise in how to procure and manage these projects, and defense construction contractors are familiar with the process and requirements. This MILCON expertise is necessary when the military owns assets; it protects the taxpayer by ensuring that contractors deliver what is promised.

With the introduction of PPAs, both parties (government and industry) are moving into new territory. The requirement for third-party financing and tax-based renewable incentives has introduced a third party to the transaction: the tax equity financier. This investor class has traditionally set the terms and conditions of their investments based on tax and risk considerations, and most tax investors have very limited (if any) experience with federal requirements such as the Federal Acquisition Regulations (FAR).

The single-most critical aspect of implementing a renewable energy PPA is also the most difficult: negotiating contract terms and conditions that are acceptable to both the government and financiers. The existence of multiple, successful PPA contracts demonstrates that the right team can find the common ground between federal and financier requirements, but all parties (developer, financier, and government) must be willing to listen, learn, and work together to make projects successful.

KEYS FOR A SUCCESSFUL LONG-TERM CONTRACT

At its most basic form, a PPA is a very simple concept: the contractor generates electricity, which is purchased and consumed by the government. As in every partnership, the key to long-term success is alignment of objectives, goals, motivations, and competencies; a successful PPA is one in which both parties' goals are met through the successful operation and maintenance of the renewable assets throughout the entire contract term.

For the military, typical goals of a PPA include a reliable, resilient power supply; predictable cost of power (resulting in savings and budget stability); no negative impact to mission objectives; and environmentally sound use of land assets.

The goals of the contractor will vary depending on their business model and structure; a contractor who intends to own and operate the project will most likely align closest with the government goals. It is imperative for the success of the project to select the most relevant and capable developer; the federal government is a very unique partner, and executing federal projects requires high levels of expertise and capability, patience, and financial resources.

SELECTING THE BEST CONTRACTOR

There are essentially two distinct phases of a PPA contract: the development and construction process (including financing) and operations. In order to be successful in the development phase, the contractor must be able to secure financing, meet interconnection requirements, and construct a quality facility.

After the project has achieved commercial operation, the contractor must then have robust operations and maintenance infrastructure in place to keep the power flowing as predicted.

Selecting a contractor that has the ability to perform both phases of the project requires well-thought-out selection plans and evaluation factors. Unfortunately, many of the factors that make for successful MILCON projects are irrelevant or even counterproductive for PPA projects. This is unfortunate because of the comfort and expertise the military has in selecting contractors based on MILCON factors. To select the best contractors for successful PPA projects, the military should move away from the MILCON model and retool its evaluation factors.

The key questions to ask when evaluating a contractor for a PPA contract include:

- **Have they demonstrated the ability to secure tax equity financing?** Do they have a broad pool of financing partners to take your project to? How many projects have they financed? The ability to secure project financing is probably the most critical factor to evaluate; without financing, there is no project. The most proven developers will be able to show a track record of 100 or more financed projects.
- **Do they have experience with federal projects?** Federal projects are very different than commercial transactions; have they financed projects that included FAR requirements? Did those projects utilize tax equity investors? Contractors who have experience with third-party tax equity financing of federal projects already know the major issues and potential solutions; they will not be "learning on the job" with your project.
- **Do they own and operate their own projects, or do they sell the assets and obligations to third parties?** Will they be around for the long-term, or do they plan to sell the project? If something goes wrong, is there a responsible party that can be relied on?
- **How strong is their financial backing?** Do they have the ability to carry development and construction costs while working through approvals and interconnect applications? Will they be around for 20-30 years?
- **How well do their existing systems perform?** Do their existing systems perform as intended/promised? How many projects do they operate and maintain? A contractor with a strong record of high performance represents a low risk of underperformance. Contractors who have significant assets under management will have comprehensive procedures and experienced teams for monitoring, operating, and maintaining your project.
- **How strong is their supply chain?** Will the technology they are proposing be available when it is time to build? Development timeframes for federal projects can easily last a year or more; will they be able to get the equipment they have proposed at the costs they have assumed for pricing?
- **Are their pricing assumptions valid?** Pricing for PPAs involves many assumptions that have a major effect on the price, and all costs must be estimated 12 or more months in the future. Relying on overly optimistic assumptions for renewable energy credits (RECs), photovoltaic (PV) modules, or other components will result in a very low price that will likely not be able to support execution of the project.

Evaluating contractors against the above criteria will help to select the most capable and experienced contractor, who represents the highest probability of success and lowest risk of failure. Selection based on these factors will ensure that the chosen contractor is an experienced PPA provider that has demonstrated the ability to take a project through the entire process, from financing and construction through operations and maintenance.

CONCLUSION

All of the military services have recognized the advantages of PPAs, the ability to implement on-site renewable generation and enhance energy security while reducing costs. Selecting the best contractor and partner is the key to setting these projects up for long-term success.

Evaluating the most relevant and important factors will allow the most qualified and experienced contractors to rise to the top and enable the contracting team to select the very best partner for each project.

ABOUT THE AUTHORS

SunEdison is a leading solar technology manufacturer and provider of solar energy services. Serving federal government, military, business, municipal, utility, and residential customers, SunEdison is dedicated to transforming lives by delivering economical, clean, renewable energy to communities around the globe.

Nate Butler is the Manager of Government Programs at SunEdison. Nate focuses on developing and deploying integrated solar energy solutions for federal agencies. Prior to joining SunEdison, Nate was the head of the Renewable Program office at Naval Facilities Engineering Command (NAVFAC) Southwest, where he implemented the first three 20-year renewable energy PPAs in the Navy. Nate holds a BS from the University of Colorado and is a Registered Professional Engineer.

Scott Provinse is Director of Government Programs for SunEdison. Scott has actively negotiated all of SunEdison's federal PPAs with DOE/NREL, DOL, Navy, and Air Force. Scott has practiced law as a litigator, and served as a Law Clerk to the Honorable Harvey Brown, Jr. Scott holds a BSS from Cornell College and a JD from the University of Houston Law Center.

RENEWABLE ENERGY FINANCING UNDER ESPC AUTHORITY: WHITE SANDS MISSILE RANGE CASE STUDY

Peter Flynn and Joseph Bonnin
Bostonia Partners LLC and Siemens Government Technologies, Inc.

The landscape for federal renewable energy procurement gained an important solution in 2009, when the U.S. Army revised and awarded Indefinite Delivery/Indefinite Quantity (IDIQ) contracts to select Energy Services Companies (ESCOs), enabling the federal government to benefit from their own renewable energy federal tax incentives under the Energy Savings Performance Contract (ESPC) authority. The new IDIQ contracts constitute a structure where the renewable energy assets are privately owned, allowing the private sector to provide the standard ESPC project while having the ability to monetize tax benefits. In 2012, this structure was successfully deployed through a strategic alliance between Siemens Government Technologies (SGT) and Bostonia Group LLC (Bostonia) for an ESPC project for the Army at White Sands Missile Range in New Mexico that included 4.5 MW of solar generation. Although the project has been a success, the validity of this structure has been called into question due to confusion surrounding existing contracting guidelines. Despite the ongoing debate, Bostonia and SGT believe that this strategy is not only cost-effective, but also acceptable under existing contracting guidance, and see a promising future for procurement of renewable energy under the ESPC authority.

ESPC, ENERGY EFFICIENCY AND RENEWABLE ENERGY: A SUCCESSFUL COMBINATION

ESPC programs administered by the Department of Energy (DOE) and the U.S. Army Corps of Engineers (USACOE) have proven to be successful tools for agencies across the federal government in reaching federal energy efficiency goals. In fact, as of October 2013, 285 ESPCs have been implemented, representing $7.3 billion in energy savings to the federal government.[28] These projects are simply the first step in an aggressive series of energy reforms that have been called for by President Obama and other civilian and military leaders.

In addition to energy efficiency targets, the Department of Defense (DoD) has established ambitious objectives to increase its use of on-site renewable energy with an aim toward reducing its reliance on both fossil fuels and electricity received from the commercial grid, improving energy security, and minimizing disruptions that could jeopardize critical missions.[29] The Army, Navy, and Air Force have each established targets of one gigawatt of installed renewable energy capacity by 2025, and the DoD has a goal to supply 25% of all the energy it produces or buys from renewable energy by 2025. According to a report published in September 2012 by Pike Research, the DoD is expected to spend $1.8 billion to meet these goals.[30] It is apparent that the federal government should make use of all its available contracting authorities to achieve these goals, and therefore, ESPCs should not be penalized or dismissed as an ineffective contracting vehicle to procure the renewable energy

[28] http://www1.eere.energy.gov/femp/financing/espcs_awardedcontracts.html

[29] United State Government Accountability Office Report to Congressional Committees. Renewable Energy Project Financing: Improved Guidance and Information Sharing Needed for DOD Project-Level Officials

[30] http://www.solarserver.com/solar-magazine/solar-news/archive-2012/2012/kw39/pike-research-us-military-to-increase-investments-in-renewable-energy-up-to-usd-18-billion-in-2025.html

and energy efficiency improvements the government demands.

