

ON POINT FOR THE NATION: ARMY AND RENEWABLE ENERGY

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“It’s operationally necessary, it’s fiscally prudent, and it’s mission essential for us to make sure that we have energy security and can perform our primary mission for the United States.”¹

Synopsis: This article explores the U.S. Army’s efforts to incorporate renewable energy into its mission at home and abroad. It explains to the reader why the Army needs and wants renewable energy as part of its overall strategy to strengthen national security and improve its operational capabilities. The article then introduces the reader to the strategic framework which set the Army’s overall goals and shaped the landscape for development and implementation of a number of wind, solar, geothermal, and biomass projects. After an evaluation of many of the projects implemented on Army installations and in the deployed and operational setting, the author identifies some remaining challenges and offers several recommendations for enhancing the Army’s capacity to further develop, implement, and expand renewable energy projects.

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1. *Assistant Secretary of the Army for Installations, Energy & Environment*, U.S. ARMY, <http://www.army.mil/asaiee> (displaying the quote of Honorable Katherine Hammack, Assistant Secretary of the Army (Installations, Energy & Environment)) (last visited Feb. 4, 2013) (the quoted text has been slightly corrected to read “it’s mission essential” rather than “its mission essential” as the website’s quotation reads).

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I. INTRODUCTION

Stop for a moment and imagine what an Army on point for the Nation, working to develop and implement renewable energy policy and initiatives, must look like.

- Photovoltaic solar panels spread across a twelve-acre landfill in Fort Carson, CO, generating enough electricity to power 540 homes.²
- Landfill gas converted into enough energy to supply power to 250 homes at Fort Benning, GA.³
- Soldiers across Afghanistan using solar-powered battery recharge systems to reduce their rucksack loads and to extend their tether from supply bases when embarking on multi-day patrols.⁴
- Reduction of annual oil use in the war in Afghanistan by thirty-three million gallons because of twenty-two new mini-grid power generation management platforms.⁵
- On the horizon sits a 13.2 MW solar power project at Fort Bliss, TX, large enough to power 4700 homes.⁶
- \$7 billion on tap for expanding renewables at Army installations across the Nation, with hundreds of renewable energy company applications in the pipeline waiting for reviews and acceptance.⁷

To some observers this picture is somewhat surprising and, frankly, confusing. To others, it is annoying at best or maddening at worst, to think of our Army *wasting* time and money on solar panels and daisy-chaining some new-fangled generators together. And for yet others, they simply stand amazed by the awesome agility and ingenuity the Army displays over and over again. But for almost all Americans, they want to know why.

Why is the U.S. Army, the world's premier war-fighting force, focused on renewable energy? In an era of sustained combat never before known by our

2. INT'L ENERGY AGENCY, PHOTOVOLTAIC POWER SYSTEMS PROGRAMME ANNUAL REPORT 2010, at 105 fig.2, available at http://www.iea-pvps.org/fileadmin/dam/public/report/annual/ar_2010.pdf.

3. Mike Rhodes, *FlexEnergy and DOD Team Up at Fort Benning*, DIESEL & GAS TURBINE WORLDWIDE, Mar. 2012, available at <http://www.flexenergy.com/wp-content/uploads/2012/03/FlexEnergy-March-Diesel-Gas-Turbine-WW.pdf>.

4. Debra Barthmann, *Army Deploys Innovative Battery-Recharging Kit*, U.S. ARMY (Aug. 2, 2010), <http://www.army.mil/article/43176/army-deploys-innovative-battery-recharging-kit/>.

5. G-4 Public Affairs, *Army Launches Smart Operational Energy Use Campaign, Identifies 10 Initiatives*, U.S. ARMY (Oct. 22, 2012), <http://www.army.mil/article/89693/>.

6. *SolarCity to Power 4,700 U.S. Military Homes*, SOLAR TRIBUNE (Dec. 7, 2012), <http://solartribune.com/2012-12-07-solarcity-to-power-4700-us-military-homes/>.

7. Bob Brewin, *Army Kicks Off \$7 Billion Renewable Energy Procurement*, NEXTGOV (Aug. 7, 2012), <http://www.nextgov.com/defense/2012/08/army-kicks-7-billion-renewable-energy-procurement/57274/>.

Nation, why is our Army now taking on the challenge of developing and implementing renewable energy policy and projects? How did we get here and what is the goal? How far have we come? How far do we have to go? And what will it take to get us to energy independence and increased national security?

This author endeavors to answer these questions and others in the pages ahead.

This article, broken into seven parts, will first highlight some of the U.S. Army's recent development and implementation of renewable energy policy, systems, and projects. It will then identify the primary challenges that continue to slow or limit further progress in renewable energy development. Finally, it will offer several recommendations for the way ahead. Part I introduced the reader to the subject matter and outlined the roadmap for the rest of the article. Part II presents a timeline that helps to explain how and why the Army is on its current course of rapidly expanding its development and use of renewable energy. Part III assesses where the Army is today, by presenting a number of success stories and case studies. Part IV summarizes the Army's plan for the way ahead. Part V addresses some of the key challenges which currently slow or limit renewable energy growth. Part VI proposes several recommendations for enhancing the Army's capacity to further develop, implement, and expand renewable energy projects. Finally, Part VII concludes the article.

II. THE ROAD TO RENEWABLES

A. *Wake-Up Call*

Assistant Secretary Hammack's quote at the start of this article provides a nice, single sentence explanation of the Army's need for renewable energy. Before entering into the meat of this article, however, it is worth detouring here for a moment to further consider some other assessments in order to understand what drives the Army's focus on renewable energy. Understanding the combination of concerns that served as the wake-up call for the U.S. Army and other federal agencies to incorporate renewable energy into their strategic vision and mission informs the reader as to why the Army is investing so much time and money into a never before seen, *whole-of-government* paradigm shift in energy and environmental strategy.

1. Climate Change and Energy Consumption

Climate change is part of the genesis of the renewable energy push. A recent military advisory board determined that the "nature and pace of climate change being observed today and the consequences projected by the consensus scientific opinion are grave and pose equally grave implications for our national security."⁸ In 2010, the Department of Defense (DOD) Quadrennial Defense Review reported:

Assessments conducted by the intelligence community indicate that climate change could have significant geopolitical impacts around the world, contributing to

8. MILITARY ADVISORY BD., THE CNA CORP., NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE 1 (2007), available at <http://www.cna.org/sites/default/files/National%20Security%20and%20the%20Threat%20of%20Climate%20Change%20-%20Print.pdf>.

poverty, environmental degradation, and the further weakening of fragile governments. Climate change will contribute to food and water scarcity, will increase the spread of disease, and may spur or exacerbate mass migration. While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world.⁹

Hopefully the Army's efforts, and those efforts of all of the federal agencies involved in the renewable energy initiatives, will help to reduce greenhouse gas emissions and protect our natural resources in order to slow, stabilize, or reverse climate change. If the Army, as a seemingly small part of society but nonetheless a leader on a national and global stage, can begin to affect change then the investment in renewables is worthwhile.

While the members of the Army and each of its sister services combined represent substantially less than 1% of the U.S. population, the DOD's mission and energy needs are actually quite significant. A 2009 Brookings Institute report noted that the DOD "is the world's single largest consumer of energy, using more energy in the course of its daily operations than any other private or public organization, as well as more than 100 nations."¹⁰ It is reported that the DOD "spent over \$15.2 billion in 2010 to purchase energy and approximately 25[%] of this expenditure was for its installations."¹¹

The Army in particular "uses about 880 million gallons of fuel and consumes 9.1 million megawatt-hours of electricity."¹² Further, the Army is responsible for a full third of overall DOD facility energy use.¹³ This is a staggering set of figures that show how much difference the services can actually make.

2. Reduce Price Volatility, Increase Energy Independence & Strengthen National Security

In response, the Army and other federal agencies are now seeking to mitigate climate change and greenhouse gas emissions by reducing overall energy and water demand, increasing efficiency at the user and infrastructure levels of both energy and water, and, to the extent possible, replacing fossil fuel with renewable energy sources. If the Army can reduce energy use in general, through efficiency upgrades and better user practices, then it can reduce its overall consumption. Reduction in consumption not only reduces the Army's

9. DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW REPORT 85 (Feb. 2010) [hereinafter QDR 2010], available at www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

10. JERRY WARNER & P.W. SINGER, BROOKINGS INST., FUELING THE "BALANCE" – A DEFENSE ENERGY STRATEGY PRIMER 1 (2009), available at http://www.brookings.edu/~media/research/files/papers/2009/8/defense%20strategy%20singer/08_defense_strategy_singer.

11. Amy S. Koch & Lorraine M. Campos, *The U.S. Army May Provide Opportunities for a Struggling Renewable Energy Sector*, in GLOBAL REFERENCE GUIDE 2012: ENERGY & UTILITIES 6, available at http://www.financierworldwide.com/ReferenceGuides/GRG_Energy_dnr848.pdf.

12. THE PEW PROJECT ON NAT'L SEC., ENERGY AND CLIMATE, REENERGIZING AMERICA'S DEFENSE: HOW THE ARMED FORCES ARE STEPPING FORWARD TO COMBAT CLIMATE CHANGE AND IMPROVE THE U.S. ENERGY POSTURE 12 (2010), available at http://www.asaie.army.mil/Public/Partnerships/doc/Pew_Reenergizing_Americas_Defense_Report.pdf.

13. *Id.*

portion of the \$19.4 billion energy bill,¹⁴ but it also reduces our national demand for fuel imports. After efficiency improvements and reductions in energy consumption however, maximum replacement of fossil fuels with renewable energy sources is imperative. All of these efforts in concert not only reduce the Army's dependence on fossil fuel imports, but they also reduce the Army's dependence on the national electric grid system. Finally, the combination of these reductions should result in less energy price volatility for the Army and an overall improvement in our national security.

3. Installations

Part of strengthening our national security is developing a sufficient and reliable energy flow for installations around the globe even in times of disruption from natural disasters, significant weather impacts, cyber-attacks, and other threats.¹⁵ One way for the Army to insulate itself from disruptions in the main power grid is to transition to onsite or close-range offsite renewable energy. With photovoltaic solar panels, thermal solar systems, wind farms, landfill gas conversion stations, biomass initiatives, and geothermal energy sources, the Army can diversify its energy base.¹⁶

The renewable sources need to be coupled with a smart grid system that is tied into the local grid so that the Army can sell back excess energy to the local utility to earn credits during low use periods. During normal or average use, the Army can mix sources and increase its renewable use in order to reduce price volatility. Then, during traditional energy source disruptions, the smart grid patched into the renewable generation stations ensures the Army has its own secure and reliable energy without depending on fuel operated backup generators.¹⁷

4. Operational

As climate change increases the potential for destabilizing conditions in volatile regions of the world, increases the number or enhances the intensity of natural disasters everywhere, and further exacerbates political tensions and strained economic conditions, the military will remain central on the world stage.¹⁸ Therefore, part of this effort is to ensure the Army can increase Soldier readiness and better protect Soldiers when forward deployed by reducing fuel and water use on the battlefield. Less demand for fuel and water means fewer convoys and fewer exposed Soldiers working to guard the resource laden trucks. Lighter packs for Soldiers and greater ability to patrol for longer periods of time means more flexibility on the battlefield.

14. MOSHE SCHWARTZ, KATHERINE BLAKELEY & RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS 33-34 (2012) (discussing the FY 2011 energy bill).

15. See, e.g., Robert J. Lambrechts, *The U.S. Electrical Grid: Surviving Cyber-Terrorism and Solar Flares*, 25 NAT. RESOURCES & ENV'T 42, 42-45 (Spring 2011).

16. See generally U.S. ARMY, INSTALLATION MANAGEMENT ENERGY PORTFOLIO 2010-2017 (Sept. 15, 2010) [hereinafter ENERGY PORTFOLIO], available at http://armyenergy.hqda.pentagon.mil/docs/Energy_Portfolio_15_Sep_10.pdf.

17. See, e.g., Dr. Gail Reitenbach, *The U.S. Military Gets Smart Grid*, POWER (Jan. 1, 2012), http://www.powermag.com/smart_grid/The-U-S-Military-Gets-Smart-Grid_4228.html.

18. MILITARY ADVISORY BD., *supra* note 8, at 6-7.

5. Overall

The DOD, as the reader will learn in Part II.B, embraces this energy mission in part because Congress set new energy goals for the entire country and then further set additional specific goals for the federal government. The Army is of course obligated to accept that challenge and to develop a plan to meet those goals.

Internally, however, the DOD was simultaneously identifying some need for institutional change in order to be best prepared to carry out its war-fighting mission. The DOD's commitment to embracing renewable energy has been driven by three primary factors, including: 1) the lessons learned in the last eleven years of sustained combat; 2) acknowledgment of evolving cyber-attack capabilities across the globe that could impact Army operations at installations and on the battlefield; and 3) the need to develop operational plans and sound infrastructure that will endure through changing environmental conditions.

Whether foisted upon the military services by national civilian leadership or of its own accord out of operational necessity, the Army and its sister services have acted as a crucible for social and technological advancement many times since their very inception. It is quite amazing what the DOD and its various services can accomplish with a clear directive from the American people and in order to facilitate its ability to fight our Nation's wars. Now, once again, the Army serves as a crucible for change.

B. General History

While certainly not the absolute nexus of the concept and practice of sustainability in the DOD or Department of the Army (DA),¹⁹ the drafting and 2004 publication of *The Army Strategy for the Environment: Sustain the Mission – Secure the Future*²⁰ was nonetheless a marked turning point for the Army. This new sustainability strategy, the first Army published environmental strategy since 1992, was a paradigm shift from the Army's environmental compliance-based approach.²¹ In this shift to a mission-based approach built on the principles of sustainability, the new strategy defined a sustainable Army as one that "simultaneously meets current as well as future mission requirements worldwide, safeguards human health, improves quality of life, and enhances the

19. A number of statutes, executive orders, and Department of Defense (DOD) and Department of the Army (DA) policies and initiatives relating to energy conservation, recycling, green product acquisition, federal fleet fuel efficiency, and other sustainability efforts were already impacting the way the Army did business. *See, e.g.*, Bob Stump National Defense Authorization Act for Fiscal Year 2003, Pub. L. No. 107-314, 116 Stat. 2458 (2002); National Defense Authorization Act for Fiscal Year 2002, Pub. L. No. 107-107, 115 Stat. 1012 (2001); Exec. Order No. 13149, 65 Fed. Reg. 24,607 (Apr. 26, 2000); Exec. Order No. 13148, 65 Fed. Reg. 24,595 (Apr. 26, 2000); Exec. Order No. 13134, 64 Fed. Reg. 44,639 (Aug. 16, 1999); Exec. Order No. 13123, 64 Fed. Reg. 30,851 (June 8, 1999); Exec. Order No. 13101, 63 Fed. Reg. 49,643 (Sept. 16, 1998); DEP'T OF DEF., GREEN PROCUREMENT PROGRAM STRATEGY (Nov. 2008), *available at* <http://www.acq.osd.mil/dpap/cpic/cp/docs/USA001967-08-DPAP.pdf>.

20. DEP'T OF THE ARMY, THE ARMY STRATEGY FOR THE ENVIRONMENT: SUSTAIN THE MISSION – SECURE THE FUTURE (Oct. 1, 2004), *available at* <http://www.sustainability.army.mil/overview/ArmyEnvStrategy.pdf>. This new strategy document was signed by Acting Secretary of the Army, R.L. Brownlee, and Chief of Staff of the U.S. Army, General Peter J. Schoomaker, on October 1, 2004. *Id.*

21. *Id.* at 5.

natural environment.”²² With a number of defined goals established,²³ the Army embarked on its journey to develop and integrate the necessary planning objectives, initiatives, and monitoring and assessment tools to make the transition.

1. 2005

Shortly thereafter, in 2005, Congress amended the Energy Policy Act of 1992 with the Energy Policy Act of 2005, in part establishing a number of renewable energy priorities for the entire federal government.²⁴ Congress defined renewable energy as “electric energy generated from solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project.”²⁵ Section 203 provided federal purchase requirements for the percentage of electric energy consumption that the federal government must derive from renewable energy: 1) fiscal year (FY) 2007 through FY2009, not less than 3%; 2) FY2010 through FY2012, not less than 5%; and 3) FY2013 and each year thereafter, not less than 7.5%.²⁶ The new legislation did not specify how the percentage requirements would be allocated for each federal agency to make its contribution, but those directives would soon follow.

2. 2007

On January 24, 2007, the President of the United States published Executive Order 13423 (EO 13423)²⁷ which in great part reiterated many of the new requirements from Energy Policy Act of 1992 and the Energy Policy Act of 2005, but for purposes of this article, also added one particularly important requirement. In accordance with section 2(b), the President required that the percentage requirements for renewables listed in Energy Policy Act of 1992 and the Energy Policy Act of 2005 actually come from *new* (put into service after January 1, 1999) renewable sources.²⁸ The DOD immediately released a memorandum to the services directing their cooperation with the relevant DOD office to develop options to “reduce energy consumption or increase use of alternative fuels.”²⁹ The DOD also committed to continue implementation and monitoring of the recommendations from the 2006 Energy Security Task Force

22. *Id.*

23. *Id.* at 8-10. The Army Sustainability Strategy goals included: foster a sustainability ethic; strengthen Army operations; meet test, training, and mission requirements; minimize impacts and total ownership costs; enhance well-being; and drive innovation. *Id.*

24. Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594, 42 U.S.C. §§ 15801-16524 (2005) [hereinafter EPACT05].

25. EPACT05 § 203, 42 U.S.C. § 15852.

26. *Id.*

27. Exec. Order No. 13423, 48 C.F.R. 970.5223-6 (2007) [hereinafter EO 13423].

28. *Id.* § 2(b) (stating “(i) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (ii) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use”).

29. Memorandum from Deputy Sec’y of Def. to Sec’ys of the Military Dep’ts on Strengthening America’s Security and Improving the Environment (Feb. 16, 2007), available at <http://army-energy.hqda.pentagon.mil/docs/keyDirectives/Energy%20EO%20SecDef-signed%20memo%202-16-07.pdf>.

report.³⁰ The order also established a lofty set of goals for the reduction of energy intensity.³¹ Energy intensity is defined as “[t]he amount of energy used per gross square foot of facility space.”³² Section 2(a) directed that agencies reduce their energy intensity by 3% annually or by an overall 30% by FY2015, relative to a FY2003 baseline.³³

Consistent with the DOD’s guidance, on December 1, 2007, the Army published its revised *Army Energy and Water Campaign Plan for Installations (AEWCP)*.³⁴ The AEWCP was not intended to address energy issues related to the contingency and operational environment (deployed setting), but rather only those 155 permanent Army installations and facilities.³⁵ Of the campaign plan’s five initiatives, three are primarily about energy efficiency and conservation, while two address the renewable energy concerns.³⁶ “Initiative #3: reduce dependence on fossil fuels,” like each of the other initiatives, included a series of nested actions.³⁷ Each action included fairly detailed policy descriptions, project concepts, funding strategies, end states, metrics for measuring success, and fiscal year milestones for meeting goals.³⁸ The metrics of success for the actions supporting this initiative were quantitative assessments of already implemented onsite or nearby renewable energy systems.³⁹ The second renewable initiative, “initiative #5: improve energy security,” was more focused on developing management and implementation methodologies and monitoring and tracking systems, with the goal of measuring the increased reliability of uninterrupted utility service and self-sustaining energy production.⁴⁰

Further, the Energy Independence and Security Act of 2007⁴¹ provided some additional funding flexibility for these newly mandated renewable energy projects. The 2007 Act permanently authorized a unique financing vehicle called Energy Savings Performance Contracts (ESPCs),⁴² and then expanded the ESPC funding by allowing, for the first time, the combination of appropriated

30. *Id.*

31. EO 13423, *supra* note 27, § 2(a).

32. DEP’T OF THE ARMY, ARMY SUSTAINABILITY REPORT 2012, at 10 (Sept. 7, 2012) [hereinafter ASR 12], *available at* <http://usarmy.vo.llnwd.net/e2/c/downloads/269536.pdf>.

33. EO 13423, *supra* note 27, § 2(a).

34. DEP’T OF THE ARMY, ARMY ENERGY AND WATER CAMPAIGN PLAN FOR INSTALLATIONS (Dec. 1, 2007) [hereinafter AEWCP], *available at* http://dodfuelcell.cecer.army.mil/library_items/AEWCampaignPlan.pdf. This 2007 version revised the original 2005 installation energy campaign plan, implemented the *Army Energy Strategy for Installations*, and established the Army’s energy goals through 2030. *Id.* at i.