ESPC AT THE WHITE SANDS MISSILE RANGE: A SUCCESS STORY

In 2012, the U.S. Army Engineering and Support Center competitively awarded SGT an ESPC to implement various energy conservation measures (ECMs), including the installation of a 4.5 MW solar photovoltaic (PV) generating system for the USACOE at the White Sands Missile Range in New Mexico. The project was completed and commissioned in December 2012, and the PV system represents the largest system of its kind on U.S. Army land. The system will generate about 10 million kilowatt-hours (kWh) of clean electricity annually – enough energy to meet the installation's demand while providing an estimated annual savings of $930,000. The White Sands ESPC also allows customers to retain 100% of the solar renewable energy credits. In aggregate, the project will create total cost savings of approximately $44 million over the 25-year contract term.

This project, a "first of its kind" transaction, was made possible through a strategic alliance between SGT and Bostonia, which provided third-party financing, construction through operations, through the innovative use of an ESPC that included an Energy Services Agreement (ESA). Unlike a traditional ESPC, where assets are transferred to the government at project acceptance, this financing involved private-asset ownership in order to monetize federal tax incentives, which in turn delivered the most economically viable financing structure for the project to the Army. This arrangement also shifted the risks of ownership from the Army to the private sector, including administration, maintenance, equipment performance, and long-term operation of the project. Ultimately, the private sector is able to replace the Army's fossil-fueled energy use with clean renewable energy over a term of 25 years at a guaranteed production level and price, without any capital investment or risks associated with ownership.

NEW CHALLENGES FOR RENEWABLE ENERGY PROCUREMENT VIA ESPC

As the DoD and federal agencies adjust priorities to meet the aggressive and highly visible goals of procuring billions of dollars of energy efficiency and renewable energy, the need for cost-effective, innovative, third-party financing solutions become increasingly important. As these agencies have found, using third-party financing solutions can prove effective in helping to reduce the burden of shrinking budgets while leveraging private-sector expertise and capital to install large-scale renewable energy developments for the government's benefit.

Recently, however, third-party financing structures have encountered new challenges and barriers as federal agencies, ESCOs, and the private sector explore new strategies for achieving energy efficiency and renewable energy mandates. Many of these challenges have stemmed from attempts by the U.S. Government Accountability Office (GAO) and Office of Management and Budget (OMB) to refine, update, and administer guidance on these initiatives to help installation managers understand what contracting vehicles are best suited for achieving their goals. The unintended consequence of well-meaning guidance has been that it has created confusion and misunderstanding as to which contracting vehicles are most appropriate for the procurement of various energy efficiency and renewable energy technologies.

Debate on this topic has centered on the uncertainty of whether ESPC guidelines (10 C.F.R. Part 436, Subpart B) allow for the inclusion of renewable assets, a point illustrated in GAO's April 2012 Report.[31] The report notes that "different interpretations of the guidance" have led some military installations to decide not to use ESPCs to

[31] *Renewable Energy Project Financing: Improved Guidance and Information Sharing Need for DoD Project-Level Officials.*

finance renewable energy due to "the uncertainty about whether such projects are considered energy conservation measures and whether the projects are economically viable."[32] The report concludes that these uncertainties and differing interpretations may prevent military services from taking advantage of the various financing approaches available. Fortunately, the DoD acknowledges this problem, and the lack of overarching guidance continues to be addressed in an effort to bridge the information gap and ensure all military services have access to the same options. For example, OMB's memorandum M-12-21 dated October 3, 2012 clearly delineates renewable energy as an ECM, and provides guidance on the conditions for which the capital costs of these projects "may be scored and obligated on an annual basis during the term of the contract," rather than be fully scored "upfront" to the first year of the contract, which is standard practice under OMB Circular A-11.[33]

Budget scoring creates a critical decision point for installation managers pursuing energy upgrades or renewable energy generation. The impact of scoring on appropriated budgets understandably creates the need to limit large upfront capital investment. Exemptions are based upon a project assuming operating lease characteristics, which were foundational in the creation of the financing structure for the ESPC at the White Sands Missile Range.

Opposition to the feasibility of using ESPCs in this way has pointed to the fact that, in order for on-site renewable energy generation to be scored annually, the federal government "must retain title to the installed capital goods at the conclusion of the contract,"[34] suggesting an obstacle to utilization of tax-efficient structures that require private ownership of the renewable assets. We are confident that existing tax-efficient capital structures can accommodate OMB's guidance, allowing ESPCs to remain useful tools for delivering on-site renewable energy projects for DoD installations.

ESPC AND LIFE-CYCLE COST EFFECTIVENESS

Cost is integral to the evaluation of these projects. "Life-Cycle Cost Effectiveness" is a requirement of project review, and yet those costs can often be misconstrued or not evaluated in their entirety. In fact, taxable public-private partnership structures have long been perceived as a more costly form of project delivery to the federal sector than traditional appropriations. Such evaluations are often myopic and focused primarily on interest-rate analyses that do not include the entire savings that can be achieved over project lifespan. Fundamental to a thorough cost analysis is the value attributed to the transfer of risks to the parties best suited to effectively deal with them, as well as efficiencies gained in design, construction terms, pricing, and long-term operations and maintenance performed by the private sector.

In the survey conducted by the GAO in their latest report, military service energy managers who have used the ESPC authority for renewable projects have cited the many "benefits of having a developer construct and manage the project and having established relationships with local utility companies."[35] Similarly for White Sands, the advantages of utilizing a preeminent ESCO, such as SGT, were numerous: (1) the advanced design of a single-access tracker ground-mounted system that maximized efficiency and provided a higher rate of return to the Army; (2) the assurance of a proven developer with the capability to coordinate subcontractors, deliveries, and logistics among a highly secure environment that required specialized

[32] *Renewable Energy Project Financing: Improved Guidance and Information Sharing Need for DoD Project-Level Officials.*
[33] OMB M-12-21 Memorandum for Heads of Executive Departments and Agencies: Addendum to OMB Memorandum M-98-13 on Federal Use of Energy Savings Performance Contracts (ESPCs) and Utility Energy Services Contracts (UESCs), 1
[34] OMB M-12-21 Memorandum for Heads of Executive Departments and Agencies: Addendum to OMB Memorandum M-98-13 on Federal Use of Energy Savings Performance Contracts (ESPCs) and Utility Energy Services Contracts (UESCs), 4
[35] United State Government Accountability Office Report to Congressional Committees. Renewable Energy Project Financing: Improved Guidance and Information Sharing Needed for DOD Project-Level Officials

clearances; (3) unexploded ordnance orientations and briefings; (4) and environmental assessments, construction, performance, and savings guarantees all backed by an investment-grade balance sheet.

CONCLUSION

Renewable energy is well-suited for procurement under the ESPC authority, which enables private ownership of assets. Since the economic feasibility of renewable energy relies upon the monetization of federal tax incentives, private ownership of renewable energy assets is often required in order to fully utilize tax benefits and create a viable and economic project. Due to the innovative third-party financing structure, the White Sands ESPC benefited from a $4.8 million 1603 Cash Grant award, which could not have been received by a federal agency owner. In addition, the mature market for ESPC investors allowed for access to billions of dollars of private-sector capital. This past year, White Sands Missile Range will have achieved 10.8% of its renewable energy goal, up from just 0.5% before the project, meeting the federal mandate by more than 3%.

Although a contingent of installations have successfully deployed renewable energy under ESPCs, others have been reluctant based upon continued confusion over ESPC authority guidelines and a limited evaluation of the overall value of private financing, including the transfer of long-term rights to private-sector partners. However, as exemplified by the White Sands ESPC, the integration of renewable energy under an ESA within the existing ESPC contract authority is a viable structure that is not only life-cycle cost-effective, but also effective in transferring risks to the private sector, and therefore should remain an invaluable financing tool for DoD installation managers as they evaluate and determine future procurement models.

ABOUT THE AUTHORS

Peter Flynn is Executive Vice President of Bostonia Partners LLC, the investment banking arm of Bostonia Group, where he focuses on financing energy efficiency, distributed generation, and renewable energy projects as well as on project finance, securitization, and public private partnerships. At Bostonia, Mr. Flynn has served as lead banker for over $2 billion in federal, municipal, and commercial energy efficiency and renewable energy projects. Mr. Flynn is a frequent speaker on topics related to the financing of energy and real estate projects and is co-author of the article "Unique Issues Associated with Financing Federal Government Receivables" that appeared in The Journal of Structured Finance. Mr. Flynn is a member of the American Council on Renewable Energy's (ACORE) Advisory Committee on National Defense and Security.