35. *Id.*; DEP’T OF THE ARMY, ARMY SUSTAINABILITY REPORT 47 (2012), *available at* <http://usarmy.vo.llnwd.net/e2/c/downloads/269536.pdf> (noting that as of 2011 there were 155 Army installations).

36. AEWCP, *supra* note 34, at i. The five major AEWCP initiatives are: 1) eliminate energy waste in existing facilities; 2) increase energy efficiency in new construction and renovations; 3) reduce dependence on fossil fuels; 4) conserve water resources; and 5) improve energy security. *Id.*

37. *Id.* at 59.

38. *Id.* at 59-82.

39. *Id.* at 65, 70, 75, 78, 81.

40. *Id.* at 106-13.

41. Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 [hereinafter EISA07]. The President signed EISA07 into law on December 19, 2007.

42. *Id.* § 514 (striking subsection (c) of 42 U.S.C. § 8287, a sunset provision in the National Energy Conservation Policy Act which provided authority for ESPCs only through October 1, 2016).

funds and private financing.⁴³ This funding vehicle, along with several others such as the power purchase agreement (PPA) which developed around the same time, was critical to the Army's ability to fund these renewable energy projects.⁴⁴ Otherwise, significant capital costs would generally be so high that appropriated funds alone were insufficient and the project would never get started.⁴⁵ Additionally, Congress established a broad sweeping goal that by January 1, 2025, the United States, not just the federal government, should get not less than 25% of the total energy consumed in the country from renewable resources.⁴⁶ The National Defense Authorization Act (NDAA) of 2007 further charged the services with meeting the 25% of renewable energy by 2025 standard.⁴⁷ Whether the average American knew it or not, the beginning of 2008 would be a turning point for the entire country after the President signed the Energy Independence and Security Act of 2007 into law on December 19, 2007.⁴⁸ Congress and the President provided, in section 806(a)(3), a succinct rationale for why the Nation must rapidly move to harness the many renewable resources available to us:

[A]ccelerated development and use of renewable energy technologies provide numerous benefits to the United States, including improved national security, improved balance of payments, healthier rural economies, improved environmental quality, and abundant, reliable, and affordable energy for all citizens of the United States.⁴⁹

This simple paragraph really captured why Congress called the entire Nation to embrace the challenge of funding, developing, and implementing the policies, education, tools, and industrial base required to begin shifting our energy base from fossil fuels to renewable energy. The most important benefits for the DOD, however, were energy independence from the national grid and improving our national security. These underlying goals will be broken down further in coming pages as the article explores how the DOD and the DA looked at how exactly the services would incorporate renewables to meet the benchmarks established within the Energy Policy Act of 1992, the Energy Policy Act of 2005, EO 13423, and the Energy Independence and Security Act of 2007.⁵⁰

43. *Id.* § 512.

44. *See, e.g.*, KEITH MCALLISTER, DEP'T OF ENERGY, BARRIERS TO MILITARY INSTALLATIONS UTILIZING DISTRIBUTED GENERATION FROM RENEWABLE ENERGY RESOURCES: THIRD PARTY POWER PURCHASE AGREEMENTS (2011), available at http://www.southeastcleanenergy.org/resources/reports/SERAC_3rd_Party_PPA_Whitepaper_%20110518.pdf.

45. *See, e.g.*, Bethany K. Speer, *Funding Solar Projects at Federal Agencies: Mechanisms and Selection Criteria*, NAT'L RENEWABLE ENERGY LAB. (Apr. 9, 2012), <https://financere.nrel.gov/finance/content/funding-solar-projects-federal-agencies-power-purchase-agreements-energy-service-contracts-utility-enhanced-use-leases> (outlining advantages and challenges of various funding mechanisms).

46. EISA07, *supra* note 41, § 806(b)(1).

47. John Warner National Defense Authorization Act for Fiscal Year 2007, Pub. L. No. 109-364, 129 Stat. 2083, 2496 (2006). The NDAA of 2010 reiterated this goal and further incorporated thermal energy into the definition of renewable sources. National Defense Authorization Act for Fiscal Year 2010, Pub. L. No. 111-84, 123 Stat. 2190 (2009). The NDAA10 was signed into law on October 28, 2009.

48. EISA07, *supra* note 41.

49. *Id.* § 806(a)(3).

50. *See generally* *Key Energy Directives*, ARMY ENERGY PROGRAM, http://army-energy.hqda.pentagon.mil/policies/key_directives.asp (last visited Feb. 5, 2013) (follow "EPACT05/EO

3. 2008

In this same period, the DOD was trying to figure out how to transform its way of thinking and how to map a course that would reduce fuel consumption and embrace renewable energy alternatives, while still maintaining its readiness, agility, and worldwide war-fighting capabilities.⁵¹ In attempting to develop this new strategy, and the policy required to capture and communicate the strategy, the DOD's Under Secretary of Defense for Policy, Office of Force Transformation and Resources reached out to the private sector for assistance.⁵² LMI Government Consulting conducted a detailed analysis of, and attempted to identify disconnects between and a strategy to reconcile, the DOD's existing energy consumption practices, future strategic goals, new development mandates, and a complex mission set.⁵³

"On May 2, 2006, the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) directed the Defense Science Board" to assess the DOD's strategy and find ways "to find opportunities to reduce DOD's energy demand, identify institutional obstacles to their implementation, and assess their potential commercial and security benefits to the nation."⁵⁴ The Defense Science Board Task Force on DOD Energy Strategy subsequently published its report in February 2008, and presented a number of findings and recommendations.⁵⁵ The report clearly articulated that the Energy Policy Act of 1992, with the Energy Policy Act of 2005 and EO 13423, should serve as floors and not ceilings as the services refined their energy strategies and started implementing programs to meet all of the newly established goals.⁵⁶ In short, the Defense Science Board Task Force recommended the DOD immediately complete and implement a department-wide energy policy and business model with key performance parameters, assessment metrics, information sharing mechanisms, and governance structure.⁵⁷

The two aforementioned studies, among others simply not discussed in this article for the sake of brevity, included a multitude of recommendations that helped to mold the evolving strategy and policy that we see today across the DOD and each of the services. Two particular recommendations related to the Army and renewable energy. First, the DOD needed to strengthen and diversify the power grids at fixed installations across the United States.⁵⁸ Second, the DOD needed to identify and capitalize on ways to implement programs that

13423/EISA07 Crosswalk," hyperlink to the Microsoft Excel Worksheet). This website is a repository for many other links to foundational documents for the Army's energy program.

51. THOMAS D. CROWLEY ET AL., LMI CONSULTING, TRANSFORMING THE WAY DOD LOOKS AT ENERGY – AN APPROACH TO ESTABLISHING AN ENERGY STRATEGY, REPORT FT602T1, at iii-vi (Apr. 2007), available at www.myearthwatchexperience.com/pvp/Energy%20Reports/2007%20April%20DoD%20Energy%20Report.pdf.

52. *Id.*

53. *Id.* at iii.

54. DEP'T OF DEF., DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY: "MORE FIGHT – LESS FUEL" 3 (Feb. 2008), available at <http://www.acq.osd.mil/dsb/reports/ADA477619.pdf>.

55. *Id.* at 3-8.

56. *Id.*

57. *Id.* at 68-69.

58. *Id.* at 3-4, 18-22.

would reduce fuel requirements and mitigate risk to missions and Soldiers in the operational setting.⁵⁹

Similar to the DOD's investment in the Energy Security Task Force, the Army established its own Army Energy Security Task Force in April 2008.⁶⁰ The Army Energy Security Task Force then drafted several documents that served in great part to expand the Army's renewable focus to date from only installation energy management to include the operational or contingency environment. Two of the most important documents were *Army Directive (AD) 2008-04, Army Energy Enterprise*,⁶¹ issued on October 20, 2008, and the *Army Energy Security Implementation Strategy*, published on January 13, 2009.⁶² *AD 2008-04* established the Senior Energy Council (SEC) and commissioned the SEC's senior Army leader members to review, revise, and approve Army energy strategy, policy, program implementation, and progress.⁶³

4. 2009

In addition to the expanding renewable energy strategy for the federal government, the American Recovery and Reinvestment Act of 2009,⁶⁴ was also a major source of funds that the Army would tap into for high-end technical assistance through the Department of Energy's (DOE) Federal Energy Management Program (FEMP).⁶⁵ The American Recovery and Reinvestment Act of 2009 funded more than \$20 million to be split amongst the fifteen federal agencies where "\$17 million will be used to enhance and accelerate FEMP service functions to the [f]ederal [g]overnment, \$3 million to develop a comprehensive greenhouse gas (GHG) management and abatement program, and \$2.5 million to develop an energy, water and emissions reporting and tracking system for [f]ederal facilities."⁶⁶

59. *Id.* at 44-52.

60. *See generally* Dep't of Def., Energy Sec. Task Force, *Department of Defense Energy Security Initiatives*, 9 WEAPON SYS. TECH. INFO. ANALYSIS CENTER Q., no. 1, 3, at 4 (2008), available at http://wstiac.alionscience.com/pdf/WQV9N1_ART01.pdf. *See also* DEP'T OF THE ARMY, ARMY ENERGY SECURITY IMPLEMENTATION STRATEGY (Jan. 13, 2009) [hereinafter AESIS09], available at http://www.asaie.army.mil/Public/Partnerships/doc/AESIS_13JAN09_Approved%204-03-09.pdf. Signed on January 13, 2009, by the Army Senior Energy Council and the Deputy Assistant Secretary of the Army (DASA) for Energy and Partnerships. *Id.*

61. ARMY DIRECTIVE 2008-04, ARMY ENERGY ENTERPRISE [hereinafter AD 2008-04]. *See also* ARMY INFORMATION PAPER, ARMY ENERGY ENTERPRISE, SAIE-EP (May 2010) [hereinafter ARMY INFORMATION PAPER], available at http://www.asaie.army.mil/Public/Partnerships/EnergySecurity/docs/Army_Energy_Enterprise_IP_May-10.pdf (outlining the background and highlights of AD 2008-04). While AD 2008-04 is not a classified document, it is not publicly available on the world wide web. The reader must access the document with a password or common access card through the Army Knowledge Online website.

62. AESIS09, *supra* note 60.

63. AD 2008-04, *supra* note 61. *See also* ARMY INFORMATION PAPER, *supra* note 61, at 2.

64. American Recovery and Reinvestment Act of 2009 (ARRA), Pub. L. No. 111-5, div. A, tit. IV, 123 Stat. 115, 138. *See also* DEP'T OF DEF., STRATEGIC SUSTAINABILITY PERFORMANCE PLAN II-14 (2011) [hereinafter DOD SSPP FY11], available at www.denix.osd.mil/sustainability/upload/DoD-SSPP-FY11-FINAL_Oct11.pdf (discussing ARRA funding and DOD energy goals).

65. Press Release, U.S. Dep't of Energy, Energy Efficiency & Renewable Energy, Recovery Act Announcement: DOE Announces Funding for Improving Energy Efficiency in Federal Buildings (Aug. 10, 2009), http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=221.

66. *Id.*

The *Army Energy Security Implementation Strategy*, developed by the Senior Energy Council and approved by the Secretary of the Army, identified the five “strategic energy security goals: [1] reduced energy consumption; [2] increased energy efficiency across platforms and facilities; [3] increased use of renewable/alternative energy; [4] assured success to sufficient energy supplies; and [5] reduced adverse impacts on the environment.”⁶⁷ The five energy security goals guide the Army in its energy use and renewable energy development regarding installation management, weapon systems, and operations.⁶⁸ The most important energy security goal for this article is of course number three, increased use of renewable/alternative energy.

Then, on October 8, 2009, the President issued Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*.⁶⁹ EO 13514 set a number of quantitative and non-quantitative goals for all federal agencies.⁷⁰ Amongst the many tasks for the whole of the federal government were several tasks of particular importance regarding Army renewable energy. First, the President mandated in section 7 and section 8 that each agency head appoint a Senior Sustainability Officer and to then develop an agency Strategic Sustainability Performance Plan.⁷¹ This article will briefly discuss the Army’s compliance with both of these mandates later in Part III and further in Part IV.

Further, EO 13514 section 9 directed that the DOD and other appropriate agencies develop procedures for quantifying and accounting for greenhouse gas emissions from a number of different sources, report those emissions statistics, and work to reduce such emissions.⁷² Finally, section 2 directed the following: 1) “increasing agency use of renewable energy and implementing renewable energy generation projects on agency property;”⁷³ 2) “aligning [f]ederal policies to increase the effectiveness of local planning for energy choices such as locally generated renewable energy;”⁷⁴ and 3) “beginning in 2020 and thereafter, ensuring that all new federal buildings that enter the planning process are designed to achieve zero-net-energy by 2030.”⁷⁵ The author will examine the Army’s progress in these areas in Part III while discussing new energy production on installations and from nearby sources.

On December 4, 2009, in accordance with EO 13514, the Secretary of the Army appointed the Under Secretary of the Army, Dr. Joseph W. Westphal, as the Army’s Senior Sustainability Officer.⁷⁶ The Senior Sustainability Officer is

67. AESIS09, *supra* note 60, at ii, 4.

68. *Id.* at ii, 3-4.

69. Exec. Order No. 13514, 74 Fed. Reg. 52,117 (Oct. 5, 2009) [hereinafter EO 13514].

70. *Id.*

71. *Id.* at 52,121-22. In part, section 8 requires that “[e]ach agency shall develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize agency actions based on lifecycle return on investment.” *Id.* at 52,122.

72. *Id.* at 52,117-23 (§ 9(a)(i)-(iii)).

73. *Id.* at 52,117-18 (§ 2(a)(ii)).

74. *Id.* at 52,119 (§ 2(f)(ii)).

75. *Id.* at 52,119 (§ 2(g)(i)).

76. DEP’T OF THE ARMY, ARMY SUSTAINABILITY CAMPAIGN PLAN ii (May 2010) [hereinafter ASCP], available at http://aec.army.mil/usaec/sustainability/campaign-plan_2010.pdf.

the senior leader responsible for coordinating the Army's sustainability efforts.⁷⁷ This appointment of the Army's second ranking civilian leader was the beginning of real commitment. Dr. Westphal's appointment was soon followed with the subsequent appointment of multiple assistant secretaries and general officers to key positions of responsibility in the sustainability mission, and the chartering of a series of working groups, task forces, and councils.⁷⁸ All of these efforts demonstrated the Army's commitment to leadership investment, and an understanding that organizationally there was much to learn and do.

Finally, on December 11, 2009, the DOD issued *DOD Instruction (DODI) 4170.11, Installation Energy Management*.⁷⁹ While the instruction primarily focused on installation level energy conservation by way of infrastructure (buildings, utilities, appliances) upgrades and responsible user management, a small portion of the instruction addressed energy security and renewable technologies.⁸⁰ This DODI was a glimpse into subsequent policy that would soon show a marked shift in the way the DOD and the Army would be looking at renewable energy.

5. 2010

In February 2010, after several years of preparing its strategic vision, and receiving multiple clear mandates from Congress and the President regarding operational and security sustainability, the DOD published its first strategic assessment of the DOD's way ahead regarding climate change considerations and energy management – the *Quadrennial Defense Review (QDR)*.⁸¹ The *QDR* was important in that it provided additional rationale for the paradigm shift away from mere environmental compliance and toward incorporating energy management and renewable energy. The *QDR* explained how energy and environmental considerations fit into risk management, caring for Soldiers, improving readiness, and global relationships.⁸²

Before advancing to Part III, and discussion which is focused almost exclusively on the Army and its renewable energy efforts, it is imperative that this author note two points. First, the Army is not on this journey alone. While this article focuses strictly on the Army from here forward, the renewable energy mission is truly a *whole-of-government* approach. The reader may find it helpful to research what the other military services are doing. The Navy, Air Force, and Marine Corps are also very active in implementing similar strategic frameworks within their own service structures, although each service has different focal

77. *Id.*

78. Examples include the appointment of an Assistant Secretary of the Army (Installations, Energy, and Environment), a Deputy Assistant Secretary of the Army (Energy and Sustainability), the Senior Energy and Sustainability Council, a geothermal working group, and the Energy Initiatives Task Force. *See also* discussion *infra* Part III.A.

79. DEP'T OF DEF., INSTRUCTION 4170.11, INSTALLATION ENERGY MANAGEMENT (Dec. 11, 2009), available at <http://army-energy.hqda.pentagon.mil/docs/keyDirectives/DODI4170-11.pdf> (reissuing the 2005 version of DODI 4170.11 to incorporate changes from EISA07 and EO 13423, and implementing DOD's Directive 4140.25 policy).

80. *Id.* at 15-17.

81. *QDR 2010, supra* note 9.

82. *See generally id.*

points based on their war-fighting missions.⁸³ In no way does the author of this article mean to discount or ignore the Army's sister services and their successes, as in fact each of the other services have some clear strengths which the Army should acknowledge, and to the extent possible, emulate.

Second, renewable and alternative energy is only one component of sustainability. The Army and all of the other federal agencies have, or are developing, a number of robust programs which address other components of sustainability. These programs include environmental remediation, fuel and energy conservation, and waste management (reuse, recycle, etc.). The Army's renewable energy initiatives are just a few of the pieces in the puzzle of federal sustainability programs. Now, with the foundation laid for understanding the basics of *why* the Army is developing and implementing aggressive renewable energy policies and goals, it is time to assess *how* the Army strategy has translated into initiatives and programs around the globe.

III. STATUS QUO

Part III outlines the Army's current status regarding renewable energy development and implementation. This part and the remaining parts (way ahead; challenges; recommendations) further break down into three subparts. First, the author discusses strategic level and planning matters such as: 1) evolving policies; 2) establishment of new working groups, task forces, councils, and missions; and 3) inter-agency coordination. Second, the author explores renewable energy project implementation at permanent installations in the United States and abroad. Third, the author examines renewable energy projects in the contingency and operational environment (deployed setting). The types of projects in the installation and contingency base settings are similar in the sense that they both use renewables such as wind and solar, but they are quite different in their purpose, value, size, scope, and funding sources. Finally, to be sure, the survey of initiatives described below, much like the history outlined above, is not an all-inclusive list but rather a series of highlights. Further investigation by the reader will certainly lead to discovery of other interesting achievements and initiatives.

In October 2012, the Army published the fourth *U.S. Army Sustainability Report (ASR 12)* since 2008.⁸⁴ The *ASR 12* is notable not only because many of the highlights for this article come from *ASR 12*, but also because the ASR is the single comprehensive annual public reporting mechanism for documenting the Army's sustainability status.⁸⁵ The three previous editions covered sustainability progress from FY2001 through FY2009, and now *ASR 12* covers FY2010 and

83. See generally THE PEW PROJECT ON NAT'L SEC., ENERGY AND CLIMATE, FROM BARRACKS TO THE BATTLEFIELD: CLEAN ENERGY INNOVATION AND AMERICA'S ARMED FORCES (2011), available at http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/DoD-Report_FINAL.pdf (discussing the DOD's clean energy and renewable programs, including service profiles on Army, Air Force, Marines, and Navy).

84. *ASR 12*, *supra* note 32, at 8.

85. *Id.* The Army previously published ASR 2010, ASR 2007, and ASR 2001-2008. To view the earlier reports, see ARMY ENVTL. POLICY INST., <http://www.aepi.army.mil/> (last visited Feb. 6, 2012) (the reports are available for download from this homepage). *ASR 12* primarily discusses accomplishments from the two fiscal years since the last report, FY2010 and FY2011. The ASR is now aligned with the DOD SSPP, both of which will annually report to the American public. *ASR 12*, *supra* note 32, at 8.

FY2011. Fiscal years run from October 1 until September 30.⁸⁶ What is particularly useful about the *Army Sustainability Report* is that it reports Army progress through three lenses, and yet all in one comprehensive report. First, it reports on each initiative within the Army's four tenets, or lines of operation (LOO).⁸⁷ There will be more discussion on the LOOs later in the article. Second, the report correlates each initiative with its corresponding *DOD Strategic Sustainability Performance Plan (DOD SSPP)* objective, goal, and sub-goal, which in combination demonstrates how the Army supports the overarching DOD mission and goals.⁸⁸ Finally, the report uses the Global Reporting Initiative indicators as a metric system to report Army sustainability performance in a format that is consistent with how the rest of the federal agencies report their performance.⁸⁹ The metric indicators consider economic, environmental, and social concerns.⁹⁰

A. Strategy

ASR 12 and the *2012 Army Posture Statement*⁹¹ report four significant policy and leadership developments which demonstrate continuing Army investment in sustainability at the strategic level.⁹² These strategic and operational level improvements also exemplified the Army's realization that it must formally combine the sustainability programs with the new energy programs because the energy initiatives were really just one spoke in the greater sustainability wheel. The Army's four major developments included: 1) establishing the Senior Energy and Sustainability Council; 2) issuing the Army Sustainability Campaign Plan; 3) developing a pilot strategy with multiple Net Zero installations; and 4) establishing the Energy Initiatives Task Force.⁹³ A fifth area of discussion, which was not discussed in detail in the two aforementioned documents, is the *2012 Army Campaign Plan* and its incorporation of sustainability principles.⁹⁴

1. Installation, Energy & Environment Leadership

A critical prerequisite for any success in the sustainability mission is dedicated and educated leadership. If the DOD, and the Army specifically, had any chance of developing an enduring sustainability strategy, the agency

86. *Glossary: Fiscal Year*, U.S. SENATE, http://www.senate.gov/reference/glossary_term/fiscal_year.htm (last visited Feb. 10, 2013).

87. *ASR 12*, *supra* note 32, at 16. The four tenants are for: 1) materiel, 2) readiness, 3) human capital, and 4) services and infrastructure. *Id.*

88. *Id.* at 8.

89. *Id.* For more information on GRI reporting and indicators, see *Reporting*, GLOBAL REPORTING INITIATIVE, <https://www.globalreporting.org/reporting/Pages/default.aspx> (last visited Feb. 5, 2013).

90. *ASR 12*, *supra* note 32, at 8.

91. U.S. ARMY, 2012 ARMY POSTURE STATEMENT, ADDENDUM J – ARMY ENERGY SECURITY ENTERPRISE [hereinafter ADDENDUM J], available at https://secureweb2.hqda.pentagon.mil/vdas_armyposturestatement/2012/addenda/addenda_j.aspx (last visited Feb. 10, 2013).

92. *ASR 12*, *supra* note 32, at 8; ADDENDUM J, *supra* note 91.

93. *ASR 12*, *supra* note 32, at 8.

94. The 2012 Army Campaign Plan (2012 ACP) is not publicly available. If the reader would like to view or procure some portion of the 2012 ACP, he or she should direct the inquiry to the Office of the Assistant Secretary of the Army (Installations, Energy, & Environment); see also U.S. ARMY, ARMY CAMPAIGN PLAN 2012 (Feb. 2012) (unclassified presentation) (on file with author).

leadership had to find smart environmental and energy specialists to develop it, the Congress and President had to fund it, the private sector had to invest in it, and the men and women across the force had to remain mission ready because of it. That leadership team was initiated when President Obama appointed the Honorable Katherine Hammack, on June 28, 2010, as the Assistant Secretary of the Army (Installations, Energy, and Environment).⁹⁵ Ms. Hammock “is the primary advisor to the Secretary of the Army and Chief of Staff of the Army on all Army matters related to Installation policy, oversight and coordination of energy security and management . . . [and] policy and oversight of sustainability and environmental initiatives.”⁹⁶ Even more focused specifically on renewable energy issues is one of Ms. Hammack’s deputies, the Deputy Assistant Secretary of the Army (Energy and Sustainability), Mr. Richard G. Kidd, IV.⁹⁷ He was appointed on October 25, 2010.⁹⁸

2. The Senior Energy and Sustainability Council

The Army next established the Senior Energy and Sustainability Council in 2011 by combining two organizations it chartered just a few years earlier: the Senior Energy Council and the Army Sustainability Council.⁹⁹ The purpose of combining them was to better align the energy and sustainability efforts.¹⁰⁰ The Senior Energy and Sustainability Council exemplified the Army’s commitment to assembling the right people, with the right credentials, with the proper authority to begin developing a new campaign plan objective that focused on energy and sustainability together.¹⁰¹ The Under Secretary of the Army, Dr. Westphal, and the new Vice Chief of Staff of the Army, General Lloyd Austin, were to co-chair the Senior Energy and Sustainability Council.¹⁰²

3. The Army Sustainability Campaign Plan

Finally, after nearly a decade of assessments and studies, initial policy development, appointment of key civilian and Soldier leaders, Congressional and Presidential mandates for sustainability progress, and lessons learned from sustained combat in multiple theaters, on May 12, 2010, the Army published its *Sustainability Campaign Plan*.¹⁰³ The *Sustainability Campaign Plan* was designed to coordinate efforts by different organizations throughout the Army,

95. *Biographies*, U.S. ARMY: ASSISTANT SEC’Y OF THE ARMY FOR INSTALLATIONS, ENERGY & ENV’T, <http://www.asaie.army.mil/Public/IE/bios/> (last visited Feb. 5, 2013).

96. *Id.*

97. *Energy and Sustainability: Biographies*, U.S. ARMY: ASSISTANT SEC’Y OF THE ARMY FOR INSTALLATIONS, ENERGY & ENV’T, <http://www.asaie.army.mil/Public/Partnerships/bios/index.html> (last visited Feb. 5, 2013).

98. *Id.*

99. ALAN D. KING, ASSISTANT SEC’Y OF THE ARMY FOR INSTALLATIONS, ENERGY & ENV’T, INNOVATION, EFFICIENCY & PARTNERSHIPS IN ENERGY 8 (Feb. 15, 2011), *available at* <http://www.defensecommunities.org/wp-content/uploads/2011/02/ADC-INNOV-AKing-FEB11.ppt> (presentation at the 2011 Association of Defense Communities Winter Forum).

100. ASR 12, *supra* note 32, at 8.

101. *Id.* at 13.

102. *Id.* at 55.

103. ASCP, *supra* note 76, at i; *see also* ASR 12, *supra* note 32, at 11.

each with varying missions and functions.¹⁰⁴ The Army essentially captured the missions or operational purpose for each part of the Army into four lines of operation (LOOs).¹⁰⁵ The LOOs – materiel, readiness, human capital, and services and infrastructure¹⁰⁶ – are like circles in a Venn diagram. The circles overlap where they share logical relationships and goals. These specific goals and supporting tasks, which often impact more than one organization and mission set, logically share initiatives required to accomplish the interrelated tasks and goals. Because of this interrelatedness, mission accomplishment requires extensive coordination to ensure maximum effectiveness and efficiency.¹⁰⁷

On August 26, 2010, in accordance with EO 13514, the DOD published its first *Strategic Sustainability Performance Plan (SSPP) Report* to meet its public reporting requirement, the *SSPP FY2010*.¹⁰⁸ The DOD going forward, like all federal agencies, must annually report its progress toward meeting the DOD's four sustainability objectives, eight supporting goals, and twenty-one sub-goals.¹⁰⁹ The four DOD Objectives are: 1) "continued availability of resources critical to the DOD mission is ensured"; 2) "DOD is a U.S. Government leader in reducing greenhouse gas emissions"; 3) "ongoing performance of DOD assets ensured by minimizing waste and pollution"; and 4) "continuous improvement in the DOD mission achieved through management and practices built on sustainability and community."¹¹⁰ Most of the renewable energy sub-goals are nested under Objectives 1 and 2.¹¹¹ Going forward, each of the Army's initiatives were designed to support the *SSPP* goals and the *Army Energy Security Implementation Strategy of 2009* energy security goals.¹¹²

Given the cross-functional nature of the Army's renewable energy program, a "whole-of-government approach" was necessary for all agencies to optimize their efficiency, share information and lessons learned, and cross-load technological support and institutional expertise.¹¹³ To that end, one very successful example of collaboration within the DOD was the creation in 2006 of the U.S. Army Corps of Engineers (USACE) Research and Development Center's (ERDC) Center for the Advancement of Sustainability Innovations (CASI).¹¹⁴ CASI's goal "is to focus the value of ERDC expertise, technologies,

104. ASCP, *supra* note 76, at ii.

105. *Id.* at 6-8.

106. *Id.* at 6.

107. *Id.* at 9.

108. DEP'T OF DEF., STRATEGIC SUSTAINABILITY PERFORMANCE PLAN (2010) [hereinafter DOD SSPP FY10], available at <http://www.denix.osd.mil/sustainability/upload/dod-sspp-public-26aug10.pdf>. EO 13514, issued in October 2009, directed implementation of sustainability goals and annual reporting on those goals. EO 13514, *supra* note 69, at 52,122 (§ 8).

109. DOD SSPP FY10, *supra* note 108, at ii-iv.

110. *Id.*

111. *Id.*

112. ADDENDUM J, *supra* note 91.

113. BARACK OBAMA, PRESIDENT OF THE UNITED STATES, NATIONAL SECURITY STRATEGY 14 (May 2010), http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf.

114. *Center for the Advancement of Sustainability Innovations*, USACE ENG'R RES. AND DEV. CENTER, <https://erdc.usace.army.mil/cerl/center-for-the-advancement-of-sustainability-innovations/> (last visited Feb. 5, 2013).

and partnerships on helping the [USACE], the Army, and the [DOD] achieve more sustainable facilities and operations.”¹¹⁵

The *whole-of-government* partnerships also extend beyond the DOD. A number of joint programs, as well as memorandums of agreement or understanding, bind the DOD and the DA to other federal agencies that also have a vested interest in meeting the federal renewable standards and improving their own operations and security. For example, the *Memorandum of Understanding Between the Department of Defense and the Department of the Interior on Renewable Energy and a Renewable Energy Partnership Plan*¹¹⁶ partners the two agencies in hopes that the Department of the Interior (DOI) may be able to facilitate renewable energy growth on defense withdrawn federal lands to assist the Army in reaching its goal of generating one gigawatt (GW) of renewable energy on or near its installations by 2025.¹¹⁷ The memorandum of understanding set conditions so that DOI could identify withdrawn land for “mission-compatible development of onshore renewable energy projects” such as utility-scale solar, wind, or geothermal projects.¹¹⁸ It is also the framework for the development of offshore wind farms that have minimal impact on military training and operations, the implementation of a solar energy pilot program, the creation of geothermal working groups, and other initiatives.¹¹⁹

The Army, specifically, is “collaborating with the Department of Energy (DOE), General Services Administration, and [the Environmental Protection Agency (EPA)] on its Net Zero initiative.”¹²⁰ One of the resulting memorandums, the November 2011 memorandum of understanding between the DA and the EPA, is the mechanism through which the EPA Office of Research

115. WILLIAM D. GORAN, USACE CONSTRUCTION ENG’G RESEARCH LAB., CENTER FOR THE ADVANCEMENT OF SUSTAINABILITY INNOVATIONS (CASI): A SUMMARY OF THE CENTER’S FIRST YEAR’S ACTIVITIES, ERDC/CERL SR-08-7, at ii (May 2008), available at http://www.cecceer.army.mil/techreports/ERDC-CERL_SR-08-7/ERDC-CERL_SR-08-7.pdf.

116. Memorandum of Understanding between the Department of Defense and Department of the Interior on Renewable Energy and a Renewable Energy Partnership Plan (July 20, 2012), <http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&pageid=312415>.

117. Press Release, Dep’t of the Interior, Interior and Defense Departments Join Forces to Promote Renewable Energy on Federal Lands (Aug. 6, 2012), <http://www.doi.gov/news/pressreleases/Interior-and-Defense-Departments-Join-Forces-to-Promote-Renewable-Energy-on-Federal-Lands.cfm> (noting that “DOD installations encompass roughly 28 million acres in the United States, of which 16 million acres previously managed by Interior’s Bureau of Land Management (BLM) were withdrawn for military use by Executive Order, congressional legislation or departmental regulations. About 13 million acres of these withdrawn lands are located in the west and are high in wind, solar and geothermal resources. Offshore wind also is an abundant renewable energy resource available to many DOD installations on the Atlantic coast, Pacific coast, Gulf of Mexico and in Hawaii. Offshore Atlantic winds alone could produce an estimated 1,000 gigawatts of energy.”).

118. *Id.*

119. *Id.*

120. ASR 12, *supra* note 32, at 49. See also QDR 2010, *supra* note 9, at 86 (discussing other collaborative efforts between the DOD and other federal agencies). Two examples are (1) “the Strategic Environmental Research and Development Program, a joint effort among DOD, the Department of Energy [DOE], and the Environmental Protection Agency [EPA] to develop climate change assessment tools,” and (2), the Defense Environmental International Cooperation Program, which “promote[s] cooperation on environmental security issues” and “international adaptation efforts.” *Id.*

and Development provides the Army with technologies which Army installations can use for meeting their zero energy, water, and waste goals.¹²¹

4. The Army Campaign Plan – Campaign Objective 8.0, Energy and Sustainability

One of the most recent, and most important policy developments for this Army energy discussion, is the Army's long awaited formal incorporation of energy and sustainability into its *2012 Army Campaign Plan*.¹²² As the reader might imagine, the *2012 Army Campaign Plan* contains the Army's overarching strategic guidance and key operational objectives for total mission success. On July 15, 2011, the Secretary of the Army directed the development of an energy campaign plan for incorporation into the *2012 Army Campaign Plan*.¹²³ By integrating energy and sustainability into the *2012 Army Campaign Plan* as "Objective 8.0: Achieve Energy Security and Sustainability Objectives,"¹²⁴ the Army leadership sent a clear message that energy security is not just a sideshow or collateral concern, but rather a critical component of total Army success. The four nested objectives within Objective 8.0 include: 1) executing installation energy security and sustainability strategies; 2) enhancing operational energy effectiveness and operational sustainability; 3) improving water security and sustainability across Army installations and forward operations; and 4) integrating and advancing sustainability across the entire lifecycle of the civil works portfolio.¹²⁵ The Deputy Assistant Secretary of the Army for Energy and Sustainability, Mr. Richard G. Kidd, IV, was charged as the Army Senior Energy Executive (senior civilian) and the Army G-4, Major General Raymond V. Mason, as the lead for the Army Staff (senior uniformed leader).¹²⁶

As in any large organization with thousands of key leaders spread out at hundreds of locations, when the organization's touchstone document from which all leaders operate includes an objective about energy security the message is clear that energy and sustainability are organizational priorities. As an established campaign plan objective, Soldiers and leaders from the top to the bottom of the Army structure are directed to incorporate this consideration into nearly all aspects of installation-based and contingency-based planning and mission execution. This positive step forward should also help to streamline business processes related to energy security development and to guarantee funding through the annual NDAA.

121. ASR 12, *supra* note 32, at 49.

122. The 2012 Army Campaign Plan (2012 ACP) is not publicly available. If the reader would like to view or procure some portion of the 2012 ACP, he or she should direct the Inquiry to the Office of the Assistant Secretary of the Army (Installations, Energy, & Environment); *see also* U.S. ARMY, ARMY CAMPAIGN PLAN 2012 (Feb. 2012) (unclassified presentation) (on file with author).

123. *See generally* ASSISTANT SEC'Y OF THE ARMY (INSTALLATIONS, ENERGY, & ENVIRONMENT), U.S. ARMY, ARMY POWER & ENERGY: ENHANCING MISSION EFFECTIVENESS, WHILE PRESERVING FUTURE CHOICES 11 (Oct. 11, 2011) [hereinafter ENHANCING MISSION EFFECTIVENESS], *available at* <http://usarmy.vo.llnwd.net/e2/c/downloads/223041.pdf>.

124. LTC KEVIN LOVELL, OFFICE OF BUS. TRANSFORMATION, U.S. ARMY, SAME CAROLINAS REGIONAL JOINT ENGINEERING TRAINING SYMPOSIUM 4 (Oct. 30, 2012), *available at* <http://www.samenc.org/presentations/lovell,%20JETS,%2010-30-2012.pdf>.

125. ENHANCING MISSION EFFECTIVENESS, *supra* note 123, at 11.

126. *Id.* at 2.

5. Relationship Between Energy and Water

Before proceeding on to the next initiative, the author would be remiss if he did not at least briefly address the symbiotic relationship between water and energy in the context of the greater sustainability objective. Much like the summary discussion throughout this article of other critical components of the sustainable energy strategy, such as energy conservation and energy efficiency, for purposes of focus and brevity this article does not go into a detailed discussion of the Army's water management and security strategy. There is, however, an intersection of energy and water that demands mention.

The fundamental relationship between water and energy is that "water is needed for energy production, and energy is needed to treat and transport water."¹²⁷ Therefore, developments in renewable energy necessarily require paying attention to water. If the biomass programs, geothermal projects, and to a more limited extent the solar programs, are to be successful, the Army must have sufficient supplies of water.¹²⁸ Additionally, in order to transport and manage water, the energy-dependent water utilities infrastructure must also have sufficiently reliable electricity.¹²⁹

Consequently, the only way the Army can truly transition itself into a sustainable force, and comprehensively strengthen the Nation's security, is to work on energy and water sustainability initiatives in concert. That means that for the Army to ensure "that water (potable and non-potable) of suitable quality will be provided at rates sufficient to fully support the Army wherever it has, or anticipates having, a mission in the future,"¹³⁰ it must continue to improve water conservation, increase its reuse and repurpose efforts, implement efficiency upgrades, and physically secure surface and in-ground water sources.¹³¹

6. Net Zero Installations

The Net Zero initiative was unveiled in 2010 and implemented in April 2011.¹³² At this point the initiative is more focused on user and organizational energy conservation, facility upgrades, and efficiency projects than renewable energy.¹³³ The Net Zero initiative has the goal of implementing the requisite systems and infrastructure to transition Army installations into net zero energy, water, or waste communities.¹³⁴ In a nutshell, the intent is to create a culture and environment where the Army meets net zero energy, water, and waste goals by reducing consumption of the respective resources, re-purposing and recycling, producing renewable energy, and using waste disposal as a last resort.¹³⁵

127. ARMY WATER SECURITY STRATEGY 20 (Dec. 2011), *available at* <http://www.aepi.army.mil/docs/whatsnew/ArmyWaterStrategy.pdf>. This report was written for the U.S. Army Environmental Policy Institute in preparation for strategic and operational level policy development. *Id.* at 1.

128. *Id.* at 21 tbl.4 (displaying water consumption for various fuel sources and generation technologies).

129. *Id.* at 11.

130. *Id.* at 2.

131. *Id.* at 9; *see also* AEWCP, *supra* note 34, at i.

132. ASR 12, *supra* note 32, at 14.

133. *Id.* at 14-15.

134. *Id.*

135. *Id.* at 48-50; *Army Vision for Net Zero*, U.S. ARMY ENERGY PROGRAM, <http://army-energy.hqda.pentagon.mil/netzero/> (last visited Feb.5, 2013) (noting that the "hierarchy" of interrelated steps is reduction, re-purpose, recycling and composting, energy recovery, and disposal).

The Army defines a Net Zero Energy Installation (NZEI) as:

an installation that produces as much energy on site as it uses, over the course of a year. To achieve this goal, installations must first implement aggressive conservation and efficiency efforts while benchmarking energy consumption to identify further opportunities. The next step is to utilize waste energy or to “re-purpose” energy. Boiler stack exhaust, building exhausts or other thermal energy streams can all be utilized for a secondary purpose. Co-generation recovers heat from the electricity generation process. The balance of energy needs then are reduced and can be met by renewable energy projects.¹³⁶

A Net Zero Water Installation “limits the consumption of freshwater resources and returns water back to the same watershed so not to deplete the groundwater and surface water resources of that region in quantity and quality over the course of a year.”¹³⁷ Also not quite as related to renewable energy but nonetheless worth noting because of its interrelatedness with the overall Net Zero approach is the Net Zero Waste Installation.¹³⁸ This installation “is an installation that reduces, reuses, and recovers waste streams, converting them to resource values with zero landfill over the course of a year.”¹³⁹

The Army currently has seventeen installations and one statewide National Guard program in the Net Zero initiative, the first six of which came online in April 2011.¹⁴⁰ Two installations, Fort Carson, CO and Fort Bliss, TX, are striving to be the first Net Zero installations in all three categories – energy, water, and waste.¹⁴¹ While it is difficult to exactly devine how much is saved through the pilot Net Zero projects, there are some marked cost savings already identified. For example, Fort Hood, TX, a Net Zero Waste Installation, “diverted 41[%] of the installation’s solid waste generated in 2010, a cost savings of nearly \$350,000.”¹⁴² The Army’s goal for Fort Hood is net zero waste by 2020.¹⁴³

Another example of immediate success is Tobyhanna Army Depot and its two new water savings projects.¹⁴⁴ This Net Zero Water Installation recently started a new wastewater recycling project that is saving the wastewater treatment plant about “300,000 gallons of potable water per month” and paid for itself in just over a month’s time.¹⁴⁵ “The second project was the replacement of a single-pass cooling system with a water chiller,” which resulted in reducing

136. *Army Vision for Net Zero*, *supra* note 135.