Joseph Bonnin serves as Director, Pricing & Structured Finance, for Siemens Government Technologies, Inc. and supports Siemens Federal Business vertical market and Siemens Alternative Energy group. He has over 20 years of experience arranging, structuring, and financing projects within the energy industry. Specifically, Joe has structured ESA, PPA, and ESPC transactions and traditional non-recourse project financing structures to fund electricity generation plants, primarily renewable and alternatively-fueled energy projects (landfill gas, gasification, wind, and solar projects). He has financed the largest U.S. Government wind project (NNSA) and the largest solar project for the U.S. Army as well as a waste-to-energy facility for the DoD. Joe has participated in closing over $700 million in financings with approximately $550 million in asset backed and project finance transactions.

SITING AND TECHNOLOGY CONSIDERATIONS

SITING ATTRACTIVE SOLAR POWER PROJECTS ON MILITARY INSTALLATIONS

Kevin Prince and Morgan Adam
SunPower

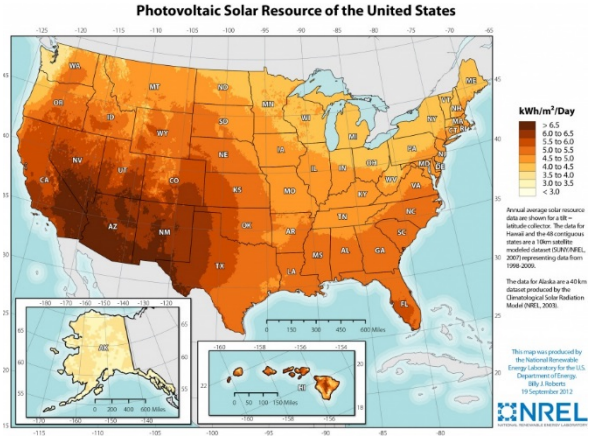
With an installation the size of Rhode Island and accounting for over 38% of the Navy's total landholdings worldwide, China Lake exemplifies the characteristics that make siting a renewable energy project attractive to developers, financiers, and the Department of Defense (DoD). Naval Air Weapons Station (NAWS) China Lake is home to over 600 active duty military personnel and over 4,000 civilians with the mission to support the Navy's research, testing, and evaluation of cutting-edge weapons systems. NAWS China Lake is also home to the largest geothermal site on a DoD installation and the largest solar array in a Navy installation, 270 MW and 14 MW, respectively.

When siting renewable energy projects, careful consideration needs to be made to (1) the available renewable resources; (2) utility regulations and rate structures; and (3) available incentives, rebates, and tax benefits. Each successful renewable energy project leverages these attributes to some degree, which help reduce risk and increase the project's economic return for each party involved in the transaction.

Each attribute to be considered during siting interacts with the other attributes and affects the project's overall attractiveness with varying degrees of influence. A renewable energy project does not necessarily need to maximize the benefit of all favorable conditions, but the project needs at least two or three favorable attributes present to make the project economical and attractive to the industry, and thereby, to the government.

RENEWABLE RESOURCE

The most obvious and straightforward factor that impacts the viability of solar at any given site is the amount of solar resource that the location receives. Clearly, a solar project located in a region that receives a lot of sunlight over the course of the year is going to generate more electricity than the same system installed in a less sunny location. The experienced energy professional may look at a solar exposure location in the Southwest compared to the Northeast and jump to the wrong conclusion about which project has the highest likelihood of successfully being developed. Why? Solar resource is only one consideration that impacts a project's economics. For example, Germany and New Jersey, with an average solar yield of merely 1,400 kWh/kWp for a single-axis tracker, are two regions with the most solar installations in the world, while Utah, which has an average solar yield of over 35% higher, has only four more megawatts of solar installed than Alaska. A high solar resource can overcome other less favorable site considerations, while a low solar resource can still be attractive if supported by favorable rate structures, interconnection rules, and local or federal incentives. The 14 MW China Lake solar project, located at the base of the Mojave Desert, has an exceptional solar resource, which negated the need for local or state incentives to make the project financially attractive. In contrast, projects in New Jersey need the support of the state renewable portfolio standard (RPS) and the monetization of solar renewable energy Credits (SRECs) to make a project feasible, due to a lower measured solar resource.



A map by National Renewable Energy Laboratory (NREL) (above) provides a visual illustration of how the solar resource varies within the United States, with the darker areas representing regions with more solar resource compared to the lighter areas.

UTILITY REGULATIONS AND RATE STRUCTURE

When siting a distributed renewable energy project, what the host customer pays for electricity is a critical factor when determining the attractiveness of a project. Using a simple avoided cost assumption of the average cost of electricity paid by the installation does not accurately represent the true value of solar. Understanding the specific rate structure coupled with the expected output of the generating asset will allow for a more accurate calculation of the true avoided cost. Many utilities offer Time of Use (TOU) rate tariffs in which the cost of electricity varies by the time of day and season, with the highest rates typically assigned during mid-day periods in the summer months (defined as peak rates) and the lowest rates offered during the evening in the winter months (defined as off-peak rates). For a solar system, the most energy is produced during a typical peak period where the value of the avoided energy purchased is maximized under a TOU tariff.

The benefit of a rate analysis is also closely tied to regulatory issues and the provision of net energy metering (NEM). NEM allows for electricity produced by a renewable resource, but not consumed immediately onsite, to be fed back into the grid and credited to the host customer's account. When pursuing a solar project, one additional net metering benefit available in select markets is the opportunity to rate switch from the utility's assigned-rate tariff to a more "solar-friendly" rate tariff. There is a significant economic benefit to rate switching where the TOU structure is modified to more closely match when the solar system is generating electricity.

In addition to NEM provisions, there are other regulatory factors that impact the viability of siting a renewable energy project. They include the timing, cost, and system-size limitations of interconnecting a project to the grid. Almost all of the over 3,000 electric utilities in the U.S. have different rules and regulations in allowing the interconnection of renewable energy projects, and these should be precisely understood before considering a solar project at a particular site.

Typically, there is a state-mandated, minimal interconnection limit with a streamlined application process for systems under 1 MW in capacity. However, once a project is sized above the minimal allowable size, the load-serving utility can burden the project with departing load, standby, or other fixed charges, in addition to requirements for system impact studies or network upgrades. California, for example, has a transparent process for systems up to 20 MW in capacity through the Rule 21 interconnection process, while other states and utilities have a less developed process to interconnect a renewable generating system, with a greater uncertainty of timing and cost.[36]

China Lake benefitted from both California's regulatory framework and high local retail electricity rates, scoring it high in this attribute for siting renewable energy projects.

[36] A helpful resource to acquire a high-level understanding of some of the regulatory issues in each state can be found here: http://www.dsireusa.org/incentives/index.cfm?SearchType=Interconnection&&EE=0&RE=1

INCENTIVES, REBATES, AND TAX BENEFITS

The last attribute requires an evaluation of the available federal, state, and local incentives that are available for a renewable generating system. These rebates or incentives range from relatively modest tax benefits, such as sales and use tax exemptions, property tax exemptions, and corporate state tax credits, to the more significant Federal Investment Tax Credit (ITC), eligible to projects owned by a private third party. They may also include monetary incentives provided by the local utility, such as performance-based incentives (PBIs), which are paid out over time as a function of expected system output, or capacity-based incentives (CBI), which are paid in a lump sum as a function of the system's nameplate capacity.

Yet another form of financial benefit to a solar project is the monetization of SRECs in states where there is an active SREC market. In such markets, each unit of energy (typically one megawatt-hour) produced equates to one SREC, which represents the environmental attributes of solar energy generation, and can be marketed, sold, traded, or retired anywhere within the country on a voluntary basis. SRECs are also a tradable commodity that can be sold for cash or other benefits in specific markets.

However, there are a number of markets in the U.S. today where a project can be sited without the need for any additional incentives. As the cost of developing renewable projects continues to decrease, the barriers to developing and siting renewable projects recede, such as longer acceptable term lengths, and the cost of procuring conventional fossil fuel increases, there will be a greater number of markets where an incentive-less project can pursued.

By China Lake utilizing the DoD's long-term contracting authority under 10 USC 2922a, which allows for the execution of energy agreements up to 30 years in term length, the project utilized incentives as efficiently as possible while scoring high in this siting attribute.