137. *Id.*

138. *Id.*

139. *Id.*

140. ASR 12, *supra* note 32, at 48; DOD SSPP FY11, *supra* note 64, at II-15.

141. ASR 12, *supra* note 32, at 48-49. Other NZEIs include: Oregon Army National Guard (statewide); Sierra Army Depot, CA; Parks Reserve Forces Training Area, CA; Fort Hunter-Liggett, CA; West Point, NY; Fort Detrick, MD; U.S. Army Kwajalein Atoll, Republic of Marshall Islands. Net Water Installations include: Joint Base Lewis McChord, WA; Camp Rilea, OR; Fort Riley, KS; Tobyhanna Army Depot, PA; Aberdeen Proving Ground, MD; and Fort Buchanon, Puerto Rico. Zero Waste Installations include: U.S. Army Garrison Grafenwoehr, Germany; Fort Detrick, MD; Fort Polk, LA; Fort Hood, TX; Fort Hunter-Liggett, CA; and Joint Base Lewis McChord, WA. *Id.*

142. *Id.* at 51.

143. *Id.*

144. *Id.* at 50.

145. *Id.*

potable water use by an additional 2,000,000 gallons per month.¹⁴⁶ This project cost approximately \$125,000, and the monthly water savings paid for the chiller program in only eight months.¹⁴⁷

The Net Zero Waste Initiative appears to be reenergizing the Army's Green Procurement policy that was published in 2004 (revised in 2008), and program that was initiated in 2006, but never seemed to be fully resourced, implemented, or monitored.¹⁴⁸ Other projects on Net Zero installations are examined later in Parts III.B and IV.

7. Energy Initiatives Task Force

In September 2011, the Army established the Energy Initiatives Task Force (EITF).¹⁴⁹ The EITF, unlike other Army and DOD task forces previously discussed, was not chartered to develop policy and goals but rather to develop and implement projects. The EITF "has responsibility only for large-scale renewable energy projects that are 10 megawatts (MW) or greater using biomass, geothermal, solar and wind technologies" on Army installations in the United States.¹⁵⁰ In other words, EITF is focused on large-scale renewable energy, primarily for installations. The EITF is the toolkit the Army needs to build the renewable energy program required to meet all of the goals and standards established in the numerous acts, executive orders, and DOD and Army directives. It is the conduit between the Army, the private sector companies, and the third party financiers who have the capital to invest, the technology available or ready to develop, and the experience and capacity to make it through the selection process.¹⁵¹

Funding for Army projects can be challenging in the renewable energy arena because of the significant start-up capital costs. Wind turbines, necessary support equipment, electricity grid upgrades and changes, and a myriad of other infrastructure purchases and initial installation costs can be cost prohibitive. The Army, until really just the last decade, has relied primarily on appropriated funds from Congress for these kinds of projects. Appropriated funds are divided into separate categories and can only be used for certain purposes during certain years.¹⁵² The problem is that Congress is not interested in committing hundreds of millions of dollars each year just to get renewable energy projects started. Now, however, the EITF uses a combination of different mechanisms to bring private funding onto federal installations such as: utility energy service contracts (UESCs); energy savings performance contracts (ESPCs); power purchase agreements (PPAs); and enhanced use leasing (EUL).¹⁵³

146. *Id.*

147. *Id.*

148. *Id.* at 25-27.

149. *Id.* at 15.

150. *Industry*, U.S. ARMY ENERGY INITIATIVES TASK FORCE, <http://armyeitf.com/index.php/working-with/industry> (last visited Feb. 5, 2013).

151. *Working with the EITF*, U.S. ARMY ENERGY INITIATIVES TASK FORCE, <http://www.armyeitf.com/index.php/working-with> (last visited Feb. 10, 2013).

152. *Appropriated Funds*, ARMY ENERGY PROGRAM, <http://army-energy.hqda.pentagon.mil/funding/appropriated.asp> (last visited Feb. 10, 2013).

153. ENERGY PORTFOLIO, *supra* note 16, at 8-9. *See also The EITF Process*, U.S. ARMY ENERGY INITIATIVES TASK FORCE, <http://armyeitf.com/index.php/eitf-process> (last visited Feb. 5, 2013). The EITF is

As this article progresses, and the author examines several projects funded with these new tools, it will be helpful to understand how exactly some of the most frequently used tools work. The PPA is a great tool for federal agencies because it is designed for implementation of *on-site* renewable project installation for contracts of up to thirty years.¹⁵⁴

Power purchase agreements allow [f]ederal agencies to implement on-site renewable energy projects with no upfront capital costs. A developer installs a renewable energy system on [f]ederal land or buildings. In exchange, the agency agrees to purchase the power generated by the system. These power purchase payments repay the developer over the contract term. The developer owns, operates, and maintains the system for the life of the contract.¹⁵⁵

Another option frequently used by the Army is the ESPC, which is authorized for terms of up to twenty-five years.¹⁵⁶ The Federal Energy Management Program (FEMP) describes an ESPC as:

a partnership between a [f]ederal agency and an energy service company (ESCO). The ESCO conducts a comprehensive energy audit for the [f]ederal facility and identifies improvements to save energy. In consultation with the [f]ederal agency, the ESCO designs and constructs a project that meets the agency's needs and arranges the necessary funding. The ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the agency.¹⁵⁷

The UESC is another popular contract and funding mechanism, but has a much shorter authorized contract period of ten years.¹⁵⁸ The FEMP explains that “[i]n a UESC, a utility arranges funding to cover the capital costs of the project, which are repaid over the contract term from cost savings generated by the energy efficiency measures. With this arrangement, agencies can implement energy improvements with no initial capital investment.”¹⁵⁹ Each of these project funding mechanisms greatly expands the number of Army opportunities

also preparing to publish its Renewable Energy Project Development Guide to provide a clear picture of the five phases of project development so that the Army's contracting process is as transparent as possible. The five phases are: 1) opportunity identification, 2) project validation, 3) acquisition, 4) building infrastructure, and 5) O&M and closure. *Id.* The guide was scheduled to be released in mid-May 2012, but it has not yet been published. *See generally* Honorable Katherine Hammack, *Update—Army Energy Initiatives Task Force*, ARMY LIVE BLOG (Mar. 19, 2012), <http://armylive.dodlive.mil/index.php/2012/03/army-energy-initiatives-task-force/> (noting that the guide was expected out in time for a mid-May Industry Summit hosted by EITF).

154. 10 U.S.C. § 2922a (2012).

155. U.S. DEP'T OF ENERGY, FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP) QUICK GUIDE: POWER PURCHASE AGREEMENTS 1 (July 2011), http://www1.eere.energy.gov/femp/financing/power_purchase_agreements.html.

156. Energy Policy Act of 1992, 42 U.S.C. § 8287(a)(1) (2012); 10 U.S.C. § 2913 (2012).

157. *Federal Energy Management Program: Energy Savings Performance Contracts*, U.S. DEP'T OF ENERGY: ENERGY EFFICIENCY & RENEWABLE ENERGY, <http://www1.eere.energy.gov/femp/financing/espcs.html> (last visited Feb. 5, 2013).

158. MICHAEL NORTON, RENEWABLE & ALTERNATIVE POWER PRODUCTION FOR DOD INSTALLATIONS 5 (Aug. 22, 2012), available at <http://www.armyeitf.com/downloads/2%20Overview%20of%20Energy%20Program.pdf>.

159. *Federal Energy Management Program: Utility Energy Service Contracts*, U.S. DEP'T OF ENERGY: ENERGY EFFICIENCY & RENEWABLE ENERGY, <http://www1.eere.energy.gov/femp/financing/uescs.html> (last visited Feb. 5, 2013).

for developing renewable energy on or near its installations,¹⁶⁰ as there is not sufficient appropriated funding to afford the capital investment costs of these multi-million dollar programs.¹⁶¹

In FY2011, the Army awarded eleven ESPC task orders totalling approximately \$74 million of investment and eleven UESC projects constituting about \$70 million of investment.¹⁶² Then, in a December 2011 Presidential Memorandum, the President committed \$2 billion of federal funding for ESPCs and EUSCs through 2013, further telegraphing from the very top of the leadership chain a pledge to procure renewable energy using these funding vehicles.¹⁶³

For the reader who may be delving into these relatively new financing mechanisms for the first time, or for the reader who needs a quick refresher beyond the general framework provided in this article, the author recommends two valuable references. The first helpful tool is the DOE's *Federal Energy Management Program (FEMP) Quick Guide: Power Purchase Agreements*.¹⁶⁴ It was designed for leaders within federal agencies who are just getting started in evaluating the feasibility of using a PPA for their renewable energy projects.¹⁶⁵ The second reference is the National Renewable Energy Laboratory Renewable Energy Project Finance group's useful compendium of information and explanations regarding all of the public-private financing and contract mechanisms discussed above.¹⁶⁶

Before moving on it is worth taking a moment here to further assess the PPA as it is quickly developing into one of the Army's most valuable alternative financing mechanisms. There have been a number of Army renewable energy projects developed using PPAs across the last several years, but there are a few in particular which are especially notable. The Fort Carson, CO 2 MW solar array was the first renewable energy project of scale in the Army financed using a PPA.¹⁶⁷ The nearly five year old project remained the Army's premier large-scale, PPA funded project until just recently. In January 2013, however, the Army's 4.1+ MW, ten million kWh per year, low concentration solar power project at White Sands Missile Range in New Mexico became the largest such

160. ENERGY PORTFOLIO, *supra* note 16, at 7-8.

161. *See generally* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-401, RENEWABLE ENERGY PROJECT FINANCING: IMPROVED GUIDANCE AND INFORMATION SHARING NEEDED FOR DOD PROJECT-LEVEL OFFICIALS 9-17 (Apr. 2012) (discussing the use of appropriations versus alternative funding mechanisms for renewable projects).

162. ASR 12, *supra* note 32, at 55.

163. Presidential Memorandum from Barak Obama for Heads of Exec. Dep'ts and Agencies on Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings (Dec. 2, 2011), <http://www.whitehouse.gov/the-press-office/2011/12/02/presidential-memorandum-implementation-energy-savings-projects-and-perfo>.

164. DEP'T OF ENERGY, FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP) QUICK GUIDE: POWER PURCHASE AGREEMENTS (2011), *available at* http://www1.eere.energy.gov/femp/financing/power_purchase_agreements.html.

165. *Id.*

166. Bethany Speer, *Funding Solar Projects at Federal Agencies: Mechanisms and Selection Criteria*, NAT'L RENEWABLE ENERGY LAB. (Apr. 9, 2012), <https://financere.nrel.gov/finance/content/funding-solar-projects-federal-agencies-power-purchase-agreements-energy-service-contracts-utility-enhanced-use-leases>.

167. *Id.* *See also* *Solar Array Generates More Than Power*, 3PHASES, <http://3phases.com/news/news-item.php?id=34> (last visited Feb. 10, 2013) (discussing the "landmark" nature of the project).

solar installation in the world.¹⁶⁸ This twenty-five year PPA solar array covers approximately forty-two acres and will save White Sands Missile Range about \$930,000 annually in electricity costs.¹⁶⁹

Three additional projects,¹⁷⁰ independent of the recently announced \$7 billion Multiple-Award Task Order (MATOC) RFP, are already in the development pipeline and will use the PPA model for large-scale projects: Fort Bliss, TX;¹⁷¹ Fort Irwin, CA;¹⁷² and Fort Detrick, MD.¹⁷³ Also, as will be discussed in more detail in Part IV.B, the Army is preparing to enter into over \$7 billion worth of renewable energy projects using primarily PPAs.¹⁷⁴ The next three large-scale, high-dollar RFPs using PPAs are: 1) the \$7 billion MATOC RFP announced in August 2012 for solar, wind, geothermal, and biomass technologies at numerous installations; 2) the Fort Detrick, MD 15 MW photovoltaic solar RFP announced in November 2012; and 3) the Fort Drum, NY 28 MW biomass RFP announced in December 2012.¹⁷⁵ The renewable energy industry and third-party financiers should remain alert as the EITF continues its screening and assessment of other installations for renewable energy project siting.¹⁷⁶ While all of the aforementioned PPA projects bring the Army's total renewable energy capacity to over 10% of its goal of 1 GW of renewable energy by 2025, the EITF and U.S. Army Corps of Engineers will certainly announce additional investment opportunities as the Army leadership endeavor to attain the 1 GW goal.¹⁷⁷

B. Installations

The first major environment where the Army is implementing its renewable energy projects is across its installations. According to the *ASR 12*, “[a]s of

168. Tina Casey, *Army Gets Biggest Ever Solar Array, Largest of Its Kind In World*, CLEANTECHNICA (Jan. 17, 2013), <http://cleantechnica.com/2013/01/17/army-gets-biggest-ever-solar-array-largest-in-world/>.

169. *Id.*

170. JOINT UNITED STATES ARMY & UNITED STATES AIR FORCE RENEWABLE ENERGY INDUSTRY DAY 13 (June 12, 2012) [hereinafter INDUSTRY DAY PRESENTATION], available at <http://www.armyeitf.com/downloads/ArmyEnergyInitiativesTaskForceUpdateRenewableEnergyProjectDevelopmentAndExecution.pdf>; see also *EITF Success Stories*, U.S. ARMY: ENERGY INITIATIVES TASK FORCE, <http://armyeitf.com/index.php/about-eitf/success-stories> (last visited Feb. 5, 2013) (noting that the Bliss, Irwin, and Schofield Barracks projects are still in the pipeline); Margaret Ryan, *U.S. Military Open for Private Sector Renewable Energy Ideas*, AOL ENERGY (June 15, 2012), <http://energy.aol.com/2012/06/15/us-military-open-for-private-sector-renewable-energy-ideas/#?icid=apb2#page2> (providing a general overview of third-party financing programs to support the military's renewable energy efforts).

171. INDUSTRY DAY PRESENTATION, *supra* note 170, at 17.

172. *Id.* at 14; see also *U.S. Army Launches Huge Solar Project in Mojave Desert*, ELEC. CONTRACTOR MAG. (Dec. 2009), <http://www.ecmag.com/section/green-building/us-army-launches-huge-solar-project-mojave-desert> (discussing the \$2 billion, 500 MW, one billion kilowatt-hour per year solar power project that is scheduled for construction between 2013 and 2022 at Fort Irwin, CA).

173. INDUSTRY DAY PRESENTATION, *supra* note 170, at 17.

174. *Procurement Actions*, U.S. ARMY: ENERGY INITIATIVES TASK FORCE, <http://armyeitf.com/index.php/opportunities/procurementactions> (last visited Feb. 5, 2013).

175. *Id.*

176. See, e.g., INDUSTRY DAY PRESENTATION, *supra* note 170, at 20 (showing the remaining Army installations under consideration and going through validation of the originally 180 screened, *id.* at 6, Active Duty and National Guard installations).

177. See generally *EITF Success Stories*, U.S. ARMY: ENERGY INITIATIVES TASK FORCE, <http://armyeitf.com/index.php/about-eitf/success-stories> (last visited Feb. 5, 2013).

September 30, 2011, the Army's physical environment consisted of 155 installations and 14.2 million acres of land and more than 960 million square feet of buildings."¹⁷⁸ With such an amazing amount of space to heat, cool, illuminate, and otherwise energize, the value of renewable energy takes on new meaning. The many new strategic policy developments discussed above paved the way for a number of exciting new wind, solar, geothermal, and biomass projects. The Army maintains a fairly current and accurate list of on-site renewable energy generation projects.¹⁷⁹ Some of the best highlights are detailed below.

1. Solar

Solar energy is by far the renewable energy used the most on Army installations. There are dozens of projects across Army installations with either small-scale arrays (generally under 10 MW), large-scale EITF coordinated arrays (10 MW and larger), or both.¹⁸⁰

In 2008, the Army completed its largest ground mounted solar site at Fort Carson, CO.¹⁸¹ The 2 MW, 3,200 MWh per year solar array covers portions of twelve acres on Fort Carson and provides approximately 2.3% of Carson's energy consumption or enough energy to power 540 homes throughout the year.¹⁸² This project was one of the first that exemplified the close coordination and partnership required between federal, state, local, and commercial stakeholders.¹⁸³ Another feature of this program that makes it noteworthy, and fairly unique, is that it sits on a now-closed landfill.¹⁸⁴ This creative use of otherwise unusable land should be touted as an outstanding siting decision and serve as an example of effective land use on military installations and in the civilian sector, where project siting is often one of the most contentious issues.

In October 2009, the Army finished construction of a football field sized carport solar array at the New Jersey National Guard National Training Facility Headquarters in Sea Girt, NJ.¹⁸⁵ The structure "will generate approximately 250,000 kW hours of renewable energy annually" or about 80% of the facility's overall energy needs.¹⁸⁶ The project reduces energy costs by about \$200,000 per year and excess power is sold to the adjacent community through the local provider and utility company on the local grid.¹⁸⁷ Fort Hood, TX has a similar,

178. ASR 12, *supra* note 32, at 47.

179. *Id.* at 52 (citing DOD SSPP FY11, *supra* note 64, at II-21).

180. See, e.g., *White Sands Home to Army's Largest Solar Power System*, U.S. ARMY (Jan. 17, 2013), http://www.army.mil/article/94412/White_Sands_home_to_Army_s_largest_solar_power_system/. The White Sands Missile Range in New Mexico has a large, 4.1MW, 42-acre low concentration solar array complemented with a 375 kW solar array on an installation carport. *Id.*

181. ENERGY PORTFOLIO, *supra* note 16, at 17.

182. Susan C. Galentine, *Solar Power Array Constructed On Fort Carson Landfill*, U.S. ARMY ENVTL. COMMAND (Winter 2008), <http://aec.army.mil/usaec/newsroom/update/win08/win0812.html>.

183. See, e.g., *Solar Array Generates More Than Power*, 3PHASES, <http://3phases.com/news/news-item.php?id=34> (last visited Feb. 10, 2013) (noting the partnership between government, private parties, utilities, and military for the Fort Carson project).

184. Galentine, *supra* note 182.

185. ASR 12, *supra* note 32, at 54.

186. *Id.*

187. *Id.*

but much smaller, carport solar panel system.¹⁸⁸ Both projects serve to block the sun from parked vehicles and simultaneously provide energy for the air conditioning and heating systems in adjacent buildings.¹⁸⁹

In 2011, another smaller example of a solar program integrated into the local grid was launched – the Hatch Stage Field on Fort Rucker, AL.¹⁹⁰ This Net Zero photovoltaic project, which will be completed by December 2012, is a 51 kWh solar array that is tied into Alabama Power’s grid and should produce up to 73,000 kWh per year while the field only uses about 20,000 kWh per year.¹⁹¹ The produced energy is fed into the Alabama Power grid where the excess is purchased for local civilian needs and then credited back to Ft. Rucker for other consumption obligations.¹⁹²

Another photovoltaic solar project just recently started was a 2.1 million MWh array at Kaiserslautern, Germany, which the Army anticipates will generate enough power for 500 homes and save roughly \$50 thousand annually.¹⁹³ Situated nearby are two smaller thermal solar programs which provide hot water for Kleber Kaserne and Landstuhl.¹⁹⁴

Other recent photovoltaic solar projects include the following: Delaware Army National Guard in Bethany Beach, DE (0.38 MW) in 2010; Presidio of Monterey, CA (0.38 MW) in 2010; United States Army Garrison Vicenza, Italy (0.75 MW) in 2010; Fort Hunter Liggett, CA (1.0 MW) in 2010; and a number of small scale programs that came online between 2008 and 2012.¹⁹⁵

Private entities authorized to operate on federal installations are also adopting the renewable energy mantra and making substantial contributions to Army communities. For example, Fort Hood, TX gave up about four acres of federal land through a no or low-cost lease for the installation’s privatized housing company, Universal Services, to install 3,000 solar panels at the company’s own cost of approximately \$3 million.¹⁹⁶ The project provides about one million KWh annually of electricity for the post.¹⁹⁷

A number of partnerships between SolarCity and privatized housing companies on Army, Air Force, Navy, and Marine Corps installations across the globe, guaranteed with financial backing from the U.S. Renewables Group Renewable Finance, Bank of America Merrill Lynch, and the DOE Financial

188. *Id.* at 47.

189. *Id.*

190. Nathan Pfau, *Fort Rucker Facility Goes Net Zero Energy*, U.S. ARMY (Nov. 15, 2012), http://www.army.mil/article/91234/Fort_Rucker_facility_goes_Net_Zero_energy/.

191. *Id.*

192. *Id.*

193. Rick Scavetta, *Army Garrison Launches Renewable Energy Project*, U.S. ARMY (Sept. 13, 2012), http://www.army.mil/article/87211/Army_garrison_launches_renewable_energy_project/.

194. *Id.*

195. ASR 12, *supra* note 32, at 53; DOD SSPP FY11, *supra* note 64, at II-25; ENERGY PORTFOLIO, *supra* note 16, at 15-17. *See also* Mike Strasser, *Solar Panels Deliver New Energy to West Point’s Net Zero Initiative*, U.S. ARMY (Nov. 29, 2012), http://www.army.mil/article/92008/Solar_panels_deliver_new_energy_to_West_Point_s_Net_Zero_initiative/ (discussing West Point’s new photovoltaic solar panels installed on the roof of the Lichtenberg Tennis Center).

196. Stew Magnuson, *Pragmatism Driving New Energy Programs on US Military Bases*, NAT’L DEF. BUS. AND TECH. MAG. (June 2012), <http://www.nationaldefensemagazine.org/archive/2012/June/Pages/PragmatismDrivingNewEnergyProgramsOnUSMilitaryBases.aspx>.

197. *Id.*

Institution Partnership Program, are leading to the largest rooftop residential solar program in the country.¹⁹⁸ The program, called “SolarStrong,” aims to double the number of solar installations in the United States with a \$1 billion, 371 MW, 160,000 panel program that stretches across thirty-three states.¹⁹⁹ Joint Base Pearl Harbor-Hickam, HI;²⁰⁰ White Sands Missile Range, NM;²⁰¹ Fort Bliss, TX;²⁰² and other Army posts have already partnered in this initiative.

In fact, the Ft. Bliss, TX and White Sands Missile Range (WSMR) project that was just announced in November 2012 is SolarStrong’s largest military project yet, with a 13.2 MW installation which will power 4,700 homes.²⁰³ WSMR was already on the map with the Army’s largest photovoltaic solar program with a \$16.8 million ESPC, which was estimated to provide 4.465 MW of solar power, or about 10.8% of WSMR’s energy requirement, at the end of construction in FY2012.²⁰⁴ An added benefit of the SolarStrong initiative is that SolarCity has committed to hire as many U.S. Veterans and military family members as possible.²⁰⁵ The company already employs seventy-nine Veterans,²⁰⁶ and ultimately anticipates generating a total of 6,000, one-year jobs generally throughout the duration of SolarStrong.²⁰⁷

A final set of solar projects that were recently implemented, but not on a large-scale, were a series of thermal solar systems. Most of these projects were implemented when buildings were under renovation to improve energy efficiency or for some other upgrade.²⁰⁸ Tooele Army Depot, UT and Fort Drum, NY have two of the most notable projects, which came online in 2009 and 2010.²⁰⁹ It is difficult to parse out the exact energy advantage gained through many of the renewable energy upgrades (i.e., solar wall air heating systems, roof tile and attic heating systems, and other tube or forced air systems) because the renovated buildings were generally also supplemented with better insulated walls, windows, and roofs. Other thermal solar projects are used to

198. See, e.g., Chris Meehan, *SolarStrong Marches Forward*, CLEANENERGY AUTH. (July 20, 2012), <http://www.cleaneenergyauthority.com/solar-energy-news/solarcity-lend-lease-solar-on-military-homes-071912>; and Todd Woody, *Military Deal to Double the U.S.’s Rooftop Solar Installations*, FORBES (Sept. 7, 2011, 3:47 PM), <http://www.forbes.com/sites/toddwoody/2011/06/14/google-invests-280-million-in-fund-to-install-home-solar-panels/>.

199. Woody, *supra* note 198.

200. Meehan, *supra* note 198.

201. Tina Casey, *SolarCity Brings 21st Century Energy to 1850’s Army Base*, CLEANTECHNICA (Nov. 13, 2012), <http://cleantechnica.com/2012/11/13/solarcity-brings-solar-power-to-fort-bliss/>.

202. *Id.*

203. *Id.*; see also Sig Christenson, *The Army’s Going Green on Fort Bliss*, MY SAN ANTONIO (Jan. 9, 2011), <http://www.mysanantonio.com/news/military/article/The-Army-s-going-green-on-Fort-Bliss-946451.php> (discussing the original plans for solar expansion and many of the underlying reasons for the growth).

204. ASR 12, *supra* note 32, at 55 (citing *Huntsville Center Awards \$16.8M Energy Savings Performance Contract*, U.S. ARMY (Dec. 28, 2011), http://www.army.mil/article/71356/Huntsville_Center_awards_16_8_M_Energy_Savings_Performance_Contract/).

205. *SolarStrong Military Solar Project*, SOLARCITY, <http://www.solarcity.com/commercial/solarstrong-military-solar-installations.aspx> (last visited Feb. 10, 2013).

206. Casey, *supra* note 201.

207. Woody, *supra* note 198.

208. ENERGY PORTFOLIO, *supra* note 16, at 28-29.

209. *Id.*

heat or cool water for uses ranging from large absorption chillers, to domestic use water heaters, to heating the installation swimming pool.²¹⁰

2. Wind

Wind energy is also quickly picking up speed, although it is not nearly as developed yet as solar. Part of the challenge for wind at present is that the industry is simply not as mature as solar because residential level solar development has been ongoing in earnest since the 1980s.²¹¹ Further slowing wind development across the country, not just in the Army, is the high capital start-up costs. Finally, siting large-scale wind farms is a challenge because of the numerous environmental, military training, wildlife, and local community concerns. Solar panels bolted to rooftops do not pose nearly as much of an approval challenge as looming turbines jutting up into the sky, with spinning blades, sometimes generating annoying noise, and most importantly for the military, occasionally causing radar interference.²¹²

Several commentators describe the challenges that wind turbines have posed where land is available for development but where the wind turbines pose potentially significant flight tracking interference for radar systems. One commentator succinctly describes that “[s]ince radar technology is designed to detect moving objects, spinning turbine blades create interference which degrades the signal. Wind towers carry a signal strength greater than a Boeing 747, so when the radar repeatedly sees the large return it cannot detect actual aircraft in the same area.”²¹³ Additionally, large wind farms can create an appearance of storm activity, which the Federal Aviation Administration needs to convey to aircraft traversing the affected areas.²¹⁴ Two particular Air Force installations, Travis Air Force Base, CA, and a long-range Air Force radar system located near Fossil, OR, have been at the center of this radar interference controversy for the last several years.²¹⁵ The Federal Aviation Administration and Department of Homeland Security, along with the Department of Defense, have shown great concern and demanded implementation of better mitigation measures before supporting the large scale development of wind farms adjacent to radar sites.²¹⁶

A number of mitigation tools are under consideration which might reduce or circumvent the impact of wind turbine interference, but none have so far

210. *Id.* at 29 (listing projects at various installations).

211. ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEP’T OF ENERGY, THE HISTORY OF SOLAR, available at http://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf (last visited Feb. 2, 2013).

212. *See generally* OFFICE OF THE DIR. OF DEF. RESEARCH AND ENG’G, REPORT TO THE CONGRESSIONAL DEFENSE COMMITTEES: THE EFFECT OF WINDMILL FARMS ON MILITARY READINESS (2006) [hereinafter WINDMILL DEFENSE REPORT], available at <http://www.defense.gov/pubs/pdfs/WindFarmReport.pdf>.

213. Lisa Linowes, *Wind Energy and Radar: A National Security Issue*, MASTERRESOURCE (Sept. 26, 2011), <http://www.masterresource.org/2011/09/wind-radar-national-security/>.

214. Deborah Gage, *Do Wind Farms Lower Military Readiness?*, SMARTPLANET (July 2, 2010), <http://www.smartplanet.com/blog/thinking-tech/do-wind-farms-lower-military-readiness/4637>.

215. Linowes, *supra* note 213.

216. *See, e.g.*, LENNY SIEGAL, CTR. FOR PUB. ENVTL. OVERSIGHT, RENEWABLE ENERGY: AVOIDING A NATIONAL SECURITY “TRAIN WRECK” 13-17 (July 2008), available at <http://www.cpeo.org/pubs/Renewables.pdf>.

proven sufficient to resolve the serious concern of losing signals of incoming aircraft or other radar-trackable airborne threats. Recommended solutions include “Scan Step,” a digital processor and software package that reduces turbine movement interference²¹⁷ or the use of other discrimination algorithms that could discriminate between wind turbine signals and aircraft signals.²¹⁸ Other proposed options include: 1) the implementation of newer but very expensive technology such as the Lockheed Martin TPS-77 radar used by the British Royal Air Force that can apparently distinguish between aircraft and turbines;²¹⁹ 2) the use of aircraft transponders to connect with secondary radar systems installed at air traffic control sites;²²⁰ 3) the use of “bald earth” or “terrain masking” line of sight mitigation techniques;²²¹ and 4) the use of stealth composite blades which absorb radar signals instead of bouncing the signals.²²² However, none of these alternatives have so far proven sufficient to mitigate the turbine interference because the programs are either cost prohibitive or have not yielded the results necessary to safeguard the Air Force’s ability to comprehensively track all of the signals it must monitor to ensure aircraft safety and overall national security.

The good news is that several federal agencies are joining together to resolve the outstanding interference issues as expeditiously and comprehensively as possible in a recently announced Interagency Field Test and Evaluation.²²³ The Department of Energy, Department of Defense, Department of Homeland Security, Federal Aviation Administration, and other federal, state, local, and private industry stakeholders are running a two year, three phase program to identify the best mitigation technologies to solve the interference problem.²²⁴ Hopefully, in the very near future, the reader will see a comprehensive solution that allows for simultaneous improvements in wind energy development and national security.

That said, the Army does have a handful of small-scale and large-scale projects. The first wind turbine on an active Army installation was the 262-ft tall, 1.5 MW turbine unveiled in July 2010 at the Tooele Army Depot in Utah.²²⁵ The turbine requires 12 mph winds to produce about 14.5 billion British thermal units (Btu) and saves the installation about \$200,000 annually.²²⁶ Fortunately

217. Linowes, *supra* note 213 (noting that “Scan Step” failed all testing).

218. See, e.g., Raytheon Network Centric Sys., *Wind Farms and Radar—A Real Solution Demonstrated!*, in 8 TRANSPORT AND SEC. NEWS No.3, 12-13 (2011), available at http://www.raytheon.com/businesses/rtnwcm/groups/ncs/documents/content/rtn_ncs_business_amhs_news_pdf.pdf.

219. Richard de Silva, *Military Radar and Wind Turbines Learning to Coexist*, DEFENCE IQ (Oct. 12, 2012), <http://www.defenceiq.com/defence-technology/articles/military-radar-and-wind-turbines-learning-to-coexi/>.

220. WINDMILL DEFENSE REPORT, *supra* note 212, at 18-19.

221. See, e.g., DEP’T OF DEF., THE REPORT TO THE CONGRESSIONAL DEFENSE COMMITTEES: THE EFFECT OF WINDMILL FARMS ON MILITARY READINESS 41-44 (2006), available at <http://www.defense.gov/pubs/pdfs/WindFarmReport.pdf>.

222. Gage, *supra* note 214.

223. BRIAN MILLER, BRIEFING PRESENTATION: INTERAGENCY FIELD TEST AND EVALUATION: AN INTRODUCTION (Aug. 13, 2012), available at <http://energy.hawaii.gov/wp-content/uploads/2012/04/BryanMiller.pdf>.

224. *Id.* at slide 13.

225. ENERGY PORTFOLIO, *supra* note 16, at 27.

226. *Id.*

the average wind speed at the site is 14 mph so energy production is relatively consistent.²²⁷ However, the requirement for consistent winds is a limiting factor for other large turbine projects because the wind speed has to be reliable in order to make the project useful and cost-effective.

Other similar sized and smaller turbines are located at Fort Irwin, CA; Fort Huachuca, AZ; Fort Wainwright, AK; Kahuku Training Area, HI; and at several locations within the Arizona, Minnesota, and New Jersey National Guard systems.²²⁸

3. Geothermal

There are a number of geothermal heat pump projects across the country at Army installations.²²⁹ One of the more recent, the Hawthorne Army Depot, NV geothermal exploration project, has been ongoing for several years as funding limitations restricted project expansion around 2009.²³⁰ The project is forging ahead now with several test holes drilled and the potential to provide 30 MW of energy.²³¹ A particularly notable project that serves as the gold bar standard for geothermal projects throughout the Army is the Fort Knox, KY project, planned and installed in 2004 and 2005, which heats and cools water and space for over 140,000 square feet of building space.²³² The project consists of 130, 500-ft wells, but could expand to as many as 5,000 wells to heat and cool as much as 6 million square feet.²³³

4. Landfill Gas & Biomass

While the Army does not have many biomass or landfill gas programs in place, there are a few implemented and funded primarily via UESC and EULs. Fort Knox, KY, for example, purchased local landfill gas to replace part of its traditional energy resourcing.²³⁴ Fort Knox also used a UESC to partner with a local cooperative to decrease its natural gas consumption and replace it with biogenic renewable methane gas from the Devonian-Shale.²³⁵

Fort Meade, MD was one of the first installations to convert landfill methane into energy in order to power some of its tenant agencies. In the case of Fort Meade, the installation contracted with a private engineering company and adjacent Anne Arundel County to purchase the county's methane, pipe it five miles to Fort Meade, and then convert it to energy.²³⁶ In 2011 Fort Benning, GA

227. *Id.*

228. *Id.*

229. *Id.* at 31-32.

230. *See generally Planned Geothermal Project on Hold at Hawthorne Army Depot, Nevada*, THINKGEOENERGY (Dec. 18, 2009), <http://thinkgeoenergy.com/archives/3263>.

231. *The U.S. Military Leads the Charge on Renewables, Efficiency and Energy Security*, THINKPROGRESS (June 14, 2011, 10:44 AM), <http://thinkprogress.org/climate/2011/06/14/244716/military-renewables-efficiency-and-energy-security/>.

232. ROBERT DYRDEK, FORT KNOX ENERGY INITIATIVES BRIEF 7-8, *available at* <http://kyvetbiz.com/gwp-content/uploads/2011/12/6-Dyrdek-Energy-smart-Design.pdf> (last visited Feb. 2, 2013).

233. *Id.*

234. ENERGY PORTFOLIO, *supra* note 16, at 24-25.

235. *Id.*

236. Justin Fenton, *Fort Meade, County Set Methane Energy Deal*, BALTIMORE SUN (Jan. 18, 2008), http://articles.baltimoresun.com/2008-01-18/news/0801180417_1_methane-fort-meade-arundel-county.

partnered with FlexEnergy and Southern Research Institute to design and install a landfill methane conversion system that now produces enough clean energy to power 250 homes, drawing the methane from a capped landfill on Fort Benning.²³⁷

C. Contingency Basing & Operational Environment

The second major environment where the Army is implementing renewable energy projects is at contingency bases and across the operational spectrum. The Army refers to this particular aspect of its energy and sustainability portfolio as operational energy, defined as “the energy and associated systems, information, and processes required to train, move, and sustain forces and systems for military operations.”²³⁸ As noted earlier in Parts II and III, lessons learned throughout the prosecution of the War on Terror indicate that reducing the fuel and water requirements in the deployed environment will greatly increase security for Soldiers.

1. Operational Energy – Contingency Basing Task Force

Although the DOD and its services have given some level of attention to environmental and sustainability concerns in the operational environment for over a decade, it has only been in the last five to ten years that each agency really got serious about developing a unified, comprehensive, and aggressive approach.²³⁹ At the DOD level, the Office of the Secretary of Defense established the Office of the Assistant Secretary of Defense for Operational Energy on June 25, 2010, and appointed Ms. Sharon E. Burke as the Assistant Secretary to lead the office.²⁴⁰ This office, slightly renamed since its inception two years ago, continues to provide agency wide guidance and assist each of the services with energy accounting, planning, management, and innovation.²⁴¹

The Army clearly established its initial operational energy strategy in the *Army Energy Security Implementation Strategy of 2009*.²⁴² Since establishing its baseline strategy, the Army has grown its Operational Energy Office within the Army’s G4, challenged the Army G3/5/7 Rapid Equipping Force with taking the lead on acquisition assessment,²⁴³ and charged the Army Capabilities Integration

237. Magnuson, *supra* note 196.

238. ASR 12, *supra* note 32, at 32 (internal citations omitted).

239. See generally DAVID A. KROOKS & KURT J. KINNEVAN, ANALYSIS OF POLICY AND GUIDANCE REGARDING SUSTAINABILITY AND ENVIRONMENTAL CONSIDERATIONS IN OVERSEAS CONTINGENCY OPERATIONS IN THE JOINT, INTERAGENCY, INTERGOVERNMENTAL, AND MULTINATIONAL (JIIM) ENVIRONMENT, ARMY ENVIRONMENTAL POLICY INSTITUTE, ERDC/CERL SR-11-DRAFT (Feb. 2011), available at <http://www.aepi.army.mil/docs/whatsnew/AEPI%20Sustainability%20Analysis%20Final%20v2.pdf>.

240. THE OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR OPERATIONAL ENERGY PLANS AND PROGRAMS, <http://energy.defense.gov/> (last visited Feb. 3, 2013).

241. *Id.*

242. THE ARMY SENIOR ENERGY COUNCIL & THE OFFICE OF THE DEPUTY ASSISTANT SEC’Y OF THE ARMY FOR ENERGY AND P’SHIPS, ARMY ENERGY SEC. IMPLEMENTATION STRATEGY (2009), available at http://www.asaie.army.mil/Public/Partnerships/doc/AESISIS_13JAN09_Approved%204-03-09.pdf.

243. Dan Nolan, *Changing the Paradigm for Operational Energy: REF 6 Speaks*, DOD ENERGY BLOG (Aug. 4, 2011, 10:48 AM), <http://dodenergy.blogspot.kr/2011/08/changing-paradigm-for-operational.html>.

Center with rapid integration of energy into the center's mission.²⁴⁴ The Rapid Equipping Force's Energy to the Edge (E2E) program, initiated in May 2011, was designed to get energy saving systems out to austere locations to reduce assignment of operational personnel to logistics requirements, and to field cutting-edge technology to the brigade combat teams for train-up and deployment.²⁴⁵

As mentioned earlier, in 2010 and 2011 there was also substantial focus at the Army level on operational energy; however, in 2012 the Army took another major step toward formalizing a very narrowly focused organization, specifically regarding contingency base development. In November 2012, the Assistant Secretary of the Army for Installations, Energy, and Environment chartered the Operational Energy – Contingency Basing Task Force.²⁴⁶ This task force has the sole purpose

to find new and efficient ways to reduce the energy requirements on our contingency bases, making it possible for commanders to concentrate on their mission. At the same time, our number one priority will be to lighten the Soldier's energy load, making them more flexible, with longer energy endurance in the field, and thus more lethal to our adversaries.²⁴⁷

The Army's recent charter of a task force with the sole mission of focusing on operational energy underscores that Army leadership is making this an organizational priority right now, and likely for the foreseeable future.

2. Generators, Mini-Grids & Solar Charged Batteries

Colonel Timothy Hill, the newly appointed Chief of the Operational Energy – Contingency Basing Task Force, pointed out recently that 70-80%, by weight, of logistical convoys contain water and fuel.²⁴⁸ If the Army can reduce the need for such a volume of water and fuel, it can reduce the number of convoys, which results in fewer casualties on the battlefield and the ability to reallocate a significant portion of the fighting force from convoy security to the primary mission. When considering that between FY2003 and FY2007, more than 3,000 Army Soldiers, civilians, and contractors were wounded or killed when their fuel or water resupply convoys were attacked in Afghanistan and Iraq, the rationale for reducing the number of resupply convoys takes on new meaning.²⁴⁹ Colonel Hill noted that in order to make those reductions, the Army is “developing and installing more fuel efficient generators, micro-grids, renewable energy sources such as solar power, and are reducing our energy foot print within our contingency base camps to reduce fuel demands, and lessen the vulnerability to Soldiers protect[ing] the resupply convoys.”²⁵⁰

244. *Operational Energy (OE)*, ARMY CAPABILITIES INTEGRATION CENTER, <http://www.arcic.army.mil/operational-energy.html> (last visited Feb. 3, 2013).

245. ASR 12, *supra* note 32, at 33-34.

246. Dennis K. Bohannon, *Army's New Task Force Focuses on Operational Energy and Contingency Basing*, U.S. ARMY (Nov. 29, 2012), http://www.army.mil/article/92082/Army_s_New_Task_Force_Focuses_on_Operational_Energy_and_Contingency_Basing/.

247. *Id.*

248. *Id.*

249. DEP'T OF DEFENSE, *ENERGY FOR THE WARFIGHTER: OPERATION ENERGY STRATEGY 4-5* (2011), available at http://energy.defense.gov/OES_report_to_congress.pdf.