PROJECT SPECIFIC SITING CRITERIA

The following list provides additional site-specific criteria that should be factored when considering a site for renewable energy development:

- **Electricity Load:** Generally speaking, the most economically and technically viable projects serve the full, onsite electricity load. As such, sites with a considerable and consistent electricity load are favorable over sites with small, diminishing, and/or highly variable loads.
- **Environmental Impact:** Since any project constructed on federal land is subject to the National Environmental Policy Act (NEPA), it is recommended that this process be initiated by the government prior to soliciting proposals from the industry. By performing environmental review early in the development process, this not only limits the risk of schedule delays (since this process has the potential to take well over a year), it can also highlight other potential environmental risks that may require mitigation by the government and/or contractor, or further investigation through an environmental impact study (EIS), before a project can be executed.
- **Site Access:** Success of a solar project is dependent upon site access for purposes of routine maintenance and operation of the facility. Contractually, investors require a commercial provision of "quiet use and enjoyment" of the property for the life of the agreement. The government needs to be able to provide for such site access, most typically in the form of a lease, an enhanced use lease (EUL), a license, or an easement.
- **Site Selection:** Whether a roof-mounted, carport-mounted, or ground-mounted solar project, favorable sites are unobstructed by shade from surrounding structures or obstacles that must be built around. The most cost-effective solar arrays are contiguous blocks of solar modules, and thus the best sites offer large, uniform areas on which to construct

them. In addition, consideration should be given to site proximity to likely points of interconnection, such as a nearby substation. Traversing long distances in order to interconnect can significantly increase the overall cost of the project, possibly even making an otherwise feasible project cost prohibitive.

- **Utility Engagement:** As referenced in the previous section, "Utility Regulations and Rate Structures," the ability to interconnect within the infrastructure of the existing utility service is not a given. Even if a site is being serviced by a utility that permits solar projects and the processes for interconnection are relatively clear and understood, it is recommended that the government reach out to the local utility provider to inform the utility of the potential project to ensure all utility-related requirements are accounted for.

CONCLUSION

The success of a solar project on a military installation is driven largely by three factors discussed in this paper – solar resource; utility rates and regulations; and financial drivers, such as incentives, rebates, and tax benefits. As demonstrated by the 14 MW project at NAWS China Lake, understanding and balancing these project drivers helps lower execution risk while maximizing the potential value for the developer, financier, and DoD. By engaging with industry early in the process and by following a proven formula for success in leveraging the lessons learned from past projects, an installation can fully uncover the potential risks and benefits of installing solar at their site.

ABOUT THE AUTHORS

Kevin Prince, Manager, Federal Programs
Kevin Prince leads SunPower's market segment strategy and project development of large-scale solar photovoltaic projects in the Federal sector. Kevin has worked closely with both the DoD and civilian agencies, utilizing both power purchase agreements and direct purchase structures. Kevin was the lead developer on the 6 MW PPA at the US Air Force Academy and the 14 MW PPA at Naval Air Weapons Station China Lake, which was the first federally compliant 20 year PPA for the DoD. In total, Kevin has developed over 33 MW for 6 different federal agencies. Prior to joining SunPower in 2006, Kevin worked as a consultant in the financial services and electric utility sector. He received a B.A. in Business Administration--Finance from the University of Washington. Kevin.Prince@sunpower.com

Morgan Adam, Project Development Analyst
Morgan Adam is responsible for all financial and technical analysis for SunPower's Federal Project Development team. He has worked in the solar energy industry for over 13 years, spanning multiple countries and ranging from commercial projects to large DoD solar plants. Morgan joined SunPower in 2001 as the company's first Applications Engineer and has held roles in engineering, product management, energy efficiency, and federal project development, where he currently supports development to both civilian and all DoD agencies. Prior to joining SunPower, he worked as a design engineer for a prominent solar firm in Germany. Morgan has a B.S. in Engineering and a B.A. in Economics, both from Swarthmore College. Morgan.Adam@sunpower.com

SunPower Corp. (NASDAQ: SPWR) designs, manufactures and delivers the highest efficiency, highest reliability solar panels and systems available today. Residential, business, government and utility customers rely on the company's quarter century of experience and guaranteed performance to provide maximum return on investment throughout the life of the solar system. Headquartered in San Jose, Calif., SunPower has offices in North America, Europe, Australia, Africa and Asia. For more information, visit www.sunpower.com.

THE WIND ENERGY OPTION FOR MILITARY FACILITIES

Harry Benson
EverPower Wind Holdings, Inc.

As the U.S. Department of Defense (DoD) gears up to deploy 3 GW of renewable energy to power their facilities, localized wind farms, either co-located on base or in nearby locations, will provide many opportunities for long-term, cost-effective electricity supply that will enhance the energy security of the bases. The purpose of this article is to summarize the present cost reductions being seen in the industry, the contributing technological advancements, and the potential to co-locate wind turbines on military facilities in a way that is compatible with mission-critical activities.

The DoD has three broad goals for its renewable energy program:

1. *Improve energy security and surety by generating electricity which can feed directly into bases*
2. *Save money in their power purchasing programs*
3. *Reduce their carbon footprint by meeting their goal of 25% renewable energy consumption domestically by 2025*

While wind energy will not be feasible at all U.S. military locations, if the facility is in or near a good wind resource, wind energy could be the best solution to accomplish these goals.

ECONOMICS OF WIND

Wind energy in a strong wind resource area is one of the most affordable forms of electricity generation today and is very competitive over the long-term. While each site is unique and requires detailed wind monitoring, the Department of Energy's Wind Technologies Market Report 2012 states, "the average leveled price of wind PPA's signing in 2011/2012 fell to around $40/MW nationwide.

***Image 1**: EverPower's Patton Wind Farm, Patton, PA*

Contracts signed from wind energy projects during 2012 ranged from $31 to $84 per MW." These power purchase agreements (PPAs) depend critically upon wind resource, capital costs, and local factors; however, in many DoD locations, wind energy is likely to be competitive particularly over the long term as fuel price volatility is a non-issue. This could save military installations millions of dollars over the life of the PPA.

The American Wind Energy Association's (AWEA) 2013 report titled *The Cost of Wind Energy in the U.S.* states that "[w]ind turbine technology is improving including lower cost wind turbines, increased performance, and advanced operations, causing the cost of wind electricity to decline significantly in recent years."

New wind turbine models are continuing to improve the amount of energy captured, enabling wind farm economics to improve and making lower wind resource sites feasible. For example, General Electric's (GE's) new G120 2.5 MW turbine has a 15-25% increase in energy yield over their previous 2.85 MW-103 model. These improvements are allowing wind farms to offer lower-cost renewable energy, and major turbine vendors are making similar advances.

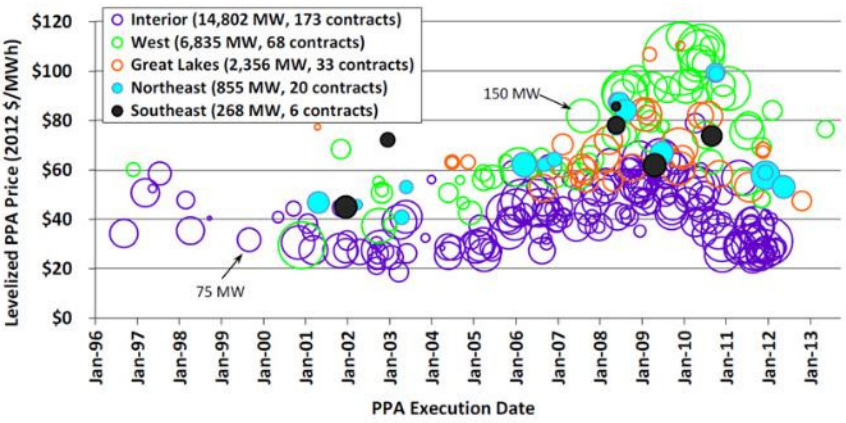


***Image 2**: Levelized PPA Prices, January 1996-2013, Courtesy of AWEA*

To understand these improvements, one must first understand the physics of wind. The formula for wind energy is:

Wind power = *½ × density of air × rotor swept area × (velocity of wind)*^{3}

Where rotor swept area is given as $\pi \times$ *(turbine blade length)*^{2}

Advances in turbine technology have improved two important factors: longer blade lengths increase rotor-swept area and taller towers position the rotor swept area at heights exposed to higher average wind velocities. Air density and wind velocity are also functions of the site characteristics and must be understood to determine the viability and economics of the specific site.

The wind resource is the most important part of the wind power equation (velocity of wind^3). For example, by changing the mean annual wind speed from 7 m/s (approximately 15.65 miles per hour) to 8 m/s (approximately 17.90 miles per hour), the wind power generated increases by 25-35%.