250. Bohannon, *supra* note 246.

All of these efforts have resulted in the Army pushing some revolutionary tools to the warfighters in Iraq and Afghanistan.²⁵¹ Mini-grids are one of the main power generation management platforms introduced to contingency bases. At least twenty-two mini-grids have been installed for United States Forces – Afghanistan as of October 2011, “resulting in estimated savings of 13[%], or approximately [thirty-three] million gallons of fuel per year.”²⁵²

The Advanced Medium-Sized Mobile Power Sources (AMMPS), in full production in July 2011, were designed to replace tactical quiet generators.²⁵³ The new AMMPS save 20% on fuel for 5-60 kW generators and the Army estimates that they will reduce fuel requirements by 300,000 gallons per month.²⁵⁴

In November 2012, Richard G. Kidd IV, Deputy Assistant Secretary of the Army for Energy and Sustainability with the Office of the Assistant Secretary of the Army for Installations, Energy, and Environment, highlighted the value of ten new hybrid solar-diesel generators recently installed at a U.S. Special Forces outpost in Afghanistan.²⁵⁵ He noted that the new hybrid generators cut needed fuel supply in half, free up air assets otherwise required to deliver diesel, reduce repair costs and down-time, power high-quality electronics equipment, and even provide power to local Afghan villages.²⁵⁶

The Rucksack Enhanced Portable Power Systems (REPPS) is a ten-pound solar-powered kit that charges most military batteries.²⁵⁷ With a series of adaptors, multiple panels can be assembled to provide more energy for more energy intensive systems.²⁵⁸ The first REPPS were sent to Afghanistan in July 2010 and have since been used across the theater.²⁵⁹ When Soldiers out on multi-day patrols are otherwise required to carry almost twenty pounds of multiple types of batteries²⁶⁰ to power communications systems, lights, lasers, and other devices, the alternative of incorporating REPPS instead reduces their loads and reduces return trips to patrol bases and convoys for replacements or recharging.²⁶¹

3. Water Reuse

On the water reduction side, the new shower water reuse systems have been a real force multiplier. The Army sent sixty-two systems to Afghanistan in FY2011 and Soldiers have used them to save up to 75% of the graywater from shower use to process it back to potable quality for reuse in showers.²⁶² If used

251. ENHANCING MISSION EFFECTIVENESS, *supra* note 123, at slides 22-26.

252. ASR 12, *supra* note 32, at 34.

253. *Id.*

254. *Id.*

255. David Vergun, *Soldiers Using Sunlight to Improve Combat Capability*, U.S. ARMY (Nov. 14, 2012), http://www.army.mil/article/91018/Soldiers_using_sunlight_to_improve_combat_capability/.

256. *Id.*

257. ASR 12, *supra* note 32, at 35.

258. *Id.*

259. *Id.*

260. *Unburdening the Soldier Through Innovations in Battery, Power Component Technology*, U.S. ARMY RESEARCH LAB., <http://www.arl.army.mil/www/default.cfm?page=564> (last updated Mar. 15, 2011).

261. ASR 12, *supra* note 32, at 35.

262. *Id.*

properly, the reuse systems could save up to “3.2 million gallons per shower facility each year.”²⁶³

4. Waste to Energy

In 2008, in the midst of continued convoy attacks and concerns of local national contracts, which brought Iraqis onto contingency bases throughout Iraq to collect trash, the Army fielded the first version of its Tactical Garbage to Energy Refinery (TGER).²⁶⁴ The TGER was designed and tested by scientists and technicians at the U.S. Army Edgewood Chemical Biological Center at Aberdeen Proving Ground, MD and then sent to Camp Victory, Iraq.²⁶⁵ The “trailer-mounted hybrid technology . . . can support a 550-person unit that generates about 2,500 pounds of trash per day, and converts roughly 2,000 pounds of that garbage—paper, plastic, packaging and food waste—into electricity via a standard 60-kilowatt diesel generator.”²⁶⁶

The prototype originally required three people to feed it garbage and monitor the operations, and could produce 155 Btus of energy per cubic foot of gas, to power operations on the base. The newly revised TGER 2.0 will only require two people and produce triple the amount of energy, or approximately 550 Btus.²⁶⁷ Additionally, future improvements include capturing the excess heat from the heat exchanger and using it for field sanitation and heating water, and further enhancing the TGER’s operation so that only one person is required to feed and operate it.²⁶⁸ This zero carbon footprint device that reduces thirty cubic yards of trash to one cubic yard of benign soil additive ash serves to even further reduce fuel requirements and increase self-sustaining energy production in the deployed environment.²⁶⁹

All of these systems serve as *force multipliers*²⁷⁰ because they not only save resources but the reduction in required fuel and water consequently reduces convoy requirements. Fewer convoys moving through the mountains and valleys of Afghanistan means less manpower used for logistical support and less exposure for Soldiers. All the way back in 2003, General James Mattis, then Commander of 1st Marine Division in Iraq, sent a message from the warzone back to Washington, D.C. asking the Pentagon “to unleash us from the tether of fuel.”²⁷¹ Hopefully, with the current projects and others yet to come, that tether will at least continue to lengthen as energy sources diversify.

263. *Id.*

264. Kristen Dalton, *Battle-Tested TGER Prototype Improved Since Mission In Iraq*, U.S. ARMY RDECOM (Dec. 4, 2012), <https://www.ecbc.army.mil/news/2012/Battle-tested-TGER-prototype-improved-since-mission-in-Iraq.html>.

265. *Id.*

266. *Id.*

267. *Id.*

268. *Id.*

269. *Id.*

270. *Net Zero is A Force Multiplier*, ARMY ENERGY PROGRAM, <http://army-energy.hqda.pentagon.mil/netzero/> (last updated Dec. 14, 2012).

271. JAMES MORIN, PROGRESSIVE POLICY INST., POLICY REPORT: CUTTING THE TETHER – ENHANCING THE U.S. MILITARY’S ENERGY PERFORMANCE 4 (May 2010), available at http://www.progressivefix.com/wp-content/uploads/2010/05/CUTTING-THE-TETHER_Morin.pdf. See also Scott C. Buchanan, *Energy and Force Transformation*, 42 JOINT FORCE Q. 51-54 (2006), available at <http://www.dtic.mil/>

IV. WAY AHEAD

Throughout Part III the author presented and examined many of the Army's substantial efforts toward meeting its renewable energy goals. However, there is certainly more work to be done. So, Part IV summarizes the Army's plan for the way ahead in strategy refinement, installation and facilities based renewables, and contingency base and operational energy projects.

A. Strategy

Operational energy is a major focus going into the next few years. The DOD set a new tone when it published its *Operational Energy Strategy*²⁷² in June 2011 and then its *Operational Energy Strategy Implementation Plan*²⁷³ in March 2012. The new DOD targets and goals clearly challenge all services to integrate policy, plans, and reporting requirements immediately with respect to energy intensity reduction, energy efficiency, renewable energy sourcing, and research and development of cutting edge technologies.²⁷⁴ Most of the initial reporting requirements for developing initial policy and programs, establishing baselines and metrics to assess progress, and assessing funding and support requirements were scattered through FY2012, so we will all see the response to the new strategy unfolding in FY2013 and forward.²⁷⁵

On August 24, 2012, the Army's Assistant Secretary of the Army for Installations, Energy, and Environment issued the Army's new *Energy Goal Attainment Responsibility Policy for Installations*.²⁷⁶ This new policy provides a clear framework for project development responsibilities and reporting obligations across DA-level offices, installations, and commands.²⁷⁷ It also succinctly captures all of the most relevant authorities that established the Army's goals as well as other associated agency policies.²⁷⁸

Finally, it is interesting to look at the FY2013 energy innovation investment and operational energy investment recently disclosed by the DOD Operational Budget Certification Report for FY2012 and FY2013.²⁷⁹ The report indicates that the Army is committing \$333 million to energy innovation investment and

doctrine/jel/jfq_pubs/4217.pdf (discussing the Army's fuel and some 2006-era projects that might partially address the extreme burden of fuel use and transportation).

272. U.S. DEP'T OF DEF., ENERGY FOR THE WARFIGHTER: OPERATION ENERGY STRATEGY (2011), available at http://energy.defense.gov/OES_report_to_congress.pdf. See also Lisa Daniel, Lynn: Energy Strategy Will Help Forces Adapt for Future, U.S. DEP'T OF DEF. (June 14, 2011), <http://www.defense.gov/news/newsarticle.aspx?id=64318>.

273. U.S. DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY IMPLEMENTATION PLAN (Mar. 2012), available at http://energy.defense.gov/Operational_Energy_Strategy_Implementation_Plan.pdf.

274. *Id.* at 1-5.

275. *Id.* at 8.

276. Memorandum from the Assistant Sec'y of the Army (Installations, Energy, and Env't.) to U.S. Army Principle Officials, Energy Goal Attainment Responsibility Policy for Installations (Aug. 24, 2012) [hereinafter Energy Goal Attainment Responsibility Policy], available at [http://armyeitf.com/downloads/ASA\(IEE\)%20energy%20goal%20attainment%20policy%20\(24%20Aug%202012\).pdf](http://armyeitf.com/downloads/ASA(IEE)%20energy%20goal%20attainment%20policy%20(24%20Aug%202012).pdf).

277. *Id.*

278. *Id.*

279. U.S. DEP'T OF DEF., ENERGY INVESTMENTS FOR MILITARY OPERATIONS: FY 2013 (June 2012), available at http://energy.defense.gov/FY13_OE_Budget_Cert_Report.pdf.

\$562 million to operational energy investment.²⁸⁰ The energy innovation budget is further divided into approximately \$175 million for research, development, testing, and evaluation, and \$157 million for procurement.²⁸¹ Of course none of these figures reflect private investments through PPAs, ESPCs, EULs,²⁸² and other alternative mechanisms because these are only appropriated funds. One can only hope that these substantial investments will yield technologies and systems to get us closer to greater energy independence, increased security, sustainable fuel costs, and a cleaner tomorrow.

Interestingly enough, while obviously not a part of the DOD's strategy, the expanding renewable energy program may also serve two additional purposes beyond the military. First, Army renewable energy programs may actually serve as a vehicle for keeping renewable companies alive and innovative during the current period of uncertainty regarding the expiration of tax credits and subsidies.²⁸³ The size of the recent \$7B Multiple-Award Task Order (MATOC), the longevity for programs executed under long-term PPAs, the benefits of project funding backed by the excellent credit of the federal government, and the opportunity for smaller businesses to bid on Army projects of 10 MW and smaller all make the Army's renewable energy program a golden egg for emerging clean, alternative, and renewable energy companies.²⁸⁴

Second, the DOD spillover effect in the commercial marketplace of new or refined innovations, as well as accelerated cost decline for renewable technologies, is sure to continue.²⁸⁵ Programs that have been around for decades, like The Environmental Security and Technology Certification Program²⁸⁶ which "uses military installations as a test bed to demonstrate and create a market for innovative energy efficiency and renewable energy technologies coming out of the private sector and [DOD] and Department of Energy laboratories,"²⁸⁷ will continue to support these developments. Some innovations more than others will impact the civilian sector, but every spillover serves to underscore the national value of the Army's renewable energy effort.

280. MEGAN NICHOLSON & MATTHEW STEPP, LEAN, MEAN, AND CLEAN II: ASSESSING DOD INVESTMENTS IN CLEAN ENERGY INNOVATIONS 7 fig.3 (Oct. 2012), available at <http://www2.itif.org/2012-lean-mean-clean-dod-energy.pdf> (summarizing the DOD Budget Certification Report for FY 2013).

281. *Id.* at 15.

282. *Net Zero Is A Force Multiplier*, ARMY ENERGY PROGRAM, <http://army-energy.hqda.pentagon.mil/netzero/> (last updated Dec. 14, 2012).

283. AMY S. KOCH & LORRAINE M. CAMPOS, FINANCER WORLDWIDE, THE U.S. ARMY MAY PROVIDE OPPORTUNITIES FOR A STRUGGLING RENEWABLE ENERGY SECTOR, in GLOBAL REFERENCE GUIDE: ENERGY & UTILITIES 6 (2012), available at http://www.financierworldwide.com/ReferenceGuides/GRG_Energy_dnr848.pdf.

284. *Id.* at 7.

285. NICHOLSON & STEPP, *supra* note 280, at 20.

286. ENVIRONMENTAL SECURITY AND TECHNOLOGY CERTIFICATION PROGRAM, <http://www.serdp.org/> (last visited Feb. 3, 2013).

287. QDR 2010, *supra* note 9, at 86.

B. Installations

1. \$7B Request for Proposals (August 2012)

Without question, the Army's August 2012 announcement of Multiple-Award Task Order (MATOC) Request for Proposals (RFP) for \$7 billion of PPAs for renewable and alternative energy development projects of 10 MW or larger for Army installations²⁸⁸ is huge. If this process is successful, these projects will play a major role in the Army reaching its goal of 1 GW of renewable power by 2025.²⁸⁹ The following quote from the EITF's press release captures the five-W's²⁹⁰ of the MATOC RFP in a nutshell:

It is the intent of the government only to purchase the energy that is produced, and not to acquire any generation assets. The contractors will finance, design, build, operate, own and maintain the energy plants. The government will contract to purchase the power for up to [thirty] years in accordance with the terms and conditions stipulated in site or project specific agreements resulting from task orders awarded under multiple Indefinite Delivery (ID) / Indefinite Quantity (IQ) contracts. Project locations may be on any [f]ederal property located within the U.S. including Alaska, Hawaii, territories, provinces or other property under the control of the U.S. government for the duration of contract performance.²⁹¹

This effort has been ongoing for well over a year. The Army Corps of Engineers' Engineering and Support Center in Huntsville, AL published its draft request for comments in February, 2012.²⁹² In response, industry submitted over 900 comments.²⁹³ After amendments were made to the draft RFP, and answers to frequently asked questions for interested potential stakeholders were posted, the final RFP was posted on August 7, 2012.²⁹⁴ EITF then hosted a pre-proposal conference in late August 2012, which appears to have been quite successful.²⁹⁵ The EITF announced recently on its LinkedIn site that

[e]xtensive competition was received in each of the four technologies (biomass, geothermal, solar and wind). The Source Selection Evaluation Board kicked off evaluations on October 15, 2012. The Source Selection Evaluation Board will evaluate one technology at a time. Staggered awards will be made once the evaluations for each technology are completed. We anticipate announcement of the MATOC awardees by May 2013.²⁹⁶

288. *Opportunities: Procurement Actions*, U.S. ARMY ENERGY INITIATIVES TASK FORCE, <http://armyeitf.com/index.php/opportunities/procurementactions> (last visited Feb. 3, 2013).

289. *Id.*

290. Who, What, When, Where, and Why. In other words, the basic information required to know what is happening.

291. Debra Valine, *USACE Announces New Action to Support Deployment of Renewable Energy on U.S. Military Installations*, U.S. ARMY (Aug. 7, 2012), <http://www.army.mil/article/85114>.

292. *Id.*

293. *Id.*

294. *Id.*

295. Debra Valine, *Capacity Crowd Turns Out to Discuss \$7 Billion Renewable Energy Contract Request for Proposals*, U.S. ARMY (Aug. 29, 2012), http://www.army.mil/article/86406/Capacity_crowd_turns_out_to_discuss_7_billion_renewable_energy_contract_request_for_proposals/. See also Dan Nolan, *Other Peoples' Money for Market Research: Army Invites You to Utah*, <http://dodenergy.blogspot.kr/> (Sept. 10, 2012, 6:58 AM) (discussing the Toole Army Depot Open House on October 10-11, 2012).

296. Dan Nolan, *Deciding to Decide: AEITF Announces MATOC Awardees . . . Will Be Announced in 6 Months* (Nov. 25, 2012, 4:57 PM) (quoting Army EITF Admin, Comment on U.S. Army Energy Initiatives Task Force, LINKEDIN (Nov. 2012), <http://www.linkedin.com/groups/Has-there-been-established-time->

To date, the Army has not been a trend-setter for the use of Indefinite Delivery/Indefinite Quantity ESPCs,²⁹⁷ but once the awardees are announced in May 2013, and the project development begins, the Army should develop some good experience and move into a leadership position on Indefinite Delivery/Indefinite Quantity ESPCs for the rest of the services.

2. Fort Detrick Solar RFP (November 2012) and Fort Drum Biomass RFP (December 2012)

Another set of recent announcements from the Army's EITF include notices about the first independent RFPs for solar and biomass renewable energy.²⁹⁸ Separate from the \$7B MATOC, the Fort Detrick RFP is for a photovoltaic solar project sized for about 15 MW at Ft. Detrick, MD.²⁹⁹ The request calls for an industry partner sufficiently qualified to meet the high expertise standards required for the Army contracting process, and prepared to enter into an EUL coupled with a thirty-year PPA.³⁰⁰ The Fort Drum RFP, released on December 12, 2012, is "for electrical power from a biomass generation facility for up to 28 [MW] located on or contiguous to Fort Drum in Watertown, New York."³⁰¹ This RFP is for a twenty-five-year PPA.³⁰²

3. Federal Energy Management Program (FEMP) Technical Assistance

The Army is putting to work the previously mentioned DOE Federal Energy Management Program (FEMP) funding from the American Recovery and Reinvestment Act of 2009 to assist in technical assistance at several installations across the globe.³⁰³ Pacific Command installations on Oahu are working in conjunction with the FEMP and six DOE laboratories on efficiency and renewable energy programs.³⁰⁴ Ft. Bliss, TX, one of the two total Net Zero installations, is working with FEMP to use appropriated funds to build renewable energy power plants to provide the 20 to 40 MW of capacity required to offset the need generated by construction of ten million square feet of space to support the 66,000 person population increase.³⁰⁵ Ft. Bliss, previously discussed

4296805.S.187314244?qid=a070a311-d6e9-4e06-bd2d-2094e51b26f1&trk=group_items_see_more-0-b-ttl), available at <http://dodenergy.blogspot.kr/>.

297. U.S. DEP'T OF ENERGY: ENERGY EFFICIENCY & RENEWABLE ENERGY (EERE), DEPARTMENT OF ENERGY INDEFINITE DELIVERY / INDEFINITE QUANTITY (IDIQ) ENERGY SAVINGS PERFORMANCE CONTRACTS (ESPC) AWARDED PROJECTS SUMMARY 1, available at http://www1.eere.energy.gov/femp/pdfs/do_awardedcontracts.pdfhttp://www1.eere.energy.gov/femp/pdfs/do_awardedcontracts.pdf.

298. *Opportunities: Procurement Actions*, *supra* note 288.

299. *Id.*

300. Dan Nolan, *Sunrise in Maryland: EITF Post First RFP*, THE DOD ENERGY BLOG, <http://dodenergy.blogspot.com/search?q=EITF+post+first+RFP> (Nov. 15, 2012, 6:49 AM). To review the official RFP, see *Opportunities, Fort Detrick Solar Electric Power Purchase Agreement (PPA)*, FEDBIZOPPS.GOV, <https://www.fbo.gov/index?s=opportunity&mode=list&tab=list> (insert SP0600-13-R-0402 into the solicitation search box) (last visited Feb. 10, 2013).

301. *Opportunities: Procurement Actions*, *supra* note 288.

302. *Id.*

303. *Federal Energy Management Plan: Recovery Act Project Stories*, U.S. DEP'T OF ENERGY: ENERGY EFFICIENCY & RENEWABLE ENERGY, http://www1.eere.energy.gov/femp/financing/recovery_stories.html (last updated Jan. 6, 2011).

304. *Id.*

305. *Id.*

in Part III, is really a phenomenal example of recent success and continues to lean forward to meet its high energy goals through 2015 and beyond.³⁰⁶

4. Biomass

In October 2012 the Executive Director of the Army's EITF, John Lushetsky, announced that within ninety days the Army intended to issue a RFP for a 15-28 MW biomass project at Fort Drum, NY.³⁰⁷ Like many of the projects discussed throughout this article, the Army intends to use the PPA as the contracting and funding mechanism.³⁰⁸ While not outlining any specifics other than on the solar front, as previously discussed, Ft. Bliss leadership has also announced its intent to develop geothermal and biomass energy.³⁰⁹

The Army and Air Force, in conjunction with a number of biomass-focused firms, recently screened 100 installations to determine their viability for distributed-scale biomass conversion facilities.³¹⁰ The firms compiled myriad statistics and figures to categorize each installation as either a top site, potential site, or poor site for investment in two commercially-proven biomass programs: "(1) a downdraft biomass gasification platform (urban, forest, and crop wastes) and (2) a high solids anaerobic digestion platform (food and other wet wastes)."³¹¹ In tandem, the systems only require a "small footprint and produce electricity, high quality heat, high quality compost, and biochar."³¹² As landfill gas and biomass have not been at the top of the priority list, this is an exciting move that will potentially lead to very secure, clean, and reliable energy.

C. Contingency Basing & Operational Environment

1. Hybrid Intelligent Power Program

The Hybrid Intelligent Power Program, a DOD-funded initiative to develop tactical smart-grid systems that merge traditional power generation with renewable sources, designed and demonstrated a micro-grid proof of concept in the summer of 2012.³¹³ Marnie DeJong, an electrical engineer with the Command, Power, and Integration directorate of the Army's Communications-Electronics Research, Development and Engineering Center, explained that "[m]icrogrid systems are currently the only solution that allows the incorporation

306. See generally Stephen Baack, *2010 GovEnergy Conference Brings Feds, Private Sector Together to Work Energy Issues*, U.S. ARMY (Aug. 27, 2010), <http://www.army.mil/article/44351/2010-govenergy-conference-brings-feds-private-sector-together-to-work-energy-issues/>.

307. William H. Holmes, *Army Announces Forthcoming RFP for Biomass Energy*, RENEWABLE + LAW BLOG (Oct. 17, 2012, 11:07 AM), <http://www.lawofrenewableenergy.com/2012/10/articles/biomass-1/army-announces-forthcoming-rfp-for-biomass-energy/>.

308. *Id.*

309. Sig Christenson, *The Army's Going Green on Fort Bliss*, MY SAN ANTONIO (Jan. 9, 2011), <http://www.mysanantonio.com/news/military/article/The-Army-s-going-green-on-Fort-Bliss-946451.php>.

310. Stephen Piccot, *Biomass to Power at Military Sites—A 100 Base Study*, Discussion post, *Renewable Energy World Group*, LINKEDIN, <http://www.linkedin.com/groups/Biomass-Power-Military-Sites-100-2121068.S.169851745> (last visited Feb. 6, 2013).

311. *Id.*

312. *Id.*

313. Edric Thompson, *Army Successfully Demonstrates Tactical Operations Smart Grid*, U.S. ARMY (Oct. 3, 2012), http://www.army.mil/article/88440/Army_successfully_demonstrates_tactical_operations_smart_grid/.

of multiple technologies, such as renewables and energy storage systems, to supplement traditional power generation techniques.”³¹⁴ While not yet ready to field, this is another promising system that will soon join the family of force multipliers out on the battlefield.

2. “Power Is In Your Hands” & “Call for Action”

In October 2012, the Army launched its new “The Power Is In Your Hands” campaign.³¹⁵ The opening act for this new campaign was the publication of a tri-signed letter on October 22, 2012 from the Secretary of the Army, Chief of Staff of the Army, and Sergeant Major of the Army called “Call for Action.”³¹⁶ The letter was written to their subordinate leaders, Soldiers, and civilians.³¹⁷ The Army leaders called on Soldiers to reduce their energy consumption and change their behavior regarding energy use in general.³¹⁸ The leaders noted that “[w]hen Soldiers start thinking: HOW CAN I USE ENERGY SMARTER?, we know we are on our way.”³¹⁹ The same Army leaders wrote another letter to their subordinates in October 2012 in recognition of October as Army Energy Awareness Month.³²⁰ The highest leaders of the Army stated that “[o]ver-reliance on resources, fossil fuels and connections to vulnerable electric power grids jeopardizes Soldiers’ lives, mission effectiveness and the continued viability of our installations.”³²¹ They further remarked that “[c]onservation, efficiency, sustainability, technology advancements and behavioral change are the pathways to creating an energy- and water-secure Army.”³²² The message appears to show that the Army is challenging all ranks with the responsibility for delivering on the various aspects of energy management. The challenge from the top leadership is a good start, but the real question is if those leaders will educate and empower mid-level leadership and first line supervisors to train, inspire, and lead the masses to conserve, re-use, recycle, and repurpose.

The next day, during the 2012 Association of the United States Army Conference, the Army’s Deputy Chief of Staff, G-4 (Logistics), Lieutenant General Raymond Mason, released a list of ten initiatives to use operational energy smarter.³²³ The list includes, in part, renewable energy programs recently launched that the Army plans to further refine and field. It also includes other related energy saving programs which are part of the overall multi-pronged

314. *Id.*

315. G-4 Public Affairs, *Army Launches Smart Operational Energy Use Campaign; Identifies 10 Initiatives*, U.S. ARMY (Oct. 22, 2012), http://www.army.mil/article/89693/Army_launches_smart_Operational_Energy_use_campaign__identifies_10_initiatives/.

316. *Id.*

317. *Id.*

318. HONORABLE KATHERINE HAMMACK, ET AL., ENHANCING MISSION EFFECTIVENESS THROUGH ARMY POWER AND ENERGY ADVANCEMENTS 10 (Oct. 23, 2012), available at http://www.ousa.org/meetings/2012/annualmeeting/Documents/ILWPresentation_ArmyPowerEnergy.pdf (presentation at Association of the U.S. Army 2012 Annual Meeting displaying a copy of the “Call for Action” letter).

319. *Id.*

320. Letter from Raymond F. Chandler III, Sergeant Major of the Army, Raymond T. Odierno, General U.S. Army Chief of Staff, and John M. McHugh, Sec’y of the Army to U.S. Army on Army Energy Awareness Month: Enhancing Mission Effectiveness (Oct. 2012), <http://usarmy.vo.llnwd.net/e2/c/downloads/266262.pdf>.

321. *Id.*

322. *Id.*

323. G-4 Public Affairs, *supra* note 315.

approach. The ten initiatives are: 1) Soldier Worn Integrated Power Equipment System (SWIPES); 2) Advanced Medium Mobile Power Sources (AMMPS); 3) Apache Aviation Simulator; 4) Tactical Fuels Manager Defense (TFMD); 5) electrical microgrids; 6) energy savings initiatives (ESI); 7) Contingency Basing Standards, Test, and Evaluation programs including the Base Camp Integration Laboratory (BCIL), the Smart and Green Energy (SAGE for Base Camps), and the Kuwait Energy Efficiency Project (KEEP); 8) improved Turbine Engine Program; 9) vehicle modernization; and 10) future platform performance.³²⁴

Finally, the Army is going to build a full-scale contingency operating base at Ft. Leonard Wood, MO “to conduct demonstration, assessment and evaluation of contingency basing capabilities and technologies (power, environmental, sustainable construction, force protection) that support Army requirements and future acquisition decisions.”³²⁵ This full-size mock-up will provide a great venue for implementing and assessing additional renewable energy concepts where Soldiers will train and put the new programs to the test.

V. CHALLENGES

Time is short for the Army to meet its statutory requirements and, more importantly, right now is the time to push its limits to realize energy independence to increase our Nation’s security. Therefore, Part V is a brief examination of some of the key challenges that currently slow or limit renewable energy growth. Finally, after identifying some of these challenges, Part VI will recommend some solutions for these issues and others.

A. Installations

1. Reduce Energy Intensity

Given that the DOD SSPP Subgoal 1.2 is to “produce or procure energy from renewable sources in an amount that represents at least 20% of electricity consumed by facilities,” and that the Energy Policy Act of 1992 as amended by the Energy Policy Act of 2005 requires that not less than 5% of the total amount of electric energy the federal government consumed by FY2010-12 be renewable energy, it is worth looking at the Army’s current statistics.³²⁶

The *ASR 12* reports that, not including thermal renewable energy, in FY2010 the Army procured 2.0% of its electricity (218,000 MWh) from renewable sources, and in FY2011 the Army only procured 0.5% from renewable sources.³²⁷ The Army notes that the FY2011 percentage reduction of renewable energy use is primarily the result of expiring renewable energy credits (REC).³²⁸ In the Assistant Secretary of the Army for Installations, Energy, and Environment’s *Department of the Army Policy for Renewable Energy Credits*,

324. *Id.*

325. Dan Nolan, *Net Zero Conference Part 2: A Guided Tour Down the Rabbit Hole*, THE DOD ENERGY BLOG (Feb. 20, 2012, 3:26 PM), <http://dodenergy.blogspot.com/2012/02/net-zero-conference-part-2-guided-tour.html>.

326. *ASR 12*, *supra* note 32, at 52. These statistics correlate with the Global Reporting Initiative’s (GRI) environmental indicator EN6. *Id.*

327. *Id.*

328. *Id.* at 53-54.

issued May 24, 2012, the Army directed that “the Army shall not purchase RECs solely to meet [f]ederal renewable energy goals.”³²⁹ The good news is that there is an explanation for the apparent reverse of renewable energy procurement, and that explanation is because the Army really wants the increase in renewable energy use to reflect an *actual* increase in renewable procurement and not just a numbers game. While part of the goal is to meet Congressional mandates, the greater purpose is to enhance national security by actually developing energy independence at the installation level. The bad news is that the Army is behind the power curve on both accounts.

Another statistic that should motivate leadership to promptly address conservation, efficiency, and renewable sourcing is the lackluster reduction in energy intensity. During FY2011, the Army reported an 11.8% reduction in energy intensity from the FY2003 baseline.³³⁰ The DOD SSPP Subgoal 1.1 requires that services realize an energy intensity reduction at facilities by 30% from the FY2003 baseline, by FY2015, and 37.5% by FY2020.³³¹ Pretty clearly, the Army will need to make great strides in the next two and half years to reduce energy intensity by another 18%, especially as Soldiers returning from Iraq and Afghanistan continue to stabilize and grow families at their home bases. Even if the anticipated drawdown helps to offset those homeward bound troops and their family members, the Army still has work to do.

2. Renewable Portfolio Standards

Renewable Portfolio Standards, which provide RECs, are central to the Army’s willingness to site renewable energy projects in individual states.³³² While the Army recently decided that RECs will not be purchased *solely* to meet mandated renewable energy goals,³³³ the Army is still very interested in ensuring that as the consumer, and in partnership with private entities, it can purchase both project RECs and replacement RECs.

3. Third-Party Power Purchase Agreements

There is still some question regarding potential roadblocks for renewable energy providers in states that have limitations on third party PPAs.³³⁴ As of November 2012, at least twenty-two states, plus Washington, D.C. and Puerto

329. *Id.* at 54 (quoting Memorandum from the Assistant Sec’y of the Army (Installations, Energy, and Environment) to numerous Principle Officials and Offices, Department of the Army Policy for Renewable Energy Credits (May 24, 2012) [hereinafter Army Policy for Renewable Energy Credits], *available at* <http://armyietf.com/downloads/RenewableEnergyCreditsPolicy.pdf>).

330. *Id.* at 50. These statistics correlate with GRI indicators EN3, 4, and 5. *Id.* at 52.

331. *Id.*

332. Margaret Ryan, *U.S. Military Open for Private Sector Renewable Energy Ideas*, AOL ENERGY (June 15, 2012), <http://energy.aol.com/2012/06/15/us-military-open-for-private-sector-renewable-energy-ideas/#?icid=apb2#page2>.

333. Army Policy for Renewable Energy Credits, *supra* note 329, at 3.

334. KEITH MCALLISTER, U.S. DEP’T OF ENERGY, CLEAN ENERGY APPLICATION CTR., BARRIERS TO MILITARY INSTALLATIONS UTILIZING DISTRIBUTED GENERATION FROM RENEWABLE ENERGY RESOURCES: THIRD PARTY POWER PURCHASE AGREEMENTS 3, 6 (May 2011), *available at* http://www.southeastcleanenergy.org/resources/reports/SERAC_3rd_Party_PPA_Whitepaper_%20110518.pdf.

Rico, authorize third party solar PPAs.³³⁵ In other states, however, state legislatures define or characterize their electric utilities such that a third party developer would be defined as an electric utility.³³⁶ As an electric utility, a web of administrative and regulatory requirements, and adjacent utility coordination, can quickly entangle the renewable energy producer.³³⁷ These sorts of regulatory schemes may drive away partnership opportunities and hinder the mandated transition of military installations.

It seems that a joint reading of 10 U.S.C. § 2922a, 40 U.S.C. § 591, and the Supremacy Clause of the U.S. Constitution would trump any state regulatory scheme that might frustrate the national renewable energy goals, but it isn't clear yet if such is the case.³³⁸ 10 U.S.C. § 2922a, in relevant part, states that “the Secretary of a military department may enter into contracts for periods of up to [thirty] 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. . . .”³³⁹ Then, 40 U.S.C. § 591(b)(2) provides that while, ordinarily, a federal agency (like the Army) may not purchase electricity in a manner inconsistent with state law, the “section does not preclude the Secretary of a military department from . . . entering into a contract under section 2394 [now 2922a] of title 10.”³⁴⁰

The U.S. Navy interprets 10 U.S.C. § 2922a to mean that an energy production facility on withdrawn land, or land under the jurisdiction of the appropriate Secretary such as Secretary of Defense or Secretary of another federal agency such as Navy or Army, may be developed and operated under federal jurisdiction³⁴¹ so long as it is “in the public interest . . . and will not deter commercial development and use of other portions of such resource if offered for leasing.”³⁴² In other words, the Navy is using twenty-year third party PPAs with private developers even if the PPA is potentially inconsistent with state law governing the provision of electric utility services within that state.³⁴³ Therefore, if the Army interprets 10 U.S.C. § 2922a in the same manner, then PPAs in states such as North Carolina, Georgia, Florida, Kentucky, Iowa, and Oklahoma, which seek to protect their utilities and consumers from electricity generation

335. DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, 3RD-PARTY SOLAR PV POWER PURCHASE AGREEMENTS MAP 1, DSIRE SOLAR (Nov. 2012), *available at* http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf.

336. MCALLISTER, *supra* note 334, at 6-8.

337. *Id.*

338. *Id.* at 6-7.

339. *Id.* at 6 (quoting 10 U.S.C. § 2922(a) (2012)).

340. *Id.* (quoting 40 U.S.C. § 591(b)(2)(A) (2012)).

341. CAPT CLAYTON MITCHELL, NAVAL FACILITIES ENGINEERING COMMAND, NAVY USE OF § 2922 AUTHORITY 4 (2011), *available at* http://www.defensecommunities.org/wp-content/uploads/2011/02/CAPT_Mitchell2.ppt. *See also* ADVANCED ENERGY ECON. INST., SUNPOWER: PROVIDING LARGE-SCALE SOLAR POWER TO THE U.S. NAVY WITH INNOVATIVE FINANCING (Jan. 2012), *available at* <http://www.aee.net/files/dmfile/SunPowerCaseStudy.pdf> (discussing the China Lake Naval Air Weapons Station as an example for all services in use of third party power purchase agreements).

342. 10 U.S.C. § 2917(a) (2012) (regarding authorization for development).

343. *See, e.g.*, Def. Cmtys. 360, *China Lake Energy Project Opens Up Rush to the Sun (and Other Renewables)*, ASSOC. OF DEF. CMTYS. (Oct. 31, 2012), *available at* <http://www.defensecommunities.org/headlines/china-lake-energy-project-opens-up-rush-to-the-sun-and-other-renewables/#> (discussing significance of China Lake as the first long term PPA following the new interpretation of § 2922(a)).

agreements outside of their state legislative and regulatory schemes,³⁴⁴ should start from a position of strength in any state challenges against them. If these two federal statutes successfully reign supreme over conflicting state law, then there is no concern. Unrest regarding such conflicts, however, may yet reside with some developers and thus chill their interest in certain states.

4. Detailed & Lengthy Contracting Process

Another challenge is the complexity of the project submission and contracting process. Part of this challenge is that the bar is high for applicants.³⁴⁵ For example, companies proposing to meet solar, wind, biomass, or geothermal needs must “demonstrate that they had designed, financed, built and operated that technology in three or more commercial projects in the United States in the same general application as in the proposed project, and that it has been in operation in each such commercial project for at least three years.”³⁴⁶ They also have some work to do on pricing determinations, which must be low enough to get them through the initial proposal process to the task order stage, but high enough to make money across the life of a thirty-year contract.³⁴⁷ These stringent standards not only limit the potential pool of applicants, but they also make those who are viable candidates engage in some lengthy and detailed planning and documentation before even getting started with one second of project discussion or negotiation.

The other part of the processing time is the rule-laden government contracting process that starts upon the submission of the application. The standards in the Federal Acquisition Regulation (FAR) are exacting and leave very little maneuver room for the federal agency to deviate from the pattern contracting process.³⁴⁸ The selection process takes months to complete and the applying company has absolutely no idea what exactly their eventual project may look like, when it might start, or how lucrative it could be. The FAR makes the process lengthy and limits industry’s ability to research and lean forward on project development.

5. General Critiques

Some commentators are critical of the renewable energy efforts altogether. One of those critics, Daniel Kish, also happens to be the senior vice president of the Institute for Energy Research.³⁴⁹ Mr. Kish argues that the Army’s logic that it needs renewable energy from wind and solar sources because those sources will provide energy during outages in the main grid is a fallacy. “It does not

344. DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, 3RD-PARTY SOLAR PV POWER PURCHASE AGREEMENTS MAP 1, DSIRE SOLAR (Nov. 2012), available at http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf.

345. Dan Nolan, *MATOC Industry Day: More Blind Date Than Match Making*, THE DOD ENERGY BLOG (Aug. 28, 2012, 7:47 AM), <http://dodenergy.blogspot.kr/> (discussing MATOC certification challenges).

346. *Id.*

347. *Id.*

348. *Id.* The Federal Acquisition Regulations (FAR) are codified in Title 48 of the Code of Federal Regulations.

349. Daniel Kish, *Army’s Logic for Developing Wind and Solar Energy Makes No Sense*, U.S. NEWS & WORLD REPORT (Aug. 10, 2012), <http://www.usnews.com/opinion/blogs/on-energy/2012/08/10/armys-logic-for-developing-wind-and-solar-energy-makes-no-sense>.

improve energy security to build sources of electricity that are inherently intermittent and unreliable like wind and solar,” he says.³⁵⁰ Moreover, if the Army is really concerned about using renewables as a way to stabilize or reduce electricity costs for the installations, it would encourage Congress to stop the planned closures of coal-fired electricity generating plants that produce approximately 27 GW of electricity.³⁵¹ Mr. Kish is not alone. There are numerous other critics who think the Army should stick to what it knows – fighting wars.³⁵² In an emerging era of limited resources, some argue the Army and other services need to spend their limited budgets on new weapon systems, training, and personnel, and not devising newer, smarter, more reliable energy sources.

One poster to Mr. Kish’s blog, however, provided a spot-on response. He noted that “hybrid renewable microgrids combine renewable, storage, load management, and backup power to provide the kind of reliability that the emergency services, such as the military, need.”³⁵³ This commentator seems to understand that renewable energy is not about just the isolated wind turbine or solar panel, but rather an entire network of systems. It is the sum of the parts that makes the new strategy and projects so exciting, clean, reliable, and secure.

B. Contingency Basing & Operational Environment

1. Funding

Funding for operational energy development is a challenge as the partnership mechanisms like PPAs, ESPCs, EULs, and others are not available. There is no question but that the Army and some of its federal agency partners are investing heavily in research, development, testing, and fielding of new technologies, but additional appropriated funding is needed now that the DOD and the services have made operational energy innovation a priority task.³⁵⁴ Perhaps more important is the need for Congress to not cut back on funding these developments as budget constraints begin to take effect across the next few years.

VI. RECOMMENDATIONS

In response to some of the aforementioned challenges, Part VI proposes several recommendations for enhancing the Army’s capacity to further develop, implement, and expand renewable energy projects.

One broad recommendation that reaches across both installation management and operational issues is the absolute necessity for inter-service cross-talk. The many DOD strategic level offices on both the uniformed and

350. *Id.*

351. *Id.*

352. *See, e.g.,* Thomas J. Spulak & Allison F. Kassir, *Renewable Energy Initiatives in the Department of Defense*, ENERGY NEWSLETTER (King & Spalding), July 2012, <http://www.kslaw.com/library/newsletters/EnergyNewsletter/2012/July/article6.html> (discussing opponents in Congress).

353. Kish, *supra* note 349 (User Comment by Peter Lilienthal, C.E.O. Homer Energy, Aug. 10, 2012 at 2:28 PM).

354. U.S. DEP’T OF DEF., OPERATIONAL ENERGY STRATEGY: IMPLEMENTATION PLAN 14 (Mar. 2012), available at http://energy.defense.gov/Operational_Energy_Strategy_Implementation_Plan.pdf.

civilian sides, the new task forces, the working groups, and the command teams must share lessons learned. As the reader takes time to review many of the source citation materials, he or she will find that in certain fields or technologies or on certain indicators or metrics, the Air Force, Navy, or Marine Corps is leading the way instead of the Army. Sometimes this disparity is due to the services having different mission requirements, dissimilar weapon systems and mobility platforms, and installations located in different geographic regions. These different driving forces result in development of different types of renewable energy. However, sometimes that disparity is because one service has discovered an answer to a complex problem before the other services. The key going forward is for the DOD to ensure that lessons learned within each service are timely communicated to the other services.