INCREASED ROTOR SWEPT AREA AND TOWER HEIGHTS

Recent trends in the wind industry show that turbine blades continue to become longer and towers are getting taller. Both of these factors improve energy yields and allow for better performance in low-wind areas. Wind power production gets an exponential bump from increased blade length, as shown in the equation above (the rotor-swept area of a turbine equals the radius of the blade length squared). In the early 2000s, a typical turbine rotor diameter was 77 meters (approximately 253 feet). In 2012, EverPower built the Highland North Wind Farm in central Pennsylvania with turbine rotors of 100 meters in diameter (approximately 335 feet). Today, turbines with rotor diameters from 112 to 122 meters (approximately 367 to 401 feet) are available for onshore applications. Additionally, wind turbine towers of 100 meters in height are now common, and they are getting taller. GE, as an example, has 110 meter (360.89 foot) and 139 meter (456.04 foot) options for their GE 120 2.5 MW model.

***Image 3**: New 2013 G120 2.5 MW Wind Turbine*

MICRO-SITING WIND TURBINES

One of the biggest obstacles to siting wind turbines on military sites is competing with mission-critical uses of the base, such as runways, flyways, radar, microwave, training, and shooting ranges. “Micro-siting” the project out of harm’s way, and in the best wind resource available either on the base or adjoining properties, requires a detailed constraints analysis and dialogue with key stakeholders to establish which areas might be available to locate the equipment.

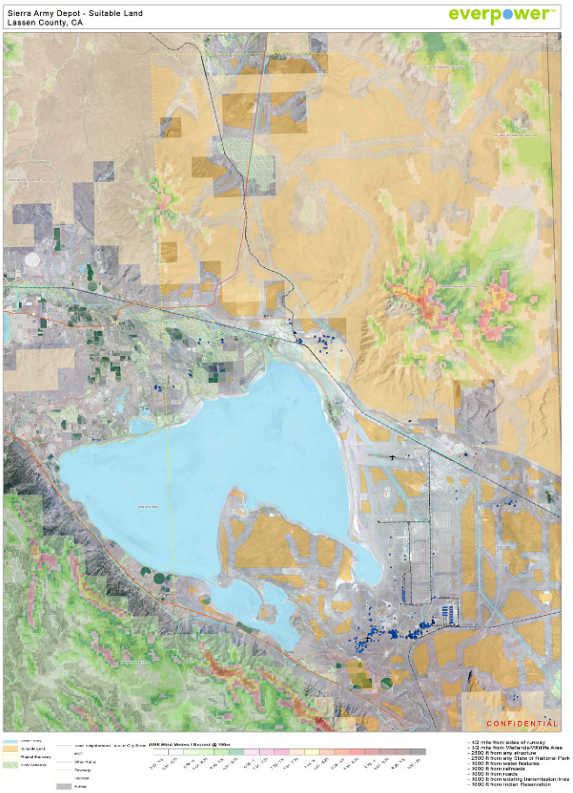


Image 4: *Example Constraints map for Sierra Depot area Northeast California. Subject to detailed analysis, turbines could potentially be located in nearby hills with electricity feeding into the base a via generator lead line.*

Developing a constraints map that identifies mission-critical restrictive areas and uses predetermined and agreed criteria is essential. Restrictions can then be evaluated in addition to more regular constraints addressed by wind farms (for example, setbacks to manage sound and flicker, wetlands, existing infrastructure, and visual constraints). With careful dialogue, areas that may initially be seen as unsuitable may be usable if mitigation measures are adopted. Examples of this might include: restricted operations during certain periods; relocation of mission critical equipment; installation of radar software upgrades; or altered operating protocols that do not significantly compromise mission-critical activities, while allowing turbines to be installed. There are several examples of the DoD utilizing Cooperative Research and Development Agreements (CRADA) to address issues at nearby wind farms. A good example of a recent on-base success story is at the Cape Cod Air Force Station (AFS), where the Sixth Space Warning Squadron (SWS) sited two new turbines that can produce 3.2 cMW of power. These two new turbines had to be micro-sited to co-exist with operations at the Otis National Guard Base, U.S. Coast Guard Base, and Camp Edwards Air Force Base. Incidentally, through a net metering agreement with the local electric company, the Sixth SWS's annual savings is estimated to be more than $600,000 a year, recouping more than 50% of Cape Cod AFS's annual electric bill.

CONSTRAINTS MAPPING

When looking at placing a wind farm on or near a military base, a wind resource assessment must be performed to find the optimal location for turbines. For example, pink on the constraints map (image 4) indicates a potentially viable wind resource (which is derived from generic wind mapping tools). A detailed assessment, including placement of meteorological towers to collect wind data, is vital to validate the wind resource. The Department of Energy's National Laboratories have been helping the DoD on many military sites to review resources, but additional opportunities may exist with detailed site analysis. Such analysis might conclude locating the wind farm several miles from the base to secure better winds and address mission-critical activities. An improved wind resource may allow for the costs of a longer generator lead line to be manageable. Generator lead lines can be above ground or underground, and connect directly to the base facility substation. They can cost as little as $200,000 per mile depending on voltage and terrain.

Image 5*: Twin Ridges Wind Farm, Somerset, PA – underground lead line.*

REGULATORY ISSUES

Critical to the value proposition for wind energy are the attributes the base requires from the wind facility and how this affects the associated structure of the PPA. For example, the lowest-cost solution from a nearby wind project may be to deliver power to the base through the existing grid infrastructure. While this may compromise energy surety, as the wires are outside the control of the base, such a structure will improve energy security due to the utilization of a local, sustainable, free energy resource. This type of compromise could meet a part of the DoD objectives, in particular, a strong long-term value proposition. Locations where this kind of supply solution is possible may be from already identified commercial wind farm locations within approximately 10-50 miles of bases, or through the development of new projects designed specifically to serve the needs of a military base.

For a solution where the electrons are delivered through the regular power grid, the contract structure will need to reflect the electricity market within which the base is located. Organized markets, such as the PJM Interconnection, can efficiently move power to the base through their members' networks; however, in other markets, such as the Bonneville Power Authority (BPA) in the Pacific Northwest, this may be impossible without the cooperation of the regulated utility.

In the case of on-site generation or a direct connection from a nearby wind farm, net metering will be an option that can substantially enhance the value proposition, as excess power generated in periods of lower demand could be sold back to the power grid at retail rates. Many states have net metering provisions in their electricity tariffs, but the specific qualification criterion varies by state. In general, if the energy generated by the wind farm annually is the same as the total load of the base, then it should qualify for net metering treatment. Different states also have different size caps, although these can sometimes be waived by a supportive utility.

Whether the power is delivered via the bulk transmission grid or direct connection, a detailed study of the electricity charges the base currently sees will be critical to understanding the long-term value proposition. Many charges are not linked to volume but to factors such as peak demand periods and regulated distribution charges. The potential also exists for smaller projects sized within minimum base loads to never export electrons to the external power grid, making the contracting structure simpler. However, this may not yield the optimal value solution for the base.

CONCLUSION

Through careful planning and consultation, there are significant opportunities to locate wind turbines on military facilities across the U.S. It will be difficult to locate the entire 3 GW target for new renewable energy only on land owned by the military. However, with careful planning and execution, nearby wind resources can be interconnected to appropriately situated facilities, either through existing electricity networks or through new generator lead lines constructed specifically to serve the base. These approaches can help the DoD meet their goal of 25% renewable consumption, offer cost-effective power purchasing solutions, and improve energy security and surety.

ABOUT THE AUTHOR

EverPower Wind Holdings, Inc., headquartered in Pittsburgh with offices in New York City and Bellefontaine, OH, is a developer, owner and operator of utility grade wind projects. Harry Benson is team leader for DoD programs. EverPower recently qualified and was selected as a MATOC Army Corp process vendor for Wind Energy. EverPower partnered with GE's wind turbine business and the Tennessee Valley Infrastructure Group (TVIG) to provide a strong team to develop, construct and operate best in class wind projects. Since its founding in 2002, EverPower has adopted a unique approach to wind power development by partnering with landowners and communities. EverPower currently owns and operates six wind farms with a nameplate capacity of 512 MW.

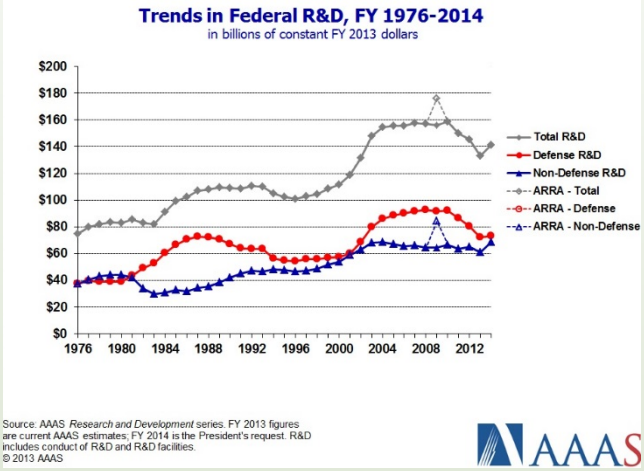
EXPANDING MECHANISMS TO DEVELOP EMERGING TECHNOLOGIES

Anita Balachandra
TechVision21

Four years after the passage of the American Recovery and Reinvestment Act of 2009, the need to accelerate the deployment of renewable electricity generation and energy efficiency technologies remains urgent. Innovative companies are developing solutions every day that will reduce greenhouse gas (GHG) emissions, improve U.S. industrial competitiveness, and increase U.S. energy self-sufficiency. The potential of many emerging technologies, however, remains unrealized as a result of critical gaps in our science and technology development infrastructure. The Department of Defense (DoD), in particular, has both a need for these technologies and the resources – e.g. legal authorities, expertise, existing programs and funds – to accelerate their development. This article examines gaps in DoD's extensive network of programs and policies that are particularly consequential for the development, demonstration, and deployment of emerging technologies.

In recent years, the Administration and Congress have taken several important steps to facilitate the development of renewable energy and energy efficiency technologies, increasing funding for existing programs and creating new ones. Even so, there remain significant gaps in the federal network of programs to support technology development. As a result, emerging technologies, with great promise to deliver cost savings and energy independence, remain stunted at an early stage of development, unavailable for widespread deployment, to the detriment of our economy, our environment, and our national security.

The Department of Defense has historically played a significant role in developing and deploying new technologies. This role has encompassed funding support for research and development (R&D) as well as serving as a target market. For over 30 years, DoD spending on R&D has exceeded that of all other agencies combined, and at the other end of the spectrum, DoD has been a smart first customer for innovative technologies. But perhaps its most consequential role is between these points, where DoD serves as a critical resource for testing, demonstrating, and validating emerging technologies.



Within this space, there are (at least) two distinct gaps: the very different experiences of ubiquitous "glue" technologies and so-called "new-to-the-world" technologies.

"GLUE" TECHNOLOGIES

Incremental improvements to existing capabilities, or "glue" technologies, are not always recognized for their value or impact. Examples of "glue" technologies include novel architectures for the internal combustion engine that dramatically improve fuel economy; additives for greases and lubricants that reduce friction between moving parts; and battery chemistries that offer high performance with life-cycle sustainability. These types of advances can fall through the cracks of

DoD's extensive network of programs for many reasons. When a capability is universally important, no single program office owns the responsibility to make it better. For small companies in particular, the "reward" for developing breakthroughs that have broad applicability is that they get passed around from one office to another, each claiming another has the requisite budget authority. Other experiences indicate a strong bias against solutions that seem too good to be true. But very exciting breakthroughs often do result from seemingly mundane incremental steps. We do not know whether performance claims are real and replicable unless we test to validate, and we need multiple demonstration and validation mechanisms to protect against these very real (often subconscious) biases.

Open test beds would provide developers of these technologies a platform to generate the kind of operating data they need to establish credibility with prospective commercial as well as military customers. Building on the experience of the Experimental Forward Operating Base (ExFOB), a network of open test beds would substantially expand our ability to evaluate emerging technologies. The ExFOB program was established in 2009 to provide quick evaluation and deployment of energy-saving technologies. The ExFOB program was established in 2009 to provide quick evaluation and deployment of energy-saving technologies. The ExFOB example demonstrates tremendous private sector demand for opportunities to learn DoD's needs and priorities firsthand, as well as a wealth of technological capability to meet those needs. A network of test beds could be collocated with existing assets, such as Industry/University Cooperative Research Centers (I/U CRCs) or even selected Manufacturing Extension Centers to accelerate the development of energy technologies beyond the military's most urgent needs.

"NEW TO THE WORLD" TECHNOLOGIES

Capital-intensive technologies that have not yet been deployed at utility scale often also go unrecognized. Often, no further scientific research is required to implement these technologies. Rather, the primary hurdle to their deployment is the upfront capital investment required, especially for the utility-scale renewable power generation systems vital for reducing U.S. dependence on fossil fuels. To attract commercial financing for such ventures, validated data on the cost, construction schedule, and performance of these renewable electricity generation systems is needed. Investors require data illustrating projected system costs and length of time to profitability, but this data cannot be generated in the absence of a pilot or demonstration system.

To lay the foundation for commercial financing, developers need to build and operate pilot and demonstration systems, as well as gather cost and performance data on construction, installation and time requirements, operations and maintenance, evidence of grid quality electricity, and system reliability. In addition, components must be tested at smaller scales before scaling up to commercial-size systems. The federal government – indeed, DoD – is the only entity that has the long-term vision, the need, and the breadth of capabilities to fund a demonstration facility at a meaningful scale. A demonstration program focused on a meaningful scale would have a significant impact on the economy, unlocking private investment and improving our ability to meet national goals.

Former Deputy Under Secretary of Defense for Installations and Environment, Dr. Dorothy Robyn, characterized DoD's role this way:

With respect to facilities energy, the military's most valuable role will be as a test bed for next-generation technologies coming out of laboratories in industry, universities, and the Department of Energy... For a wide range of energy technologies… DoD can play a crucial role by filling the gap (the "valley of death") between research and deployment. As both a real and a virtual test bed, our facilities can serve two key roles in which the military has historically excelled. One is as a ***sophisticated first user****, evaluating the technical validity, cost and environmental impact of advanced, pre-commercial technologies. For*

*technologies that prove effective, DoD can go on to serve as an **early customer**, thereby helping create a market, as it did with aircraft, electronics and the Internet.*[37]

DoD currently administers numerous programs to target this part of the development continuum, including:

- **Environmental Security Technology Certification Program (ESTCP):** Established in 1995, ESTCP seeks to move innovative technologies from proof of concept to field use. These demonstrations generate data on cost and performance that is necessary to determine how – and whether – such technologies will perform in a real-world environment.
- **Strategic Environmental Research and Development Program (SERDP):** SERDP is DoD's environmental science and technology program, administered in partnership with the Department of Energy (DOE) and Environmental Protection Agency (EPA). SERDP invests across a broad spectrum of basic and applied research, as well as advanced development.

These programs and others are dramatically oversubscribed, putting them effectively out of reach for many companies developing promising technologies. Often, companies are required to generate test data showing how their products perform against existing specifications before they can meet with a DoD program manager. For program managers who are inundated with industry overtures, this position makes sense – but it nonetheless poses a significant burden on the small and medium companies who are a major source of our most innovative technologies. A substantial expansion of these programs would serve both the agency's mission objectives as well as the nation's economic interests by fostering the growth of new industries.

CONCLUSION

Despite the numerous programmatic tools DoD has at its disposal to accelerate technology development – as well as a very real mission interest – there are still gaps in the system. Some of the shortfall can be explained by the current budget environment; in addition to the programs listed above, several other extremely critical programs, such as the Manufacturing Technology Program (MANTECH), are consistently oversubscribed. Additional funding for these programs will not only help the DoD meet its renewable electricity generation targets, it will also fuel the growth of our most innovative companies and generate high-value job growth.

A network of open test beds is another tool that can substantially advance these goals. DoD should identify partners with whom it can establish open test beds that companies can utilize to demonstrate and validate promising technologies. In order to have maximum impact, these test beds must be accessible at minimal cost and must provide robust protection for intellectual property. There are models for this approach, such as the private non-profit SEMATECH, which was established with DoD and industry funding over 25 years ago to revitalize the semiconductor industry.

While much has been accomplished in the last four years, much remains to be done. Funding exploratory research and "greening" federal purchases are important but not sufficient measures. To realize the economic potential of renewable energy and energy efficiency technologies, we must focus more attention on the demonstration and validation segment of the technology development continuum.

[37] Testimony before the House Armed Services Committee Subcommittee on Readiness, March 18, 2010.

ABOUT THE AUTHOR

Anita Balachandra, Senior Vice President of TechVision21, brings extensive knowledge of R&D budgets and programs to her work on advanced technology development and manufacturing issues. Ms. Balachandra has worked closely with technology developers, state and federal funding programs, and Federal laboratories, previously at the Maryland Technology Development Corporation (TEDCO) and prior to that at the U.S. Department of Commerce.

TechVision21 is a full service technology policy consulting firm, specializing in helping public and private organizations advance their interests through the development of targeted initiatives and communication tools. Clients include technology and renewable energy companies, research universities, science and technology, and non-profit organizations.

ENERGY SECURITY AND MICROGRIDS

PROTECTING CRITICAL INFRASTRUCTURE FROM IMPACTS OF EXTENDED GRID OUTAGES

The Honorable William C. (Bill) Anderson
Eaton Corporation

Less than a decade ago, the concept of cyber risk was virtually unknown to the average American. Today, reports of cyber-attacks permeate the nightly news. As the risk becomes more apparent and the threat more imminent, federal, state, and local governments, the global financial community, and other organizations heavily dependent upon advanced electronics have been hard at work hardening critical information technology (IT) and communications infrastructure against cyber-attacks. These efforts are laudable, but have left us with a false sense of security. These assets play a significant role in national defense, homeland security, and public safety, but sit upon a very fragile foundation. All are almost entirely dependent upon the electrical grid for their power, while grid infrastructure remains highly vulnerable to cyber and electromagnetic pulse (EMP) attacks, as well as to the impacts of catastrophic natural events, such as the recent Superstorm Sandy. Although significant time and national treasure has been expended to upgrade the reliability, robustness, and resiliency of the grid, those upgrades rely heavily on automation and computers to provide stability to the system. It is this automation technology that is most susceptible to cyber and EMP attack – it has essentially increased the vulnerability of the grid to such threats.

Cyber-attacks, EMP events, or natural disasters could cause long term and wide-spread disruptions to the electrical supply – too extensive to be remedied by backup or emergency power generation. Yet, very little of our critical infrastructure is protected by anything more than backup emergency power units, which are limited by amount of power output and run time.

The efforts required to remedy this situation may at first appear daunting, but currently available technology offers cost-effective approaches to significantly mitigate the risks and facilitate rapid recovery from catastrophic events. These technologies range from equipment that significantly reduces the cascading effects normally associated with major outages – such as synchronous condensers and utility-scale storage that can provide standby spinning reserves – to localized distributed power generation and distribution systems (microgrids), which can operate for extended periods of time, totally independent of crippled grid infrastructure, and which can take advantage of local energy feedstocks like renewable resources.

How the nation prepares to combat these threats will dictate how effectively we will be able to respond to adversaries bent on the destruction of our way of life.

UNDERSTANDING THE THREAT AND ADVANCING A SOLUTION

Every day, forces unfriendly to the United States are hard at work to disrupt and destroy our government and economy. Traditionally, the ability to inflict significant harm required sophisticated weapon systems. In other words, credible adversaries in the past were exclusively nation-states with large treasuries and vast armies. Today, because of our nation's widespread and growing dependence upon

computers that run essentially every aspect of our lives, including our national defense, enemy combatants with limited sophistication and financial resources have the tools to wage an effective asymmetric campaign against high-tech nations like the United States, with impacts as or more devastating than the effects of traditional weapons.

So, how severe is this problem? In 2009 a U.S. Government Accountability Office (GAO) report concluded that of the 34 most critical facilities within the U.S. Department of Defense (DoD), 31 rely on commercially operated electricity grids as their primary source of electricity. The DoD's Defense Science Board reported in 2008 that, for the most part, neither the electric grid nor on-site backup power generation can provide the level of reliability necessary to ensure the continuity of critical national security functionality in the event of a long-term grid outage. It is certainly not hard to extrapolate the totality of the exposure across the entire national security and public safety infrastructure.

With the exposure being so significant, how real is the threat? Not so long ago, cyber and EMP attacks were theoretically possible, but relatively unlikely. Much has changed in a very short number of years. Today, there is significant evidence of viruses embedded in electronic equipment purchased overseas–dormant now, but capable of being awakened remotely to attack equipment all along the electrical grid infrastructure. We are all aware of the reports of the thousands to millions of cyber-attacks perpetrated against U.S. critical infrastructure each day. A lone hacker could possess the capability to unleash a cyber-attack capable of massive and long term disruption to our electric grid.

An EMP attack requires the delivery of a short-duration intense pulse of electromagnetic energy, which can be delivered in several different ways. But, the effect is the same, with damage or destruction to sophisticated electrical equipment in the line of sight of the attack point. Because EMP is a line of sight weapon, accuracy is less important. An EMP detonation accomplished hundreds of miles above the earth's surface could impact facilities on the ground for thousands of miles. Adversaries no longer need advanced guidance systems to deliver a desired effect. All that is needed is a delivery vehicle that can position a weapon in the general vicinity of a desired target. Evidence over the past couple of years that rogue nations now possess rocket technology to carry a payload over significant distances confirms that bad actors now have the capability to execute an EMP attack.

Those within government most familiar with these issues have begun to register their concerns. Former Defense Secretary Leon Panetta has noted that a "cyber-attack perpetrated by nation states or extremist groups… [could be] as destructive as the terrorist attack on 9/11." Congressman Trent Franks, Chair of the Congressional EMP Caucus stated that "an EMP event would be the ultimate in a cyber-security catastrophe." In 2012, U.S. Senator Susan Collins lamented that, "in all my years on the Homeland Security Committee, I cannot think of another issue where the vulnerability is greater and we've done less."

The risk discussed here is not that of short-term and relatively localized power outages. Those can be adequately addressed by the standby back-up power generation currently in place. The concern is the catastrophic effects of wide-area and long-duration grid outages, which require more sophisticated solutions in terms of the power generation, the energy feedstock supply chain, and equipment required to ensure grid stability and demand management over an extended period of time.

The exposure is real and the threat is imminent, so what are some solutions? Dr. William R. Graham, Chair, EMP Commission has noted that, "vulnerability to EMP that gives rise to potentially large-scale, long-term consequences can be reasonably reduced below the level of a potentially catastrophic national problem by coordinated and focused effort between private and public sectors of our country." The solutions Graham suggests will address EMP threat as well as exposure to cyber-attack and national disaster, offering a starting point for a rational and cost-effective approach, to quickly

and efficiently address the most pressing national security issue of our time.

What is the approach to reasonably reduce exposure to a catastrophic risk? The effort would require a two-pronged approach to (1) reduce the overall impact of a successful attack on the grid and (2) create the ability to physically island identified critical infrastructure and provide for long-term operation of those critical assets with local power generation assets driven off of locally-derived energy feedstocks, like renewable energy.

The overall effect of a successful attack would impact the target area as well as creating stress on other portions of the grid, transmission, and distribution circuits, causing a cascading effect which could lead to widespread power outages, i.e. blackouts. The impacts of the cascading effect can be significantly reduced by the installation of additional spinning reserves along the grid. Technologies such as synchronous condensers and utility-scale storage devices adjust conditions along the grid and reduce the likelihood of significant cascading. However, adding these spinning reserves to the grid is not currently a priority of the government or utilities.

In the event an attack is successful in triggering a significant grid outage, it will be necessary to operate critical national security infrastructure off the grid for extended periods of time. Microgrids provide an excellent platform to operate critical assets utilizing "on-site" electrical power generation over extended periods in isolation from a crippled grid. We are now positioned to deploy microgrid solutions to address risks to grid infrastructure:

- A number of microgrid demonstration projects have been sponsored by federal and state agencies. The industry has learned much from these projects. The data provides insights including (1) integration of hybrid power generation assets to ensure continuous microgrid operation, (2) appropriate procedures for safe isolation and reconnection of distributed power generation assets to the main grid, and (3) even approaches that could offer cost savings opportunities to users during normal operations. Releasing the findings from these projects would assist in rapid commercial-scale deployment, and turn the U.S. towards execution of commercial-scale microgrid solutions to support critical infrastructure.
- We need to recognize that we must deploy these solutions during difficult economic times. Government funding may not be there to develop projects. Therefore, we may need to rely on private-sector financing to develop and operate these projects. In certain parts of the country, where utility rates are high or there is a requirement for additional power generation capacity, microgrids that utilize a "new" source of electrical power generation that operates in parallel with the grid during normal operations, thus generating revenue for the investor, should be able to achieve commercial financing. Those systems can be designed to allow for physical isolation from the grid in the event of an attack, operating in islanding mode as long as necessary to provide assured power to critical national security infrastructure.
- Microgrids are local solutions, operating under local control with local energy feedstocks. The solutions can be designed to address both federal and local critical power requirements. Solutions matched to local requirements and circumstances ensure a focus on efficiency, effectiveness, and relevance to local need. Solutions will likely incorporate a healthy mix of green and brown feedstocks for power generation, as well as traditional and cutting-edge technologies, thereby advancing President Obama's objective to take an "all of the above" approach to energy security.

Energy efficiency will play a significant role in the success of the overall effort. The size of these microgrid systems will depend on overall demand, and the overall costs of the systems will depend on required electric output. The ability to install equipment that will reduce energy demand, maintain that equipment at peak performance, and

manage or shed load as necessary can significantly reduce system cost and extend operating life.

The risk is real, and the threat is imminent. We are fortunate that cost-effective solutions are available today to significantly reduce the impact of any successful attack to the grid infrastructure. Only through partnership between the private sector; local civic leadership, state, and local governments; and the federal government, can an effective and timely rollout of a set of proper solutions be accomplished.

ABOUT THE AUTHOR

The Honorable William C. (Bill) Anderson currently serves as Strategic Development Executive at Eaton Corporation in Washington, D.C. He previously served as the Assistant Secretary of the United States Air Force for Installations, Environment and Logistics under President George W. Bush. He also served as the Air Force's Senior Energy Executive, leading efforts that established the Air Force Energy Program, developed the 14 MW solar array at Nellis AFB, Nevada, and certified the military air fleet to fly on alternative fuels. Secretary Anderson is a noted speaker and author in the areas of energy, sustainability, environmental stewardship, leadership, and military supply chain issues. The author gratefully acknowledges the assistance of Jim Dankowski, National Business Development Manager and Tess Flohr, Marketing Communications Manager, both of Eaton, as well as Bernadette Chepega of Largemouth Communications for assistance in development of this paper. The author can be reached at williamcanderson@eaton.com.

THE KEYS TO AVOIDING MICROGRID LOCK: NATIONAL SECURITY THROUGH PUBLIC-PRIVATE PARTNERSHIPS

Roger Feldman
Andrews Kurth LLP

FRAMING THE ISSUE

A microgrid is a local energy system capable of balancing captive supply and demand resources to maintain stable service within a defined boundary. Microgrids are not defined by their size, but by their function. They may either be isolated (not connected to the local utility); islandable (fully interconnected, but also able to maintain some level of service during a utility outage); or non-synchronized (capable of consuming power from the grid, but not supplying it). In effect, a microgrid is an energy management system, coordinating electricity storage and demand response/efficiency of distributed generation sources. Microgrids can also be tied into district heating management. Almost every form of energy supply can produce power distributed in a microgrid.

The military has already identified several key applications of microgrids and has begun to test them. Their applications include:

- *Integration of multiple facilities for reliability purposes*
- *Reliability and ability to continue functioning at time of interruption of utility service – including increasingly common disruptive weather conditions*
- *Enhancing feasibility of the use of renewable energy resources*
- *Providing forward operating base independence and "self-healing" characteristics*

Each of these applications ultimately relates back in some measure to a key national priority issue – protection of critical electrical power assets. The nation's hardened electric transmission and related communications infrastructure rests on a fragile foundation. The National Academy of Sciences indicated last year that physical damage by terrorists to large transformers could disrupt power to large regions, take months to repair, and be carried out with little risk of detection. Advanced microgrids represent critical infrastructure to deal with several facets of this dilemma: need for local autonomy, local feedstocks, and supporting community assets for strategic assets. Military customers represent a large segment of the potential microgrid market to meet requirements for command control communications, computers, intelligence, surveillance, and reconnaissance.

The fundamental problems for development of such microgrid-related arrangements by Department of Defense (DoD) components seem to be:

- *The armed services cannot pay more for power than the conventional market permits;*
- *Legal and institutional issues in self-implementation frequently arise out of existing and interface issues.*

These very different considerations have some common roots in the evolving structure of the utility industry and DoD's efforts to come to terms with these changes.

MICROGRIDS AND UTILITY INDUSTRY STRUCTURE AND OPERATIONS

Microgrids are progressively proving attractive to the private sector and have been earmarked as one of the fastest growing non-fuel power market sectors (although there is some "hype").

There have been a variety of motivating factors:

- Climate disasters have led states to begin sponsoring support for microgrids for public service assurance.
- The perceived high need to assure performance of functions in manufacturing and service industries.
- The broadening recognition by hospitals, datacenters, and universities of the necessity to develop their own microgrids to assure ongoing needed reliability.
- The continued, strong public support for use of renewable energy systems which may raise utility system load balancing issues.
- Expanded public policy recognition of the value of microgrids in the promotion of energy efficiency through systems management.

More broadly, the practical appeal of distributed generation for the above and other factors has increased, and with it the appeal of future microgrid use. These reasons principally include the systems. Consequently, there is eroding support for and interest in the traditional utility model: central stations, long distance transmission, the linkage of utility duty to serve, and rate-based economics.

Consequently, there is increasing pressure on many utilities to preserve the current system of regulation, based on their well-established economic models. Simply put, the danger of loss of load due to the potential incursions of distributed generation, with the resulting possibility of stranded assets, has increased some utilities' resistance to the third-party independent development of assets, such as microgrids, which could contribute to that result. These utility concerns are not directly the concern of DoD in fulfilling its missions. But, the resulting areas of dispute in the civilian sphere have collateral impact on the unfolding DoD effort to adopt microgrids: jurisdiction/ownership; allocations of costs; size and scope of projects; and regulation of operation within the utility regulatory framework.

DoD is still in the process of fully formulating its programs for its microgrid initiatives. For many years, its overall policy has been to seek institutional management of electric facilities by experienced utility advisors rather than other contract managers. DoD reform initiative directives have fostered efforts to influence competitive procedures and economic analysis to effect utility provision of these services. While, in theory, DoD could find that the necessary standard of service has not been met by utility providers, this is an unlikely scenario. Meanwhile, Defense Logistics Agency (DLA) procurements for utility privatization have continued.

DoD approaches to problem solving by enhancing the scope and reliability of utility service has been subject to criticism by the National Association of Regulated Utility Commissioners (NARUC). For example, NARUC has criticized DoD efforts to deploy grid peak onsite energy as resulting in stranded generation and transmission investment, thereby causing increased rates for stranded customers. Business Executives for National Security (BENS), which is otherwise sympathetic to the value of microgrids to DoD, therefore has encouraged DoD "to coordinate" with utilities and state regulators. Potential problems highlighted by BENS involving lack of satisfactory coordination between DoD and local utilities are: entanglement of DoD operations with utility operations, interference with utility duty to serve, possibility of multi-jurisdictional authority over facilities, and possible rate base incorporation of DoD assets.

In a similar vein, BENS also opposes the collaborative use of microgrids beyond military installation perimeter lines with adjacent communities, citing the "inherent utility functions" that would be entangled with facility operations; the possibility of multiple governmental jurisdictions having authority; and the issue of incorporating on-base assets into the rate base. It further bolsters these arguments in the invocation of non-interference with the "inherently governmental" functions of locales. (There are, nevertheless, examples of different forms of hybrid service arrangements at the Robins

and Tinker Air Force Bases, involving excess on-base power being made available to local communities. The potential for the creation of a variety of other innovative formats is still being explored by DoD.)

NOT JUST ANOTHER JURISDICTIONAL SQUABBLE

While fallout from the regulatory debate over the scope of and jurisdiction over distributed energy continues, and as DoD seeks to accommodate its operations to the vagaries of its requirements, the seriousness of the impacts on cyber-security and vulnerability of the grid to natural or hostile events (and the potential of microgrids to alleviate them) hangs over their resolution. Utilities are certainly not unaware of this issue.

The clear vision of one utility on its security-related issues is instructive. It recognized that where security is concerned, the utility's fragmented organizational structure of the past, based on various compliance jurisdictions, was not designed for modern threats. So it undertook a cyber-security reorganization that removed and replaced all responsibilities of other executives, and placed them under a single vice president of business infrastructure and technology. The utility believes that with the right internal coordination and reporting structures in place, it can remain vigilant and adaptable in the face of this ever-changing challenge.

The same should hold true on the national level as well. The unifying principle guiding the convergence of national security (as it relates to microgrids), and the present business model of the utility industry should be one of public/private cooperation, because it serves the national interest in energy system security much better than balkanized management of each domain by a separate party. While the mechanics of structuring public-private partnerships to achieve this goal are clearly not simple, they can be achieved if explicit recognition is given to two basic principles:

- Acknowledgment and follow through on the need for cash flow to support *infrastructure*, as well as power production, to best serve the interest of reliability and attendant security for both private suppliers and government purchasers.
- The procurement process can be a means to foster the potential for innovative financing/technology applications, if it is calibrated to recognize private sector needs for firm cash flow.

The net result can be, as BENS termed it in a moment of crystalline clarity, the availability of a "clean line of sight for private capital availability" to provide DoD with the full range of benefits it hopes to obtain from the utilization of microgrids.

ABOUT THE AUTHOR

Roger Feldman, Counsel at Andrews Kurth LLP, has chaired the Project Finance Groups of three major international law firms during his 40-year career.

He is a Director of ACORE, currently chairs ABA's Government and Private Sector Innovations Committee, is immediate past Chair of the ABA's Renewable and Distributed Energy Committee, and is Chair Emeritus of The National Council for Public-Private Partnerships.

He began his professional life in systems analysis at the Pentagon, served as a Deputy Administrator in the Federal Energy Administration and throughout his legal career in Washington has always been active in the financing of public-private partnerships for energy and infrastructure.

Mr. Feldman is a graduate of Brown University, Yale Law School and the Harvard Business School.