A. Installations

1. Amend the Federal Acquisition Regulation

The DOD and other federal agencies should propose amending portions of the FAR, particularly Part 16.³⁵⁵ As noted above, in Part V, time is money. The renewable energy industry, and probably more importantly the Wall Street investors, do not want to wait for years for contracts to cut their way through the bureaucratic red tape.³⁵⁶ Particularly in times when there is significant uncertainty about repeated short term extensions and possible expiration of the renewable energy enablers, like the production tax credit and other critical legislation, the DOD and other federal agencies need to lobby for simplification of the contracting process. If the DOD and other agencies do not facilitate this change, and instability continues for the emerging renewables industry, the investors may choose to go somewhere else.³⁵⁷

The competitive solicitation method used by the Army, as mandated by the FAR, has a multitude of advantages for the Army and, ostensibly, for the American tax payer. The key advantage for the Army, and most federal agencies seeking to contract for a service or product, is getting the most cost competitive renewable energy project from the most experienced and reliable developers. As noted earlier in Part V, the detailed submissions from prospective private partners must include a demonstration of previous success in the specific renewable energy area(s) the developer proposes to offer to the Army.³⁵⁸ The submission must also include estimated pricing determinations that are sufficiently low, such that the company is a viable candidate in the competitive process.³⁵⁹ The purpose of the acquisition system after all, “is to deliver on a

355. FAR pt. 16 (2012).

356. Stew Magnuson, *Defense Department Needs Investors to Buy Into its Renewable Energy Goals*, NAT'L DEF. (Aug. 2012), <http://www.nationaldefensemagazine.org/archive/2012/August/Pages/DefenseDepartmentNeedsInvestorstobuyIntoitsRenewableEnergyGoals.aspx>.

357. See, e.g., Jacquelyn S. Bryan, Jason L. Richey, & William D. Wickard, *Failure to Extend the Renewable Energy Production Tax Credit: Will It Send Wind Energy Investors Packing for Opportunities Abroad?*, LEGAL INSIGHT (K&L Gates), Sept. 13, 2012, <http://www.jdsupra.com/legalnews/failure-to-extend-the-renewable-energy-p-20713/>.

358. Dan Nolan, *MATOC Industry Day: More Blind Date Than Match Making*, THE DOD ENERGY BLOG (Aug. 28, 2012, 7:47 AM), <http://dodenergy.blogspot.kr/>.

359. *Id.*

timely basis the best value product or service to the customer, while maintaining the public's trust and fulfilling public policy objectives."³⁶⁰ Additional advantages include forcing maximum creativity in technology and implementation advancements, avoidance of credit problems and loss of investor support during the contract negotiation process, and an assessment of other weighted factors apart from only project pricing. The end result should be awards to reliable partners for the most cost-effective projects, and the avoidance of wasting additional time and money in the future on further project development and cost assessments.

The multiple disadvantages, however, are what support this author's argument for considering amendments to the FAR. First, the detailed preparation and due diligence required of the developer and investors means the entity must engage in costly assessments which require significant upfront capital and resources. Second, the lengthy and often unknown duration of the waiting period required for the Army to determine which companies it will select from the solicitation submissions means other opportunities may be lost for the competing parties. These opportunity costs accumulate and can result in profitability losses in the Army project, and other lost business opportunities. Finally, the lengthy waiting period between proposal submission, contract negotiation, and eventual project development and implementation can result in substantial cost estimate changes.³⁶¹ The combination of these disadvantages creates an environment where new or small developers may not be able to even enter into the competitive field. Further, more established developers and investors who otherwise have the capabilities and resources may simply not be willing to participate in the RFP. The months of preparation required, months of lag time waiting for an announcement of awardees, and additional months of contract negotiation, can accumulate into a year or more passing before a developer even gets a cogent vision of what project it will ultimately generate.

Some may argue that the \$7B MATOC is the turning point, that business will not turn away now because the awardees will be holding golden eggs, and the speed of the process and investing in preparing projects to sell will no longer matter. This author argues that the FAR contracting process needed revision before the advent of public-private renewable energy partnerships. The renewable energy contracting projects, which involve matters of national security, military readiness, and economic development, merely further highlight the need for change. Why not streamline a convoluted system now, when it matters for renewables, and also help other agencies with other contracting concerns in other arenas?

2. Grid Modernization & Expansion

Grid modernization and expansion is another concern that merits discussion. For renewable energy investors to seriously consider off-site investment for wind and solar projects, they have to know that a modern transmission line system is in place or on its way to get power to Army

360. FAR pt. 1, 48 C.F.R. § 1.102(a) (2012).

361. See, e.g., Magnuson, *supra* note 356.

installations.³⁶² Similarly, excess power from on-site generation is only valuable to the surrounding community if there is a grid system to carry the load to where the community needs it.

This is a nationwide concern as all jurisdictions are acknowledging that the web of power lines that is decades old will require nearly \$1.5 trillion by 2030 “to maintain, modernize and update the nation’s electric generation, transmission and distribution systems.”³⁶³ Education, understanding, and leadership on this front is required at the highest levels of DOD and Army leadership for purposes of affecting legislation, funding, and policy. Leaders all the way down to the installation level need to appreciate how grid modernization impacts their facilities, coordination with local utilities, and investor interest.

3. Increase Collaboration with Potential Private Sector Partners

The Army’s Deputy Assistant Secretary of the Army for Energy and Security, Mr. Richard Kidd, represented in an August 2012 National Defense Business and Technology Magazine article that the Army’s EITF has identified about eighty potential projects that it is reviewing in an effort to see which projects are simply not viable due to technical, regulatory, or economic concerns.³⁶⁴ He says the Army invests “about \$28 million per year” for front-end project development, review, refinement, and packaging costs.³⁶⁵ The goal is to present attractive, site-appropriate, and cost-effective projects to hook private investors.³⁶⁶ There is little doubt that this screening process is a helpful time-saving mechanism.

Perhaps the EITF might also engage in additional collaborative engagements to increase the number of critical assessments like those done by Concentric Renewable Energy³⁶⁷ which might further speed the overall process, serve to reduce secrecy, and increase transparency regarding investment opportunity.³⁶⁸ In other words, remove the veils that prevent the renewable energy industry from seeing what they need to see to stay interested, get creative, and push the limits of innovation. The Army should not forget that opportunity and financial gain will motivate the private sector to think far outside the box. Leaders at the installation level need to understand this concept as well, as installation command teams have significant flexibility to independently initiate projects smaller than 10 MW.³⁶⁹ Particularly in a period when uncertainty

362. THE COUNCIL OF STATE GOV’TS, MAJOR FEDERAL GOALS ACHIEVED FOR SITING RENEWABLE ENERGY PROJECTS AND THE CHALLENGES AHEAD (Nov. 2012), available at http://knowledgecenter.csg.org/drupal/system/files/siting_renewable_energy_projects.pdf.

363. *Id.* at 2 (citing AM. SOC’Y OF CIVIL ENG’RS, REPORT CARD FOR AMERICA’S INFRASTRUCTURE (2009), <http://www.infrastructurereportcard.org/fact-sheet/energy>).

364. Magnuson, *supra* note 356.

365. *Id.*

366. *Id.*

367. *Example Projects*, CONCENTRIC RENEWABLE ENERGY, <http://concentricrenewableenergy.com/example-projects.html> (last visited Feb. 6, 2013).

368. See, e.g., Dan Nolan, *Other People’s Money for Market Research: Army Invites You to Utah*, THE DOD ENERGY BLOG (Sept. 10, 2012, 6:58 AM), <http://dodenergy.blogspot.kr/> (discussing the value of the Toole Army Depot open house on Oct. 10-11, 2012).

369. Energy Goal Attainment Responsibility Policy, *supra* note 276, at 4.c(1) and (2).

prevails regarding federal subsidies, the Army needs to remind the private sector of the Army's need for renewable energy innovation.

4. Leader Development & Institutional Information Sharing

A closely related issue is collaboration and information sharing. The DOD and the DOI acknowledge that additional legislation maybe required as they, and maybe other federal agencies, determine lead agencies for certain energy efforts, interagency approval processes, and information sharing concerns.³⁷⁰ Just like the DOD is participating in a *whole-of-government* partnership and information sharing approach with other federal agencies,³⁷¹ so too must the Army partner with other services, and the various directorates and commands within the Army itself, to communicate in order to combine resources and share information.

The Army is not the lead in all or even most SSPP metrics. The Navy and Air Force have had great successes in some areas where the Army has struggled. Some of the operational differences are based on organizational requirements for weapon systems, mobility platforms, and service mission sets. The Army, for example, does not have the need for biofuels that the Navy or Air Force has for its aircraft. Similarly, not all services share the same geographic and topographic conditions regarding their installations. The different locations, weather, physical terrain, and geothermal resources set varying conditions from installation to installation, so not all renewable energy technologies are the same for all locations. However, to the extent that lessons learned, industrial contacts, and federal agency affiliations can be shared to speed the developmental process, the services should engage with each other and partner.

Then internally, the Army needs to train its junior general officers and senior field grade officers (lieutenant colonels and colonels), and their senior enlisted advisors who form the command teams for units and installations, on the *purpose* behind this initiative. Additionally, those leaders need to be provided with all the tools, and empowered with all of the authority the Army can power down to them, to rapidly grow the small-scale initiatives outside of EITF's purview. Finally, these command teams need multiple user-friendly venues to share ideas, partner together, and get more of the 155 installations on the map with their own success stories.³⁷² These command teams have spent a career developing leadership and military occupational specialty skill sets, not mastering business model principles and clean energy concepts. If the Army expects growth below the EITF large-scale project level, then it needs to ensure those men and women at the installations and their staffs know what they are doing and why they need to do it.

5. Combination of Solar Energies: Photovoltaic (Electricity) + Thermal (Warming)

As noted earlier in Parts III and IV, solar energy has been at the leading edge of renewable energy in the Army for several years. The Army needs to go

370. Memorandum of Understanding between The Dep't of Def. and Dep't of Interior on Renewable Energy and a Renewable Energy Partnership Plan (July 20, 2012), <http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&pageid=312415>.

371. *Id.*

372. AEWCP, *supra* note 34, at 47.

one step further to generate even more energy from its future solar projects by combining photovoltaic (for electricity) and thermal (for heating) in the same project. Studies show, and industry proves, that the cost effectiveness and operational efficiency is enhanced when the two systems are installed simultaneously.³⁷³ In fact, recent examples show that “PV-thermal (PV-T) systems can generate four times the energy produced from the same surface area for only a 25% increase in cost.”³⁷⁴

6. Improve Water Conservation, Increase Efficiency, and Increase Security

As noted earlier in Part III, there is a fundamental relationship between water and energy. For that reason, it is imperative that the Army continue to account for those aspects of water security which are fully integrated with renewable energy development. The *Army Energy and Water Campaign Plan for Installations* of 2007 discussed five specific water initiatives³⁷⁵ which the Army directly incorporated into the *Army Energy Security Implementation Strategy*, the Army’s sustainability plan, and then again recently included in the *2012 Army Campaign Plan*, Objective 8.0 as major objective #3.³⁷⁶ All of this policy focus demonstrates that the Army understands and is committed to proper water management and security, but three particular areas merit mention here because of how critical they are to the renewable energy effort.

First, the Army has to further decrease its water intensity through better water conservation. Relative to the FY2007 baseline, the Army’s water intensity decreased by 15.3% in FY2010, but then only decreased by 10.3% in FY2011.³⁷⁷ The reason the trend slightly reversed was because the water intensity actually increased between FY2010 and FY2011 by 1.8 gallons per gross square foot.³⁷⁸ As previously noted regarding the energy intensity figures, the Army may be challenged to meet the DOD SSPP goals as more Soldiers return from forward deployed locations to their home installations. This is primarily a personal responsibility issue, but the individual Soldier will only conserve the water and reduce waste if he is educated, trained, encouraged, and supported. That means the primary way to arrest the increasing water intensity is for leadership to engage the Soldiers about efficient use of the resource. The elimination of energy waste and conservation of water resources are two of the five initiatives in the *Army Energy and Water Campaign Plan for Installations*;³⁷⁹ this concept is not new but yet the Army is still losing the fight on this issue.

Second, as the United States continues to rebound from the recent years of recession and Congress continues to look for areas to reduce the Defense budget,

373. See, e.g., George Marsh, *Solar PV and Thermal – A Marriage Made in Heaven*, RENEWABLE ENERGY FOCUS (July 15, 2010), <http://www.renewableenergyfocus.com/view/10922/solar-pv-and-thermal-a-marriage-made-in-heaven/>.

374. *Id.*

375. AEWCP, *supra* note 34, at i, 33, 85.

376. The 2012 Army Campaign Plan (2012 ACP) is not publicly available. If the reader would like to view or procure some portion of the 2012 ACP, he or she should direct the Inquiry to the Office of the Assistant Secretary of the Army (Installations, Energy, & Environment); see also U.S. ARMY, ARMY CAMPAIGN PLAN 2012 (Feb. 2012) (unclassified presentation) (on file with author).

377. ASR 12, *supra* note 32, at 10, 18.

378. *Id.*

379. AEWCP, *supra* note 34, at i, 33, 85.

it cannot cut back on improving the Army's installations infrastructure. All of the funding strategy discussion for installation level commanders throughout the *Army Energy and Water Campaign Plan for Installations*³⁸⁰ is of little consequence if Sustainment, Restoration, and Modernization money is not in the budget for efficiency improvements like replacing the many dated and woefully inefficient water faucets, shower heads, toilets, pipes, insulation, boilers, and heaters. As the Army barracks, command buildings, support facilities, and housing communities continue to age and require replacement, Military Construction funds cannot diminish. Also, graywater reuse initiatives which use treated graywater to irrigate green spaces or resource waste treatment facilities are also intelligent and cost-effective ways to conserve water.³⁸¹

Congress annually shorts the Army on Sustainment, Restoration, and Modernization and Military Construction funding by about 20%.³⁸² As budgets are reduced going into the next NDAA, the old adage "do more with less" simply will not work for improving energy and water efficiency. Appropriate funding is required to recapitalize water utilities and improve overall Army infrastructure whether through Sustainment, Restoration, and Modernization or Military Construction funding, or alternate funding sources for privatization contracts.

Finally, as surface and ground water remain subject to climate change impacts (i.e., drought, hurricanes, typhoons, floods, etc.) and the water utilities (i.e., transportation, pump, and management systems) remain subject to cyber-attacks or loss of power from natural disasters, general water security must remain part of the greater national security equation. At the strategic and policy level the Army seems to be well aware of the water security concern as evidenced by its incorporation of the water security objective into the *2012 Army Campaign Plan*,³⁸³ but the installation projects are the area of concern. The same argument as above, regarding leadership education and institutional information sharing, applies here. Commanders and their staffs need training to understand the impacts of securing surface and ground water as they develop renewable geothermal, biomass, and hydroelectric projects, which require significant water supplies to operate. Just as important as it is to ensure the military installations are secure in their access, the Army must also remain cognizant of resource sharing and community relations with the population centers adjacent to Army installations.

Improvement in water conservation, graywater reuse or repurpose, infrastructure systems efficiency, and general water security will not only help the Army to meet its statutorily mandated water management goals, but those efforts will also help the Army attain its own Net Zero initiative goals, support

380. *See generally id.*

381. *See, e.g.,* RICHARD J. SCHOLZE, U.S. ARMY ERDC-CERL, GRAYWATER USE BY THE ARMY—IS IT TIME YET? (May 11, 2011), *available at* <http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA563690> (presentation at the Environment, Energy & Sustainability Symposium, New Orleans, Louisiana).

382. ARMY WATER SECURITY STRATEGY, *supra* note 127, at 30.

383. The 2012 Army Campaign Plan (2012 ACP) is not publicly available. If the reader would like to view or procure some portion of the 2012 ACP, he or she should direct the Inquiry to the Office of the Assistant Secretary of the Army (Installations, Energy, & Environment); *see also* U.S. ARMY, ARMY CAMPAIGN PLAN 2012 (Feb. 2012) (unclassified presentation) (on file with author).

the development of renewable energy initiatives, and strengthen our Nation's security.

B. Contingency Basing & Operational Environment

This author's two recommendations for contingency base and operational initiatives are focused on leadership and motivation. Without concerted efforts from the top, the innovations in the field will not be valued by Soldiers, will not be properly used by the Soldiers, and will not be improved with feedback from the Soldiers.

First, Soldier education, understanding, and acceptance are critical. Our Army is filled with intelligent men and women who will use the supplies the Army provides and will do what they are told. But those same bright Soldiers will embrace the new innovations discussed throughout Parts III and IV, and really take them the extra mile if they are educated on their value and asked for their feedback on how to improve the systems. Otherwise, when the end-user is dissatisfied with the performance of the new solar battery blanket because he does not know how to use it properly or because it does not work as well as or better than the traditional batteries, he will revert to what he knows works. The *Call for Action* letter from Sergeant Major of the Army Chandler set the tone for charging Soldiers down to the lowest ranks with energy management responsibility. Such an exhortation from the senior enlisted Soldier in the entire Army who is charged with advising the Chief of Staff of the Army carries great weight. His directives matter, and the Army's subordinate leaders will listen, but without additional emphasis this type of message will quickly slip down the list of priorities for America's warfighters. A simple letter (which most Soldiers will never see) and a few battlefield circulation visits will not get the message to the bulk of the Soldiers. Instead, energy education at the officer and non-commissioned officer education schools is needed to inform and challenge the Army's first line supervisors. When the Army leadership communicates that operational energy and installation energy management is critical for Army operations, and communicates to each of those leaders that they will be held responsible for implementing these new policies at the small unit level, then we will see action. Then, those lower level unit leaders will share that education, encourage creative ways to implement the energy plans, and ensure compliance down to the lowest level.

Second, the development of contingency base and deployed environment tools in great part grew out of necessity. The intense driving force of getting the tools discussed above to the Soldiers in the combat zones will begin to fade as the Iraq theater is closed out and the Afghanistan theater begins significant troop reductions this year. The Army cannot lose the bubble on contingency basing and operational energy progress as it begins drawing down. The urgency may be gone, but the investment must continue.

VII. CONCLUSION

This author endeavored to highlight some of the U.S. Army's recent developments in renewable energy policy, systems, and projects, identify the primary challenges that continue to slow or hinder progress, and then offer several recommendations for paving the way ahead. Part I introduced the reader to the subject matter and outlined the rest of the article. Part II presented a

timeline to explain how and why the Army is on its current course of renewable energy development. Part III examined where the Army is today through discussion of Army strategy, success stories at the 155 Army installations, and new technology introduced at contingency bases and in operations on the battlefield. Part IV summarized the Army's plan for the way ahead, and Part V addressed some of the key challenges which currently slow or limit renewable energy growth. Finally, Part VI proposed several recommendations for enhancing the Army's capacity to further develop, implement, and expand renewable energy projects.

If this effort is going to meet Congress' and the President's developmental goals, the Army must continue what it is doing well and improve where it is lacking. More importantly, in order to save lives on the battlefield, reduce greenhouse gas emissions, reduce its exposure to price volatility, increase installation energy independence, and strengthen our national security, the Nation needs, and Americans should want, the Army on point for renewable energy.

TABLE OF TERMS

AD	Army Directive
AEWCP	Army Energy and Water Campaign Plan for Installations
AMMPS	Advanced Medium-Sized Mobile Power Sources
ASR 12	Army Sustainability Report of 2012
Btu	British Thermal Unit
CASI	Center for the Advancement of Sustainability Innovations
DA	Department of the Army
DOD	Department of Defense
DODI	Department of Defense Instruction
DOD SSPP	Department of Defense Strategic Sustainability Performance Plan
DOE	Department of Energy
DOI	Department of Interior
EITF	Energy Initiatives Task Force
EO	Executive Order
EPA	Environmental Protection Agency
ERDC	Engineer Research and Development Center
ESCO	Energy Service Company
ESPC	Energy Savings Performance Contracts
EUL	Enhanced Use Leasing
FAR	Federal Acquisition Regulation
FEMP	Federal Energy Management Program
FY	Fiscal Year
GHG	Green House Gases
KWH	Kilowatt Hour
LOO	Lines of Operation
MATOC	Multiple-Award Task Order
MW	Megawatt
NDAA	National Defense Authorization Act
PPA	Power Purchase Agreements
QDR	Quadrennial Defense Review
REC	Renewable Energy Credit
REPPS	Rucksack Enhanced Portable Power Systems
RFP	Request for Proposals
RPS	Renewable Portfolio Standards
SEC	Senior Energy Council
TGER	Tactical Garbage to Energy Refinery
UESC	Utility Energy Service Contract
USC	United States Code
USACE	United States Army Corps of Engineers
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics