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The Art of the Deal: How Can the Air Force Successfully Execute Renewable Energy Transactions?

13 December 2010

by

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ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
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ABSTRACT

The purpose of this paper is to explore the methods the Air Force uses to procure renewable energy. To comply with Executive Order 13423, agencies must ensure that at least half of all renewable energy required under the Energy Policy Act of 2005 comes from new renewable sources (developed after January 1, 1999; Department of Energy, Laws and Regulations, n.d.). The Air Force is currently on track to meet the requirements of this legislation and is also the Department of Defense (DoD) leader in total renewable energy procured. The contracting tools used to procure renewable energy are Power Purchase Agreements and Enhanced Use Leases. The processes involved with Power Purchase Agreements and Enhanced Use Leases are unique and challenging. Additionally, renewable energy procurement includes many other participants or interested parties, which is contrary to the standard contracting process. Working within this renewable-energy arena requires the use of public–private partnerships in order for these deals to be successful. This paper will describe and evaluate the entire process used to procure renewable energy including parties involved, tools to execute, examples of successful projects, and it will explain how the Air Force can better support the procurement of renewable energy.

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ACRONYMS

AFCAP—Air Force Contract Augmentation Program

AFCESA—Air Force Civil Engineering Support Agency

AFI—Air Force Instructions

AFPD—Air Force Policy Directive

AFRPA—Air Force Real Property Agency

BTU—British Thermal Unit

DoD—Department of Defense

DoDIG—Department of Defense Inspector General

ESCO—Energy Services Company

FAR—Federal Acquisition Regulation

FY—Fiscal Year

IDIQ—Indefinite Delivery, Indefinite Quantity

kW—Kilowatt

kWh—Kilowatt hours

LPTA—Lowest Priced, Technically Acceptable

MW—Megawatt

RDT&E—Research, Development, Test, and Evaluation

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EXECUTIVE SUMMARY

Budget constraints and funding reductions have driven the Department of Defense (DoD) to obtain 2–3% net annual growth in warfighting capabilities without incurring a commensurate budget increase by identifying and eliminating unproductive or low value-added overhead; in effect, the DoD has had to do more without more (Under Secretary of Defense, Acquisition, Technology, and Logistics [USD(AT&L)], 2010). This push to create savings, along with federal legislation such as Executive Order 13423, mandates that agencies manage energy savings along specific consumption baselines. To meet the executive order requirements, the Air Force is leading the way in procuring renewable energy, using wind, sunlight (photovoltaic), water, landfill and sewage methane gas, biomass, and the earth's heat (geothermal). The contracting tools used to procure renewable energy are Power Purchase Agreements and Enhanced Use Leases. Generally, renewable energy contracts and the writing of Power Purchase Agreements and Enhanced Use Leases are managed by the Air Force Civil Engineering Support Agency (AFCESA) or the Air Force Real Property Agency (AFRPA), respectively. These Field Operating Agencies are the Air Force experts in the field of renewable energy procurement. The contracting community is new to the renewable energy business. Historically, the purchase of fossil-fuel energy consisted simply of civil engineering paying the installations electric bill each month to the local utility. Renewable energy essentially empowers the Air Force base to become its own utility by creating electricity from a renewable source. This paper will describe and evaluate the entire process used to procure renewable energy including parties involved, tools to execute, examples of successful projects, and it will explain how the Air Force can better support the procurement of renewable energy.

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I. INTRODUCTION

A. OVERVIEW

The purpose of this chapter is to provide the reader with an introductory layout of this research. The research background presents the basic environmental information and the objectives of the study. The research questions guide the study, while the organization of the discussion clarifies the research. The benefits of the study relate to the significant impact of renewable energy contracts on the Air Force as well as the DoD as a whole.

B. BACKGROUND

The Air Force is the top purchaser of green power in the federal government, an Environmental Protection Agency Green Power Partner, and among the top 20 On-Site Green Power Purchasers in the Nation (U.S. Air Force, 2010b). Although the Air Force leads the DoD in renewable energy procurement, the circumstances involved with renewable energy procurement present many challenges. Specifically, the contract vehicle, contract period, interested parties, and market conditions make renewable energy procurement especially challenging. The contract vehicles used to procure renewable energy (power purchase agreements and/or enhanced use leases) coupled with the contract period (usually 10–20 years) are outside the norms of the contract management process. These challenges combined with the robust renewable energy contracting environment (consisting of technical, financial, and political influences) are atypical for the contracting community. Additionally, the renewable energy industry is in its early stages of development and has only begun to see technology markets mature. These factors add to contract risk for both the government and renewable energy contractors. This paper will identify the current procedures for procuring renewable energy, analyze the power purchase agreement and enhanced use lease against the six-phase contract management process, evaluate the challenges and risk associated with

renewable energy procurement, and propose the path forward for the future procurement of renewable energy within the Air Force.

C. OBJECTIVES OF THE STUDY

In this exploratory study, we will provide the reader with an understanding of every aspect that goes into completing a renewable energy deal. The paper is organized intuitively, beginning with the legislation that directs the DoD to use renewable energy and then moving to the agencies within the Air Force that are responsible for carrying out the legislative direction and the contract vehicles used to complete the deal. We close Chapter II by introducing the contract management process and by exploring executive orders and federal, DoD, and Air Force renewable energy policy. Next, we assess field operating agency responsibilities, specifically AFCESA and AFRPA. We then evaluate the purpose and make-up of power purchase agreements and enhanced use leases and study how the contract management process is applied to each of these contract vehicles. Next, we perform an analysis of the renewable energy industry and introduce how the public–private partnership concept will be the linchpin in the successful execution of these renewable energy deals. Finally, we propose a path forward for Major Commands (MAJCOM) and installations to better support renewable energy procurement.

D. RESEARCH QUESTIONS

1. How is contracting for renewable energy different from that of a typical commodity or service contract?
2. How can Air Force contracting professional's better support renewable energy procurement?
3. What is the role of public–private partnership in renewable energy procurement?

E. ORGANIZATION

Chapter 1 provides the introductory information for the research, with the background structure, study objectives, research questions, chapter organization,

and the research benefits. Chapter II provides the literature review, starting with definitions of fossil fuel and renewable energy sources, and the tools used to procure renewable energy and ending with an introduction to the contract management process, which is used as a framework for evaluating the renewable energy procurement process. It continues with policy, specifically, the Energy Policy Act of 2005 and Executive Order 13423 and then all applicable legislation and ending at the Air Force Energy Plan, which was updated in 2010. Chapter III narrows the scope of the research and examines the field operating agencies' involvement in renewable energy procurement. It also identifies the tools used in renewable energy procurement, specifically power purchase agreements and enhanced use leases. Chapter III concludes by evaluating the challenges and risk from both the government and industry perspective. Chapter IV begins with an analysis of the renewable energy industry via the Porter's Five Forces Model. Next, we introduce the public–private partnership concept and evaluate the role it plays in renewable energy procurement. We conclude the research paper in Chapter V by answering the research questions, providing lessons learned, and presenting areas for further research.

F. BENEFITS OF THE STUDY

This exploratory study intends to provide Air Force contracting professionals with a roadmap for procuring renewable energy. This study benefits contracting professionals by identifying public–private partnership as a way to better link up with all parties involved in renewable energy procurement, and in doing so, be a better team member and business advisor to their customer. This study benefits civil engineering by identifying potential areas that create technical risk for industry and their partners. This study benefits the Air Force by identifying issues that cause risk to industry, which results in higher prices to the government. The Air Force can work to alleviate the risk to industry and thus receive better pricing on renewable energy proposals. This study provides industry with some insight into government contracting practices and processes, enabling them to prepare better proposals for renewable energy.

Most important, it opens the door for the government and industry to collaborate with the ultimate goal of putting together a better renewable energy deal.

G. SUMMARY

This chapter provided the reader with an introductory layout of the research. The research background introduced the renewable energy environment and identified the main areas of discussion. The research questions presented here guide the discussion thinking, while the organization of the paper clarifies the research. The benefits of the study relate to the significant impact of renewable energy use within the Air Force. The next chapter will provide a literature review on renewable energy.

II. LITERATURE REVIEW

A. INTRODUCTION

This literature review begins by defining key terms associated with renewable energy acquisition, then identifies the contract management six-step process and concludes with a discussion of the policy involved with renewable energy. This literature review follows an intuitive sequence, especially in the area of policy, beginning with the Energy Policy Act of 2005 and following the policy trail to the Air Force Energy Plan.

B. DEFINITIONS

1. Fossil Fuels

Fossil fuels—coal, oil, and natural gas—provide more than 85% of all the energy consumed in the United States, nearly two-thirds of our electricity, and virtually all of our transportation fuels (Department of Energy, 2010b). Fossil fuel energy is also known as brown power. Formed from plants and animals that lived up to 300 million years ago, fossil fuels are found in deposits beneath the earth and are a nonrenewable source of energy. The fuels are burned to release the chemical energy that is stored within these resources (Chughtai & Shannon, n.d.). It is likely that the nation's reliance on fossil fuels to power an expanding economy will actually increase over the next two decades, even with aggressive development and deployment of new renewable and nuclear technologies (Department of Energy, 2010b).

2. Renewable Energy

Renewable energy is derived from natural sources that replenish themselves over short periods of time. These resources include solar, wind, hydro, landfill and sewage methane gas, biomass, and the earth's heat (geothermal). This renewable energy can be used to generate electricity, among other applications (Department of Energy, 2004). Renewable energy within itself may exhibit substantially more price stability than fossil-fuel based energy

(Schatsky, 2009). According to a 2008 report by the government-sponsored National Renewable Energy Laboratory, “whether a utility owns its renewable generation or purchases renewable energy through a power purchase agreement, the price is known and essentially fixed over time.”

3. Types of Renewable Energy

a. Solar: Photovoltaic cells and modules can be configured to almost any size from a few kilowatts (kW) up to more than one megawatt (MW). On-site photovoltaic cells may be situated on schools, homes, community facilities, and commercial/government buildings. Photovoltaic cells can be made part of a building, displacing other building material costs, such as roofing shingles or car park shading (Department of Energy, 2010c).

b. Wind: Wind turbines vary in size. A typical small unit provides fewer than 25 kW, whereas large turbines range from 500 kW to more than 3 MW. On-site applications are usually only possible in nonurban areas and often require zoning permits if they are to exceed 35-foot height restrictions (a tower for a 250-kW turbine is 130 feet high with a blade sweep of 98 feet). Such installations usually require approximately one acre of land per turbine and wind speeds that average 15 mph at a 50-meter height. In addition, placing turbines near tall buildings is inadvisable because the building may create wind turbulence that can disrupt the turbines' performance (Department of Energy, 2010c).

c. Hydro: Hydro energy is taken from water and converted to electricity. Hydro energy can be obtained using many methods of capture. The most common method is a hydroelectric dam, in which water flowing through an area

causes turbines to rotate, and the energy is captured to run a generator. Power can also be generated from the energy of tidal forces by using the energy created by waves (Green Energy Help Files, 2010).

d. Landfill and Sewage Methane Gas: Methane gas derived from landfills or sewage treatment plants may be used to generate electricity. Methane gas also may be generated using digesters that operate on manure or agricultural wastes. The methane gas is converted to electricity using internal-combustion engines, gas turbines (depending on the quality and quantity of the gas), direct-combustion boilers and steam-turbine generator sets, microturbine units, or other power-conversion technologies. Most methane gas projects produce from 0.5 to 4 MW of electrical output (Department of Energy, 2010c).

e. Biomass: Biomass is plant material burned in a boiler in order to drive a steam turbine and produce electricity. This system is good for producing combined heat and power at facilities with large thermal loads. Biomass projects are best suited to locations with abundant biomass resources (often using waste products from the forest industry or agriculture; Department of Energy, 2010c).

f. Geothermal: Geothermal energy is derived from the natural heat of the earth. The earth's temperature varies widely, and geothermal energy is usable for a wide range of temperatures from room temperature to well over 300°F. Geothermal reservoirs are generally classified as being either low temperature (<302°F) or high temperature (>302°F). Generally speaking, the high temperature

reservoirs are the ones suitable for, and sought out for, commercial production of electricity (Idaho National Laboratory, 2010).

4. Renewable Energy Certificates

Renewable energy credits are increasingly seen as the currency of renewable electricity and green power markets. Buyers can select renewable energy credits based on the generation resource (e.g., wind, solar, geothermal), when the generation occurred, as well as the location of the renewable generator. Renewable energy credits can be bought and sold between multiple parties, and they allow their owners to claim the renewable electricity that was produced from that credit (Environmental Protection Agency [EPA], 2008).

Renewable energy credits represent the environmental and other non-power attributes of renewable-electricity generation and are a component of all renewable-electricity products. Renewable energy credits are measured in single megawatt-hour (1MW) increments and are created at the point of electric generation as shown in Figure 1 (EPA, 2008).

Renewable energy credits usually include the following primary attributes and information:

- The type of renewable resource producing the electricity,
- The vintage of the renewable energy credit (i.e., the date when it was created),
- The vintage of the renewable generator or the date when the generator was built,
- The renewable generator's location,
- The renewable energy credit's eligibility for certification or renewable portfolio compliance, and
- The renewable generation's associated greenhouse gas emissions (if any). (EPA, 2008)

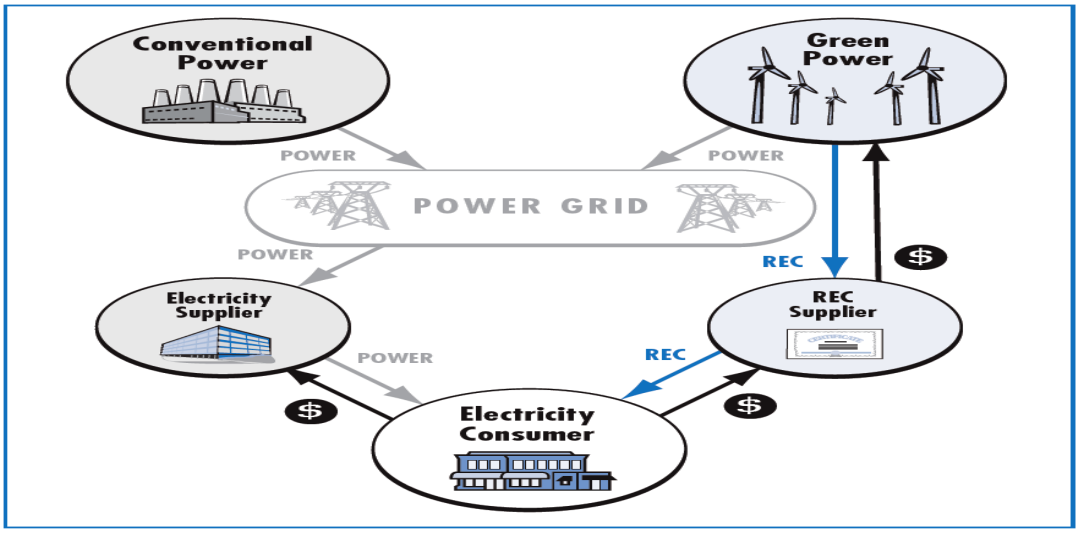

Figure 1. Power Grid
(Department of Energy, 2010c)

5. Energy Savings Performance Contract

An Energy Savings Performance Contract (ESPC) is an indefinite delivery, indefinite quantity (IDIQ) contract that allows agencies to accomplish energy projects for their facilities without up-front capital costs and without special congressional appropriations to pay for the improvements. The Department of Energy has six regional super energy savings performance contracts awarded across the United States, managed through the Federal Energy Management Program (FEMP, 2010).

An energy savings performance project is a partnership between the customer (agency) and an energy services company. The energy savings company conducts a comprehensive energy audit and identifies improvements that will save energy at the facility. In consultation with the agency customer, the energy service company designs and constructs a project to meet the agency's needs and arranges financing to pay for it. It guarantees that the improvements will generate 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. Contract terms up to 25 years are allowed (Federal Energy Management Program, 2008).

6. Utility Energy Savings Contract

Utility energy savings contracts offer federal agencies an effective means to implement projects to promote energy efficiency, renewable energy, and water efficiency. In a utility energy savings contract, a utility arranges financing 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. The net cost to the federal agency is minimal, and the agency saves time and resources by using the one-stop shopping provided by the utility (Federal Energy Management Program, 2010).

7. Power Purchase Agreement

Power purchase agreements allow agencies to finance on-site renewable energy projects with no up-front capital costs incurred. With a power purchase agreement, a developer installs a renewable energy system on agency property under an agreement that the agency will purchase the power generated by the system. The agency pays for the system through these power payments over the life of the contract. After installation, the developer owns, operates, and maintains the system for the life of the contract (Department of Energy, 2010a). Power purchase agreements are primarily used for energy projects in which the energy produced will be consumed in-whole by the agency.

8. Enhanced Use Lease

An enhanced use lease allows underdeveloped and non-excess military facilities and real property assets to be leased to private and public entities (Air Force Real Property Agency, 2009). This arrangement maximizes the utility and value of the installation's real property and provides additional tools for managing the installation's assets to achieve business efficiencies. Enhanced use leases give installation commanders the opportunity to enter into long-term leases, providing greater flexibility for facility use and reuse and the ability to receive cash or in-kind consideration for income on leased property (U.S. Army Corp of

Engineers, 2010a). A typical enhanced use lease project is managed in five phases:

1. Project Identification,
2. Project Definition and Acquisition,
3. Lease Negotiation and Closing,
4. Post-closing Management, and
5. Project Closeout. (U.S. Army Corp of Engineers, 2010a)

9. Public–Private Partnership

A public–private partnership is a contractual agreement between a public agency (federal, state, or local) and a private-sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to sharing resources, each party shares in the risks and rewards in the delivery of the service or facility (National Council for Public–Private Partnership, n.d.).

C. Contract Management Process

The contract management process consists of six phases: procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout or termination. The Federal Acquisition Regulation (FAR) provides guidance into each of these phases. Table 1 lists the main areas within the FAR to look for guidance for each of the six contract management process phases. The contract management process will be the framework for our evaluation of power purchase agreements, enhanced use leases and public–private partnership throughout Chapters III and IV.

Table 1. Contract Management FAR Guidance
(FAR, 2010)

CONTRACT MANAGEMENT PHASE	FAR PART/REFERENCE
Procurement Planning	FAR 7: Acquisition Planning
Solicitation Planning	FAR 10: Market Research FAR 11: Describing Agencies Needs FAR 12: Acquisition of Commercial Items FAR 13: Simplified Acquisition Procedures FAR 16: Types of Contracts
Solicitation	FAR 5: Publicizing Contract Actions FAR 6: Competition Requirements FAR 9: Contractor Qualifications
Source Selection	FAR 14: Sealed Bidding FAR 15: Contracting by Negotiation
Contract Administration	FAR 42: Contract Administration and Audit Services FAR 46: Quality Assurance
Contract Closeout or Termination	FAR 4.804: Closeout of Contract Files FAR 49: Termination of Contracts

1. Procurement Planning

Procurement planning is determining what to procure and when (Garrett, 2003). This phase also includes the make-or-buy decision, which in the case of renewable energy you could say we are choosing to make energy versus simply buy it from the utility. Other considerations during this phase are market conditions, constraints, assumptions, risk management, contract type and contract terms and conditions. These considerations are all included in the market research and they play a key part in the success or failure of the project.

Additionally, the statement of work and procurement management plan is developed during this phase.

2. Solicitation Planning

Once you have done your homework, it's time to begin preparing your solicitation. Developing and communicating requirements through the solicitation is one of the most critical functions in contract management. The solicitation tells industry what you want and how you want it; the solicitation must be thorough and concise to be effective. This phase includes the completion of the statement of work and evaluation criteria, which are included in the solicitation along with the terms and conditions. When the government is unsure about key portions of the requirement, it may use a sources sought notice, request for information, or post the statement of work as a draft copy to solicit comments from industry. The information received from industry before formally issuing of the solicitation can be used to validate assumptions and answer key questions, thus preventing delays and confusion once the solicitation is issued.

3. Solicitation

Solicitations can take the following forms: request for proposals, request for quotations, request for tenders, invitation to bid, invitation for bid, and invitation for negotiation. Solicitations should communicate the buyer's needs clearly and concisely. Better solicitations from the buyer generally result in better prices, quicker response time, and more offers. Conversely, poorly communicated solicitations can result in delays, confusion, fewer bids or proposals, and lower-quality responses. The solicitation contains the bid schedule, terms and conditions, qualification requirements (if any), statement of work, drawings, specifications, evaluation criteria, and instructions to offerors.

4. Source Selection

The source selection phase is where you evaluate the proposals received as a result of your solicitation. Source selection may be as simple as determining the lowest price or it may involve months of proposal analysis, plant

visits, prototype development and testing. The instructions to offerors in the solicitation told industry what to submit and how that submission would be evaluated. Now, it's the contract manager's job to ensure that proposals are evaluated in strict accordance with the solicitation. The areas common to source selection evaluation are technical, cost, and past performance. This phase is especially important because you are selecting not only a contractor but, in some cases, a business partner to perform important services.

5. Contract Administration

Contract administration is the process of ensuring compliance with contractual terms and conditions throughout the life of the contract (Garrett, 2003). Good oversight holds contractors accountable; poor oversight often leads to waste, fraud, and abuse of taxpayer dollars (Project on Government Oversight, 2010). During contract administration, Contracting Officers are responsible for ensuring technical personnel are not only trained but also carry out the requirements of the quality assurance plan.

6. Contract Closeout or Termination

After the parties have completed the main elements of performance, they must settle final administrative and legal details before closing out the contract. Unfortunately, contracts are sometimes terminated due to the mutual agreement of the parties or due to the failure of one or both of the parties to perform all or part of the contract (Garrett, 2003).

D. POLICY/GUIDANCE

This section will provide an overview of the policies and guidance in place to assist federal agencies in pursuing and executing renewable energy initiatives.

1. Energy Policy Act 2005

The first major energy legislation passed by Congress since 1992, the Energy Policy Act of 2005 was signed into law by President Bush on August 8, 2005. The act provides revised annual energy reduction goals (2% per year

beginning in Fiscal Year [FY] 2006). It also provides revised renewable energy purchase goals and reauthorized the use of ESPCs until October 1, 2016 (EPA, 2005).

The new law replaces the energy portions of Executive Order 13123, issued in 1999, which required federal "industrial facilities," such as laboratories, to reduce their energy intensity (from an FY-1999 baseline) by 20% before FY 2005 and by 25% before FY 2010. The act requires agencies to reduce energy intensity every year in their buildings—on a BTU-per-gross-square-foot basis and from an FY-2003 baseline—by 2% per year beginning in FY 2006, up to a cumulative 20% reduction by the end of FY 2015 (EPA, 2005).

The act created new federal government-wide goals for green power purchases on an escalating scale from 2007 to 2013 and beyond. The major purposes of the renewable energy portion of the act are to increase production and use of renewable energy, advance technology development, and promote commercial development of RE (Holt & Glover, 2006). The act created goals to increase dependency on renewable sources and to decrease use of non-renewable energy sources. The goals for electricity consumption derived from renewable sources are at least 3% for 2003 to 2009, at least 5% for 2010 to 2012, and at least 7.5% for 2013 and beyond. In addition, the act encourages federal solar-energy projects, particularly through the General Services Administration (EPA, 2005). The EPAct 2005 provides agencies with attainable renewable goals.

2. Executive Order (EO) 13423: Strengthening Federal Environmental, Energy, and Transportation Management

EO 13423 was signed on January 24, 2007, to strengthen key goals for the federal government. It set more challenging goals than the Energy Policy Act of 2005 and superseded Executive Order 13123, Greening the Government through Efficient Energy Management and Executive Order 13149, Greening the

Government through Federal Fleet and Transportation Efficiency, both of which were enacted to further promote renewable energy initiatives. Executive Order 13423 set numerous federal energy and environmental management requirements in several areas, including but not limited to

- Implementing instructions,
- Reducing energy intensity,
- Increasing use of renewable energy,
- Reducing water intensity, and
- Designing and operating sustainable buildings. (Department of Energy, n.d.b)

The Executive Order 13423 policy states, "Federal agencies will conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner" (Council on Environmental Quality, 2007).

a. Implementation Instructions:

> The Federal Government has made significant progress in improving environmental and energy performance through a series of executive orders, memoranda of understanding, and other guidance. Executive Order 13423 intends to build on that body of work and success by integrating and updating prior practices and requirements into a cohesive, strategic approach to further ensure enhanced performance and compliance with statutory and other legal requirements (Council on Environmental Quality, 2007).

Section 2 of Executive Order 13423 directs agencies to implement sustainable practices for

- Energy efficiency and reductions in greenhouse-gas emissions;
- Use of renewable energy;

- Acquisition of green products and services;
- Pollution prevention, including reduction or elimination of the use of toxic and hazardous chemicals and materials;
- Cost-effective waste prevention and recycling programs;
- Increased diversion of solid waste; and
- Sustainable design/high-performance buildings. (Council on Environmental Quality, 2007)

b. Reducing Energy Intensity: Executive Order 13423 requires agencies to reduce energy intensity by 3% each year, leading to a 30% decline by the end of FY 2015 compared to an FY 2003 baseline. This goal was given the weight of law when ratified by the Energy Independence Security Act of 2007 (Department of Energy, n.d.b).

c. Increasing Use of Renewable Energy: To comply with Executive Order 13423, agencies must ensure that at least half of all renewable energy required under Energy Policy Act of 2005 comes from new renewable sources (developed after January 1, 1999). To the maximum extent possible, renewable energy-generation projects should be implemented on agency property for agency use. Agencies can also purchase renewable energy to help meet Executive Order 13423 requirements (Department of Energy, n.d.b).

d. Reducing Water Intensity: Agencies are mandated to reduce water intensity (gallons per square foot) by 2% each

year through FY 2015, for a total reduction of 16% based on water consumption in FY 2007 (Department of Energy, n.d.b).

e. Designing and Operating Sustainable Buildings: Agencies are required to ensure new construction and major renovations comply with the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding, which was signed at the White House Summit on Federal Sustainable Buildings (Department of Energy, n.d.b).

The 2006 memorandum of understanding has a number of goals and objectives. The signing of this memorandum marks the first interagency effort supporting sustainable design practices in federal facilities. As such, it represents a historic step in creating a sustainable federal government and serves as a linchpin for the sustainable building provisions in Executive Orders 13423 and 13514. The memorandum establishes a common set of sustainable guiding principles for integrated design, energy performance, water conservation, indoor environmental quality, and materials aimed at helping agencies and organizations:

- Reduce the total ownership cost of facilities,
- Improve energy efficiency and water conservation,
- Provide safe, healthy, and productive built environments, and
- Promote sustainable environmental stewardship. (National Institute of Building Sciences, 2006)

It also requires that 15% of the existing federal capital asset building inventory of each agency incorporate the sustainable practices in the guiding principles by

the end of fiscal year 2015 (National Institute of Building Sciences, 2006). Executive Order 13423 provided federal agencies the green light to implement renewable energy initiatives; the next section narrows how these requirements apply to the DoD.

3. *United States Code* Title 10, Section 2911

Title 10, section 2911 of *United States Code* (U.S.C.) establishes energy performance goals for the DoD. Specifically, it calls for the Secretary of Defense to submit to the congressional defense committees the energy performance goals for the DoD regarding transportation systems, support systems, utilities, infrastructure, and facilities. In addition, the DoD's established energy performance goals shall be submitted annually, not later than the date on which the president submits to Congress the budget for the next fiscal year under section 1105 of title 31. The goals should cover that fiscal year as well as the next five, ten, and twenty years. The Secretary of Defense is also tasked with identifying changes to the energy performance goals since the previous submission (U.S. Congress, House of Representatives, 2010).

The code establishes the following goals for the DoD regarding use of renewable energy to meet facility energy needs: (1) to produce or procure not less than 25% of the total quantity of facility energy it consumes within its facilities during fiscal year 2025 and each fiscal year thereafter from renewable energy sources, and (2) to produce or procure facility energy from renewable energy sources whenever the use of such renewable energy sources is consistent with the energy performance goals and energy performance plan for the DoD and supported by the special considerations specified in subsection (c), titled Acquisition Process (U.S. Congress, House of Representatives, 2010). The specific plan to meet these goals is captured by the Air Force in its Energy Plan. Although U.S.C. title 10, section 2911 focused on DoD requirements, the Air Force went further to serve as a model innovator in renewable energy.

4. Air Force Energy Plan

The Air Force Energy Plan serves as the operational framework for all military and civilian Air Force personnel in communicating the Air Force energy goals, objectives, and metrics. The Air Force Energy Plan (U.S. Air Force, 2010a) aligns with the goals outlined in the Air Force Strategic Plan (U.S. Air Force, 2006) and is aligned under the Agile Combat Support Master Plan. This Strategic Plan codifies the Air Force's strategic Priorities, Goals and Objectives in accordance with the intent of the National Security Personnel System and the President's Management Agenda (U.S. Air Force, 2006). The Agile Combat Support Master Plan is the foundation of global engagement and the linchpin that ties together Air Force distinctive capabilities. It includes the actions taken to create, sustain, and protect aerospace personnel, assets, and capabilities throughout the spectrum of peacetime and wartime military operations. Further, it supports the unique contributions of aerospace power: speed, flexibility, and global reach (Acquisition Community Connection, 2010). Air Force energy goals, objectives, and metrics are specified in the Air Force Energy Plan, as well as the cross-functional governance and management structure of all levels of the Air Force command responsible for executing the Air Force Energy Policy stated in the Air Force Policy Directive (AFPD) 90-17, Energy Management, and Air Force Instruction (AFI) 90-1701, Energy Management, both dated July 16, 2009 (U.S. Air Force, 2010a).

The Air Force Energy Plan is built upon three pillars that guide energy management within the Air Force. Each pillar of the plan is equally important. The pillars of the Air Force Energy Plan are (a) to reduce demand, (b) to increase supply, and (c) to encourage cultural change, each of which is further discussed in detail (U.S. Air Force, 2010a).

Reduce Demand: The Air Force is committed to reducing aviation, ground operations, and installation energy demand. The goals and objectives developed to reduce demand cover each of these areas and provide the framework for each executing organization (U.S. Air Force, 2010a).

Increase Supply: The Air Force is committed to increasing the amount of energy supplies available to enhance our nation's energy security. When possible, the Air Force will develop and utilize renewable and alternative energy to reduce greenhouse-gas emissions. The goals and objectives to increase supply target these three areas: aviation fuel, ground fuel, and installation energy (U.S. Air Force, 2010a).

Encourage Culture Change: Changing the Air Force culture is critical to achieving the Air Force's energy vision. As the culture changes and the Air Force increases its energy awareness, new ideas and methodologies for operating more efficiently will emerge as airmen consider energy in their day-to-day duties (U.S. Air Force, 2010a).

What drives the Air Force to take such an active approach to better manage how it operates? The following synopsis will answer this question.

Synopsis of Air Force Energy Use: The Air Force is the largest consumer of energy in the U.S. federal government, as its mission and global operations require a tremendous amount of energy. In fiscal year 2008, the Air Force spent approximately $9 billion to fuel aircraft and ground vehicles and to provide utility services (primarily electricity and natural gas) to installations. The Air Force is also the largest purchaser of renewable energy in the federal government and is continuously seeking out interagency and industry partnerships to expand its renewable portfolio (U.S. Air Force, 2010a).

As the Air Force modernizes aircraft, satellites, and equipment, new energy technology will be incorporated into these systems to enhance the energy efficiency of Air Force operations. To optimize energy usage across mission areas, it is imperative that the Air Force continually refine its Energy Plan and create a culture that is mindful of the footprint it leaves on the environment, while still producing combat power and yielding options for America (U.S. Air Force, 2010a).

Energy is a critical component of Air Force strategy and sustainability. Due to the magnitude of energy consumed by the Air Force, any actions taken to reduce energy consumption and procure alternative or renewable energy sources are significant in their potential impact for enhancing energy stewardship and national security (U.S. Air Force, 2010a).

Energy End-State Goals to Achieve by 2030: The Air Force's energy end-state goals are designed to ensure that the Air Force progresses toward energy management considerations that will position the Air Force as a cutting-edge leader in the arenas of renewable energy, alternative fuels, advanced design systems, and sustainability (U.S. Air Force, 2010a). The following list highlights those goals directly related to the objective of this research; other goals are listed in the complete Energy Plan.

- Bases meet Air Force energy-security criteria while optimizing the mix of on-base and off-base generation;
- Forward Operating Bases are capable of operating on renewable energy;
- Research, Development, Test, and Evaluation (RDT&E) has delivered the new cost-effective energy technologies necessary to substantially reduce demand and increase supply; and
- Acquisitions prioritize energy as a key consideration (U.S. Air Force, 2010a).

Creating a Framework for Energy Management Across the Air Force: This calls for a plan built upon three pillars: reduce demand, increase supply, and cultural change. Each pillar has been defined and further developed to include implementing goals, objectives, and metrics.

Constraints and Assumptions That Impact Implementation: In order to successfully execute the energy initiatives set forth, the Air Force recognizes four challenges: funding, operations tempo, energy expertise, and manpower resources (U.S. Air Force, 2010a).

Funding requires targeted investments in projects that enhance the Air Force's ability to affect substantial reductions in energy usage rates and

enhancements in domestic energy supplies. Funding drives the pace of energy initiatives; therefore, funding must be aligned and balanced to support the transformational changes required to realize Air Force energy goals and objectives. Additionally, the cost-savings potential associated with Air Force energy management measures will help mitigate future budgetary constraints and energy price volatility, unless the Air Force is successful in reducing its budget and spending concomitantly. The Air Force needs to provide options to manage financial and operational challenges generated by the cost and availability of oil and other forms of energy (U.S. Air Force, 2010a).

National security is directly affected by mission readiness and the ability to respond at a moment's notice. As U.S. military operations reach a global scale, operations tempo drives energy consumption rates higher. With the uncertain pace of U.S. military operations in the future, the Air Force must integrate energy management strategies seamlessly into operations practices now to ensure the capability to sustain its mission requirements in the future. Enhancements in operational efficiencies will not only save energy and money, but can also extend the lifespan of equipment and reserves of energy supplies, thus reducing the vulnerabilities associated with replenishing forces and equipment during operational endeavors (U.S. Air Force, 2010a).

Energy expertise and manpower resources are limited. The Air Force recognizes that effecting a culture change is a monumental task. Expert energy knowledge is required, and energy experts enable outcomes by exercising a functional understanding of how energy systems work in the context of the Air Force. These experts must share their knowledge and provide leadership in designing energy initiatives from the unit level up to the major command level (U.S. Air Force, 2010a).

The Air Force will need to collaborate with other federal government agencies that specialize in energy issues and to access opportunities for applying knowledge and technologies in Air Force operations (U.S. Air Force,

2010a). This cultural change includes all parties—military, civilian, and contractor support alike. The environmental engineer, the contracting officer, and the personnel specialist all will take active roles in effecting change.

Innovative Financing Advisory Working Group: This group's purpose is to explore, identify, and analyze best financial approaches to support the Energy Plan. Funding all energy programs and projects using traditional funding methods will not enable the Air Force to reach its energy goals. The Air Force budget simply does not have the capacity or the capability to fund energy projects, which has been a major challenge facing the group. To bridge this gap, the Air Force is exploring partnerships with industry through innovative programs, such as the EULs, PPAs, and ESPC Program. Additionally, the U.S. federal government is increasingly exploring public–private partnerships for the execution of energy development projects.

As the Air Force implements the Energy Plan, the Innovative Financing Advisory Working Group will continue to provide financial insight and work with the Office of the Secretary of Defense to gain support for energy legislative initiatives and proposals with a financial impact. Alternative financing mechanisms can help the Air Force achieve its energy goals and priorities. As federal regulations continue to emerge around renewable and alternative energy, demand for technological innovation will also emerge and require adequate financing streams that can be accomplished through public–private partnerships. Innovative financing will provide the Air Force with innovative energy sources and innovative energy savings (U.S. Air Force, 2010a).

E. SUMMARY

This literature review defined key terms associated with renewable energy transactions. Next, it introduced the contract management process and provided FAR guidance references for each of the six phases. From there, the policy and guidance section synopsized what is required of federal agencies, the DoD, and the Air Force. All information was presented in an intuitive sequence, specifically

from the Energy Policy Act of 2005 to Executive Order 13423, to U.S.C. title 10, chapter 2911, and finally to the Air Force Energy Plan. The next chapter will provide information on the organizations within the Air Force that procure renewable energy (specifically AFCESA and AFRPA) and the contracting tools (power purchase agreements and enhanced use leases) that are used to carry out these deals. Additionally, the power purchase agreement and enhanced use lease process will be evaluated against the contract management process.

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III. THE U.S. AIR FORCE AND RENEWABLE ENERGY

A. INTRODUCTION

The Air Force uses Field Operating Agencies to manage its renewable energy procurement. These experts reside at the Air Force Civil Engineer Service Agency (AFCESA) and the Air Force Real Property Agency (AFRPA), located at Tyndall AFB, FL, and Randolph AFB, TX, respectively. Both agencies are heavily staffed with civil engineers; they receive contracting support from their supporting MAJCOM, the Air Education and Training Command. AFCESA and AFRPA each procure renewable energy, but they use different tools and procedures. AFCESA uses and specializes in power purchase agreements, while AFRPA uses and specializes in enhanced use leases.

In Chapter 2, the contract procurement vehicles for renewable energy included the energy savings performance contract, utility energy savings contract, power purchase agreement, and enhanced use lease. The energy savings performance contract and utility energy savings contract are both IDIQ contract vehicles, thus making award through these contracts less complex. You can use an IDIQ to pave a road, or replace 1000 light bulbs, but you lose the ability to capture innovation. IDIQ type contracts limit or reduce latitude and flexibility, because the line items, terms and conditions and prices have already been negotiated and pre-priced. For the purposes of this research, our intent is to focus on the more complex and potentially more rewarding contract vehicles: the power purchase agreement and the enhanced use lease. This chapter will study in depth the agencies and contracting tools used to procure renewable energy and conclude with the challenges and risks associated with pursuing the renewable energy deal.

1. AIR FORCE CIVIL ENGINEERING SUPPORT AGENCY (AFCESA)

The Air Force Civil Engineer Support Agency (AFCESA), with headquarters at Tyndall Air Force Base, FL, is a field operating agency that reports to the Office of the Civil Engineer of the Air Force at Headquarters, U.S. Air Force, Washington, DC. AFCESA provides tools, practices, and professional support to maximize Air Force civil engineer capabilities in base and contingency operations. The staff comprises technical and professional experts in a variety of areas, including engineering, emergency management, training, pavement analysis, fire protection, explosive ordnance disposal, aircraft arresting systems, and energy management.

The staff is made up of nearly 400 members of the military, civilians, and contractors. These professionals provide expertise in three core competencies: readiness, operations, and energy. Agency functions are organized under six divisions: Readiness Support, Operations and Programs Support, the Air Force Facility Energy Center, Contract Support, Field Support, and Mission Support. For the purposes of this paper, we will focus on the energy and contract support sections.

The Air Force Facility Energy Center at AFCESA is made up of more than 50 engineers and energy experts, who identify, evaluate, and help implement technologies and funding strategies to enable the Air Force to meet and surpass federal energy goals. They focus on these key areas: conservation, renewable energy, capital investment, utility privatization, and utility rates management.

The Contract Support Division manages long-term, multibillion-dollar programs. One, called the Air Force Contract Augmentation Program (AFCAP), provides contingency support in the areas of design, construction, service contracts, logistics, and just-in-time commodity solutions. AFCAP is used by combatant and major commands, as well as other U.S. government agencies, to support a wide spectrum of response, such as natural disaster recovery, humanitarian relief efforts, and rapid global force projection to meet urgent U.S.

National Command Authority Objectives. The other program, called the Sustainment, Restoration, and Modernization Program, provides project–execution support to bases as they maintain, update, and restore their facilities and infrastructure (Air Force Civil Engineering Support Agency [AFCESA], 2010).

2. AIR FORCE REAL PROPERTY AGENCY (AFRPA)

AFRPA, with headquarters in San Antonio, TX, is a field operating agency within the office of the Assistant Secretary of the Air Force for Installations, Environment, and Logistics. The agency manages the Air Force real property portfolio. The mission of the Agency is to acquire, manage, and dispose of all Air Force-controlled real property worldwide. AFRPA has 230 civilian personnel and contractors, including specialists in real property, environmental cleanup and compliance, financial management, facility operations and maintenance, public affairs, environmental and real estate law, civilian personnel, and information systems.

AFRPA addresses the Air Force's immediate and long-term real property management needs. AFRPA's divisions provide a full spectrum of real property expertise and a suite of programs to maximize asset value, ensure asset viability, and provide increasing value to the warfighter. The Strategic Asset Utilization division manages value-based transactions, including enhanced use leases, as a means of extracting additional value from Air Force assets. Strategic asset utilization provides the Air Force with “top-tier professionals” armed with modern, effective strategies to create opportunities that benefit the warfighter. The division conducts AFRPA's post-closing management program and is leading the Air Force's efforts in joint basing (Air Force Real Property Agency [AFRPA], 2010).

The AFCESA and AFRPA manage the procurement of renewable energy. The next section will cover the power purchase agreement and enhanced use lease starting with a side-by-side comparison of each, as captured in Table 2.

Table 2. Contracting Options Comparison
(King, 2010)

CONTRACTING OPTIONS COMPARISON		
	Power Purchase Agreement	**Enhanced Use Lease**
DESCRIPTION	A contract whereby a developer installs a renewable energy system on agency property for an agency commitment to purchase the power generated. Developer cost recovery occurs through these power payments over the life of the contract	A lease allowing agencies to out-lease available non-excess real property to the private sector in return for cash and/or in-kind consideration
AUTHORIZATION	None specific to PPA	Title 10 U.S.C. section 2667. Section 2812 of H.R. 5408, Public Law 106-398. AR 405-80. DFAS-IN Reg 37-1
COMPETITION	Depends on specific situation	Competition required
CONTRACTING PARITY	Contracts with developer or utility provider	Contracts with private developer
PERFORMANCE	Provider has incentive for maximum performance-payment based on solar electricity produced	Guaranteed performance negotiable
TERM	Depends on authorities used. 10 years allowed using FAR Part 41, 30 years allowed for the DoD using 2922A, 20 years & longer allowed using WAPA	Varies by Agency
OPERATION & MAINTENANCE	O&M typically included	Negotiated
TITLE/OWNERSHIP RETENTION	Owned by renewable developer. Contract terms determine energy prices and buyback options	Agency-owned. May be sub-leased
POTENTIAL COMBINATIONS	Can be combined with ESPC, UESC, or EUL. PPA requires a land use agreement – typically a lease or easement	ESPC, UESC, and/or PPA
FINANCING COMBINATIONS	Appropriate funding may potentially be used to supplement the project	Developer provided funding

3. POWER PURCHASE AGREEMENT

Power purchase agreements feature a variety of benefits and considerations for agencies. Benefits include (a) no up-front capital costs; (b) ability to monetize tax incentives; (c) typically, a known, long-term energy price; (d) no operations and maintenance responsibilities; and (e) minimal risk to the agency. Some considerations agencies must take into account include (a) federal sector experience with PPAs is still growing, (b) contract term limitations, (c) inherent transaction costs, and (d) challenges with site access contracts and concerns (Department of Energy, 2010a). Figure 3 shows the feasibility of the power purchase agreement.

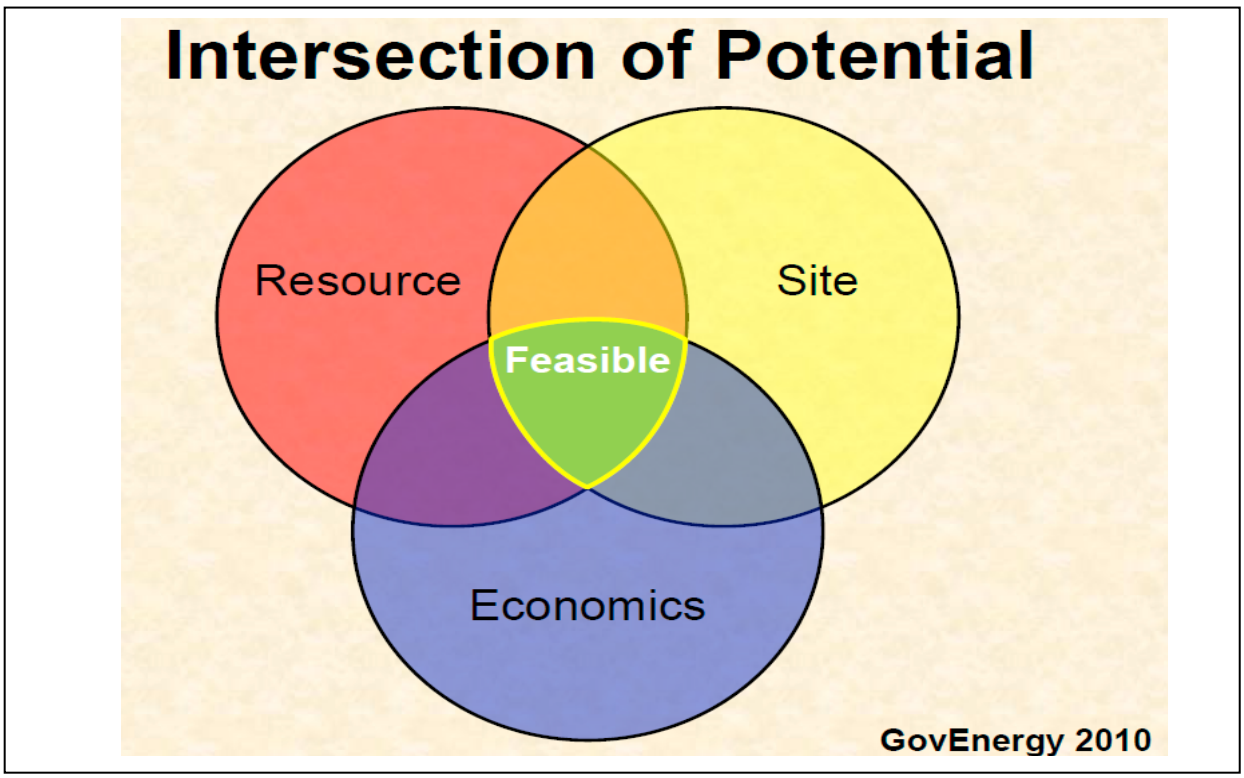

Figure 2. Power Purchase Agreement Feasibility Chart
(Dumont, 2010)

Resource Feasibility: To determine resource feasibility, a resource review must be performed as different RE types are not available or reasonable within different areas of the country. For example, the western United States has a great feasibility for geothermal and concentrating solar thermal, whereas the central U.S. offers a strong wind-energy base. Detailed maps of resource availability for the United States can be found at the National Renewable Energy Lab's website (http://www.nrel.gov/).

Economic Feasibility: Economic feasibility should be evaluated with the goal of creating a win–win situation. The evaluation team should consider points of view from both the customer and the developer. Some of the factors to consider are energy and demand costs, renewable energy credit sales income, standby tariffs, cost of capital, tax incentives and rebates, operations and maintenance costs, production credits, and construction costs. The evaluation of economic factors is critical to the success of the project and must be accomplished thoroughly and accurately. Partnering and engaging in frank, open discussions is absolutely necessary to achieve economic feasibility for all parties.

Site Feasibility: Site feasibility can make or break a project. The project team must review installation maps to identify access to utilities and topography and to ensure maps are current and accurate. Site feasibility determines the following land requirements for each type of RE:

- Solar 10 to 14 acres/MW,
- Wind 15 to 20 acres/MW,
- Biomass/WTE: < 2 acres (excluding source), and
- Geothermal Power: 1 to 8 acres/MW. (Snook & Dumont, 2010)

The feasibility chart (Figure 3) reinforces the small window of opportunity for successful renewable energy project execution. However, with the right team and a close partnership among all parties, it can be successful. The Air Force's example of success is seen in the DoD's first photovoltaic array project, which is also North America's largest array.

Nellis Air Force Base Photovoltaic Project: The Air Force's seminal power purchase agreement project for renewable energy was conducted at Nellis AFB, NV, in 2007. The Nellis AFB power purchase agreement was highlighted at the 2008 GovEnergy Conference in Phoenix, AZ, held August 3–6, 2008. According to the slides presented by Mr. Steve Dumont, Air Combat Command Energy and Facility Management Branch, the Nellis AFB 14 MW project was completed on 140 acres located within the property line of Nellis AFB, of which 45 acres were previously a landfill. Three proposals were received, and a single round of clarifications led to all proposals being placed in the competitive range. The competitive range is a determination by the contracting officer to identify proposals that have a reasonable chance of being selected for award of a contract (FAR, 2010). The result was a contract award 141 days after standing up the team at a final price of 2.2¢/kWh.

The solicitation called for a performance-based/pay only for KWh delivered requirement, and all power would be consumed by Nellis AFB via direct connection to the base grid. The developer would be responsible for designing, financing, building, and operating the array and would sell the power produced to Nellis AFB at a firm-fixed price with a negotiated escalation factor applied. Nellis AFB would sign an indefinite utility contract with the developer and provide the land via a ground lease. The proposals were evaluated as lowest priced, technically acceptable (LPTA). The technical evaluation consisted of the following four factors: (1) performance plan, (2) financial capability, (3) implementation plan, and (4) quality management plan. Past performance and cost were also evaluated using standard contracting methods. The Air Force has identified 15 solar projects it hopes to construct and bring on line by 2013, three of which are as big as or bigger than the 14 MW array at Nellis AFB, NV (U.S. Air Force, 2010b). Next, we evaluate the Nellis AFB power purchase agreement within the framework of the six-phase contract management process.

Contract Management Process—Nellis AFB Photovoltaic Project: The Nellis AFB project identifies many challenges for both the government and

industry when evaluating it through contract management process framework. Team dynamics and expertise, time, goals of interested parties, and project feasibility played a key role in the procurement process for this project. Now let's look at the six phases of the contract management process.

Procurement planning. With this being the first renewable energy deal done by the Air Force, there was no template to follow when conducting procurement planning. Defining the requirement posed many unknowns and the team frequently had to contact outside sources, such as subject matter experts when preparing the statement of work.

Solicitation planning. Defining the scope and limitations of the project and having to work with forms that are not typical to the standard procurement process, such as lease documents and power purchase agreements, posed a challenge to the team during solicitation planning. Also, certification issues had to be addressed, which resulted in the contractor being certified by the local utility, which was another area unfamiliar to the project team.

Solicitation. The issued solicitation brought many questions from interested parties, 20 pages in total. This is an area familiar to contracting personnel, but an area that requires careful monitoring and attention. The timely response and advertising of that response to all parties is critical to meeting scheduling goals.

Source selection. As stated above, the Nellis AFB team chose to issue a LPTA contract model, and they received three proposals, which were all considered within the competitive range. Under this model, the team had to first determine if the proposal met the technical requirements, which were (1) performance plan, (2) financial capability, (3) implementation plan, and (4) quality management plan. Next, past performance submissions were limited to up to six of the offeror's largest projects of similar scope. Recency was determined to be within five years of the date of the proposal. Under most circumstances, recency

is within 3 years, but possibly given the magnitude and complexity of this project they chose to use five years. The proposal preparation instructions were listed in Section L: Instructions, Conditions, and Notices to Offerors, of the solicitation. After 141 days, the contacting officer signed the award to Powerlight Corporation and the contract administration phase began.

Contract administration. The contractor is responsible for building and then maintaining the renewable energy infrastructure for the next twenty years. This was not a MILCON project, the contractor was leased the government's land to build this photovoltaic array and then sell the power it generates back to the government. However, getting the necessary manpower on base to complete this $115-130M effort caused a significant burden on the pass and registration department. This was the biggest complaint post-award from the contractor on-site representative. They did not anticipate the administrative burden or the time, up to two weeks, required to get workers approved to come on base. With a very aggressive six-month construction period, this caused additional risk to the contract success. Additionally, this is an area the government can engage to possibly lower proposed prices on future projects. Having a 20-year performance period versus a standard base and option periods is interesting for a couple of reasons. First, there are no price fair and reasonable determination requirements, because there are no options; the contract is for twenty years or until it's terminated. Second, there is no language in the contract concerning price adjustment, up or down. This contact was pre-priced for twenty years into the future with a simple escalation applied to the initial kWh price based on competition.

Contract closeout or termination. Contract closeout will be tricky with this requirement because the contract is priced for 20 years, but the lease that accompanied the award is indefinite. The term of the contract is indefinite and shall continue in effect until terminated at the option of the Government by giving written notice of not less than 365 days in advance of the effective date of the

termination. Default is a topic of concern for both the government and industry, as seen from this question posed by a potential offeror during the solicitation phase. Question: the RFP is silent as to the course of action the Government will pursue should there be a shortfall of estimated contract deliveries in any given year. Will that be addressed in the lease document or is the power being contracted for on a "best effort" basis? Answer: the Air Force will purchase the power produced by the PV array and deliver to the Nellis AFB electrical distribution system. The successful offeror is expected to make a best effort to produce power at the rate proposed and there is no shortfall penalty defined in the RFP. However, failure to produce power at the rate proposed could be considered as a default. Next we will discuss another contract vehicle for renewable energy: the enhanced use lease.

4. ENHANCED USE LEASE

Beyond bricks and mortar construction, and maintenance and operations, the EUL program requires specialized third-party private and federal sector financial management expertise, integrated with the ability to negotiate complex partnerships through public–private transactions with investors, capital providers, insurers, real estate developers, state and local code compliance enforcement entities, non-profit organizations, and community partners (Association of Defense Communities, 2010).

Enhanced use leases are opportunities for the Air Force to partner with private industry by leasing non-excess real property. This tool can be used to acquire numerous assets, such as office space, flight line and hangar facilities, warehouses and industrial buildings, laboratories, research and development facilities, energy co-generation plants, hotels and temporary lodging, conference centers, and hospitals and medical facilities (AFRPA, 2010).

The Air Force utilizes enhanced use leases to optimize resources and obtain value from non-excess capacity as defined in the Federal Property Administrative Services Act, AFI 32-9002, titled "Use of Real Property Facilities,"

and as determined by Installation or MAJCOM. An enhanced use lease allows underdeveloped and non-excess military facilities/real property assets to be leased to private and public entities. Through cooperation between Installations and MAJCOMs, proceeds from EULs are used to return value to the warfighter (AFRPA, 2009).

An enhanced use lease is an outgrant between the Air Force and some public or private interest that is willing to pay fair market rental value for the use of an Air Force asset. Outgrants in the form of a lease are authorized by the Military Leasing Act, title 10 *United States Code* (U.S.C.) section 2667 and title 12 U.S.C. section 1770 (for federal credit unions), which provides, in part, that "conditions on leases—a lease under subsection (a) (4) shall provide for the payment (in cash or in-kind) by the lessee of consideration in an amount that is not less than the fair market value of the lease interest, as determined by the Secretary" (AFRPA, 2009). This authority broadens the installation's opportunity to make best use of its real property, thus empowering leadership to manage assets that maximize efficiencies across the entire portfolio.

The Military Leasing Act provides flexibility in the way the Air Force may receive fair market value by authorizing consideration in the form of cash or in-kind goods or services. Regardless of the type of in-kind consideration received, the in-kind goods or services provided by the lessee must equal or exceed the fair market value of the leasehold interest. Otherwise, the lessee must provide additional cash consideration to make up the deficiency.

Eligible property primarily includes four types of assets: land, facilities, equipment, and natural infrastructure. The Military Leasing Act requires that the asset be under the control of the military department and be non-excess as defined by the Federal Property and Administrative Services Act. In general, non-excess assets are defined as those that are not anticipated to be necessary for the duration of the lease, but which the Air Force may need at a future date or needs to retain ownership of for a mission-related reason.

The prospective lessee's use of the asset must be compatible with adjacent Air Force uses. In selecting candidate assets, consideration should be given first to operational and force protection issues. If the asset is easily severable from the installation, it may be possible to minimize operational and force protection impacts (AFRPA, 2009).

A typical enhanced use lease project is managed in four phases, project identification, project definition and acquisition, lease negotiation and closing and post-closing management. Each phase is further described in the following paragraphs and is based on the "Enhanced Use Lease Playbook," volumes one and two, each dated May 10, 2009.

The first phase, project identification, determines the feasibility of a proposed project. The stakeholders from the Installation, MAJCOM, Headquarters Air Force/The Civil Engineer (HAF/A7C), and AFRPA work together to make this determination by developing a concept opportunity study to evaluate potential returns and risks associated with the project. All projects will be evaluated by AFRPA to determine the appropriate risk/return levels for the Air Force. Upon completion of this evaluation, the MAJCOM concerned will request approval to proceed to Phase II and initiate mission compatibility screening by HAF/A7C to vet any mission or environmental concerns. Procurement planning is initiated in conjunction with the enhanced use lease project identification phase. It is here the stakeholders take into consideration what market conditions exist and possible constraints. By looking at the benefits the Air Force will potentially gain through this enhanced use lease, it can assess how to manage risk. Essentially, it allows the team to determine if the benefit of pursing the project will outweigh the additional risk.

The second phase, project definition and acquisition, focuses on identifying the highest and best use of the non-excess asset. AFRPA leads a deal team, which produces a business case analysis analyzing the project's viability from operational, force protection, environmental, and financial

standpoints as well as identifying the type of consideration (cash or in-kind) that will be sought. It includes sending out a request for qualifications, holding one or more industry days, issuing a request for qualification solicitation, request for qualification evaluation and a highest ranking offeror selection. This phase ends with a competitive selection of a developer that will undertake the project. In this phase, the contract management phases, procurement planning is continued, solicitation planning, solicitation and source selection are executed.

The contracting team works closely with the government team in developing and communicating the requirements to industry. The requirement includes what the evaluation criteria will be, submittal requirements, organization conflict of interest, and what the Air Force plans to achieve through the enhanced use lease, including existing utility capacity on site, existing improvements on site, existing infrastructure and installation information, all necessary to prepare the potential offerors with the necessary information to prepare their response. All of this information translates to the solicitation planning phase of contract management. The requirement along with the enhanced use lease process will be discussed and fully shared at the industry day. Upon conclusion of the industry day, a solicitation will be issued.

The request for qualification solicitation differs from the contract management solicitation phase in that it seeks out qualified offerors only. The terms and conditions and price are not negotiated in an enhanced use lease until the next phase, lease negotiation and closing. Source selection is related to the enhanced use leases phases of request for qualification solicitation and qualification evaluation. The government team evaluates the request for evaluation responses from all offerors. Discussions are permissible in this phase, giving offerors the opportunity to orally explain their vision for the enhanced use lease project.

Upon conclusion of discussions, the government team evaluates the received proposals and offerors presentations. The criteria set forth in the

request for qualifications are used to assign a rating for each sub-factor of the proposal under evaluation. The sub-factor ratings are used to rank the offerors and reach consensus on the highest ranked offeror.

In the third phase, lease negotiation and closing, is a continuation of the contract management source selection phase. The Air Force engages in lease negotiations with the developer to finalize the arrangements of the lease. It includes refining construction and demolition, relocation, property management, leasing and marketing, maintenance, capital repair and replacement, environmental management, and historic preservation plans and the lease terms. The Air Force also informs Congress on the intent to lease. This phase ends with the signing of the lease by the authorized Air Force signatory.

The fourth phase, post-closing management, is responsible for asset/portfolio management of the project for the length of the lease (typically 50 years). It is primarily concerned with efficiently managing the terms and conditions of the deal. This phase closely resembles the contract administration phase. It includes conducting quarterly and annual reports based on data reported by the installation and lessee in accordance with the lease documents and compliance checklists. It is also in this phase that contract closeout or termination will commence. The government will coordinate the receipt of final closing legal documents and verify completeness and accuracy.

The Air Force has several renewable energy enhanced use lease projects in progress, but is not reporting on any completed projects. However, the U.S. Army was the first agency to execute a renewable energy enhanced use lease project at Fort Detrick, MD, with the project fully operational as of April 2008. The Army and Fort Detrick selected Keenan Development to market, finance, develop, manage, and operate a central utility plant on the installation (U.S. Army Corps of Engineers, 2010b).

The central utility plant produces steam, chilled water, and conditioned power to meet the energy requirements of the National Interagency Biodefense

Campus, which includes the U.S. Department of Agriculture, Centers for Disease Control, Department of Health and Human Services, Department of Homeland Security, the U.S. Army, and the U.S. Navy. It includes numerous sustainable design features, such as high combustion-efficient boilers, high efficiency chillers and primary pumps as well as use of solar energy.

Keenan Development provided the leadership and insight essential to the project's successful financial and organizational structure, with such approved by all pertinent federal authorities, including the United States Army Corps of Engineers and the DoD. The project's success included secured alternative financing, a design to support specialized research equipment, and other unique challenges of partnering with a number of separate government agencies (U.S. Army Corps of Engineers, 2010b).

B. CHALLENGES AND RISKS

Government challenges and risks associated with renewable energy procurement include the unknowns of the project and their lack of vision on what is required of the contractor to execute a typical renewable energy project. There are many moving parts, which are identified in Figure 4. Procuring renewable energy does not fit the typical government–contractor relationship, where the government directs the contractor to perform according to the terms and conditions of the contract. A disconnect occurs because of the complexity and intricacies involved in renewable energy procurement. While Air Force contracting officers are skilled in a multitude of contracting methodologies, the types contemplated in large, renewable energy deals may be beyond the scope of their training. The types in question, power purchase agreements and enhanced use leases may be outside of their expertise. It's likely these transactions will include third-party financing, special purpose entities, land lease components, interactions with Air Force field operating agencies and possibly external players like utilities and public partners. Contracting Officers essentially become "deal" makers or integrators of complicated business transactions.

For example, the contractor's financier exerts great influence over the administrative portion of the contract, such as payment terms (what and when), and the cost structure. The contractor has to partner with the local utility for permission to connect to grid. They also subcontract with a construction firm to build and maintain the renewable energy infrastructure. Each of these parties (financier, local utility company, and construction firm) has its own rules of engagement for dealing directly with the developer, not the government. What happens is the government finds itself in unchartered territory where it must be flexible and work around the developer's terms.

Contractor challenges include all of the intricate workings of the deal behind "the deal." This includes tax equity, which is leveraged through the LLC Company via a separate party. The LLC Company that is formed to complete and oversee the project is also an asset that is sold or transferred at market value. The value of the project asset is determined by its long-term fixed revenue and other financial benefits such as accelerated depreciation and REC sales (Kawamura, 2010). Many of these moving parts happen without visibility by the government, which increases unknowns, reduces open communication and increases risk or perceived risk on all parties involved.

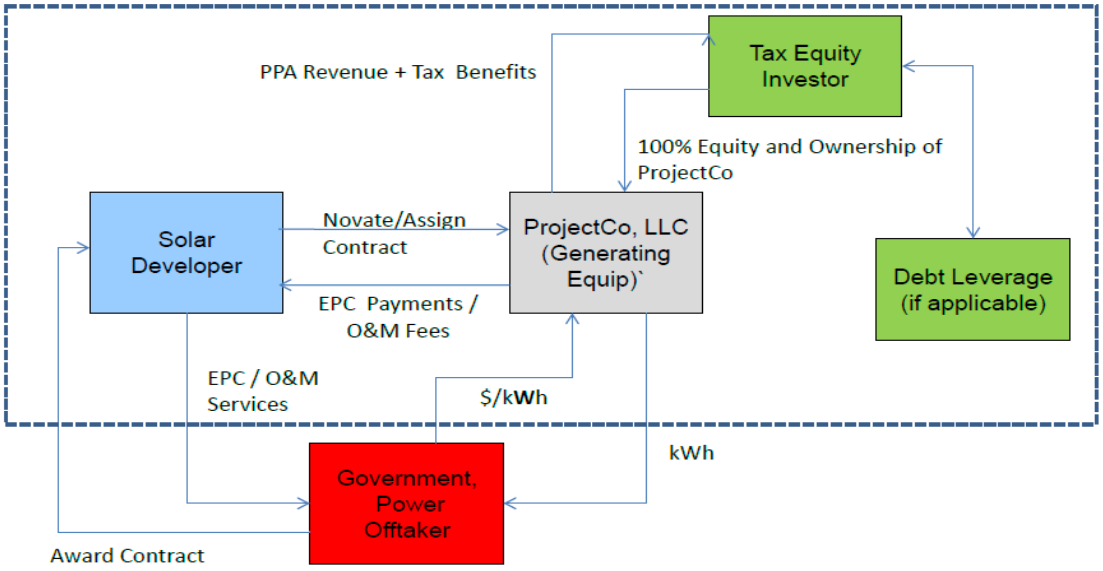

Figure 3. Typical RE Developer/Financier Arrangement
(Kawamura, 2010)

The contractor (developer) finds itself in the tough position of balancing a relationship between the government, the financier, the local utility, and the construction firm. The contractor faces information ignorance from its lack of knowledge about government contracting (including the FAR and associated clauses), or navigating through the government's intentions. To mitigate the risk associated with these unknowns, the contractor will increase its costs.

Figure 4 compares the government's and the contractors' challenges and risks. As discussed, many of the government challenges and risks match those from industry. Both the government and industry have unknowns: contractor terms and conditions imposed on the government, compared to enforcement of the FAR on the contractor such as terminations. Take or pay is a project finance condition in which the buyer(s) of the project's output are required to purchase an agreed amount in a specific period if produced (Take or pay, 2010). DoD Contract Management has been on the GAO high-risk list since 1990 (GAO, 2009). The contract reflects the agreement between the buyer and seller on all aspects of the project, and thus, its currency and accuracy is of the utmost

importance (Garrett & Rendon, 2010). Government Contracting Officers have to get contract management right, and that has been reinforced from the top with "recapture acquisition excellence" being one of the five current Air Force priorities (Schwartz, 2010).

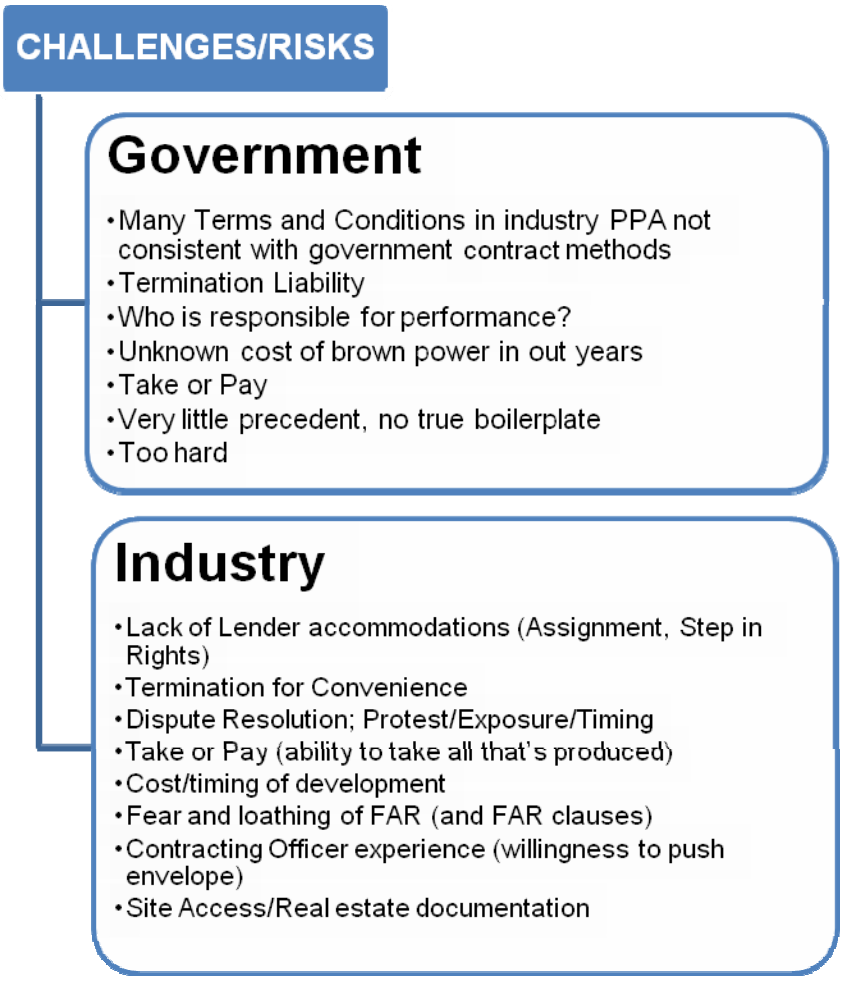

Figure 4. Government and Industry Risks and Challenges
(Kawamura, 2010)

Within the scope of power purchase agreements and enhanced use leases are potential showstoppers that have to be addressed early on in the project, such as mission, environmental, legal or regulatory, and community opposition. Mission showstoppers include size restrictions and radar issues that are linked to the limitations or restrictions of the installations airframe.

Environmental issues include proximity to endangered species, contamination potential, and wetlands. Legal or regulatory issues relate to land-use restrictions or commission regulations. Finally, community acceptance of the project is critical, especially when community resources are involved in the project. Partnering with the government and contractor can help stimulate the local job market, improve environmental conditions, and foster better relations (Dumont, 2010).

The challenges and risks cover a multitude of areas. Every state/utility is a different market so a "one size fits all" approach is difficult (Davis, 2010). The Air Force contracting officer must learn a new skill set in order to execute renewable energy transactions. Including the mission, environmental, legal and regulatory are all critical to success, however, the greatest hurdle to overcome is embracing the necessity to cultivate a relationship with all stakeholders in the renewable energy transaction. The contracts team must initiate contact with the stakeholders in the procurement planning phase of the contracting process and journey through each of the phases together in order to meld the long-term relationship with the 10, 15, 20+ year contract period of performance. The Air Force has very specific requirements it is trying to meet. Compliance with Executive Orders, regulations and policy are driving the need to execute complex deals, often times without appropriates funds. At the same time, the DoD enjoys some of the lowest utility rates available. In fact, many installations are paying far less than their civilian counterparts. Economic realities prove that clean, renewable and sustainable energy technologies do not come cheaply. Additionally, the Air Force may not fully understand nor appreciate the complex nature that exists when orchestrating transactions that require third-party financing, federal, state or local tax incentives, partnerships with local utilities and/or public partners. It should be the responsibility of the Contracting Officer to create an environment where these types of transactions are possible. In order for this to occur, a fair and reasonable profit margin must exist to attract industry

partners to the table. Without appropriated funds, insisting on a lowest priced, technically acceptable offer may not be practical.

C. SUMMARY

AFCESA and AFRPA have experts that procure renewable energy, and the renewable energy procurement vehicles they use (including the power purchase agreement and enhanced use lease) have their benefits and drawbacks. The contracting officer's job is respectably broad and complex (Hawkins & Rendon, 2010), and the process involved in successfully executing a renewable energy deal is lengthy and very challenging. In this chapter, we laid the groundwork for the renewable energy process, looked at examples of the power purchase agreement and enhanced use lease, and discussed their challenges and risks. Additionally, we evaluated the power purchase agreement and enhanced use lease within the six-phase contract management process. The next chapter will provide an analysis of the renewable energy industry and discuss the intricacies of the public–private partnership and its use in ensuring successful renewable energy transactions.

IV. HOW THE AIR FORCE CAN SUCCESSFULLY EXECUTE RENEWABLE ENERGY TRANSACTIONS THROUGH PUBLIC–PRIVATE PARTNERSHIPS

A. INTRODUCTION

Chapter 3 identified that AFCESA and AFRPA manage power purchase agreements and enhanced use leases respectively. We presented examples of the power purchase agreement and enhanced use lease, along with the challenges and concerns faced by the government and industry in completing renewable energy deals. The similarities with regard to the challenges and risks between the government and industry identify an opportunity. That opportunity is to use the public–private partnership to successfully execute these renewable energy transactions. This chapter begins with an industry analysis using the Porter's Five Forces Model. As identified in the previous chapter, the government and contractor both have similar risks in executing renewable energy contracts. Both have unknowns: contractor terms and conditions imposed on the government, compared to enforcement of the FAR on the contractor. Other challenges include take or pay, a protracted period of performance (10,15, 20+ years), fossil fuel energy is much cheaper than renewable energy, the addition of the third-party financier, federal, state or local tax incentives, and partnerships with local utilities. The Porters analysis will provide the contracting officer with a snapshot of the renewable energy market, specifically from the supplier and buyers perspective and what the market is willing to bear. Within this chapter, we will revisit the risks and challenges faced by the government and industry and validate why the public–private partnership is the most innovative and effective approach to successful execution.

B. PORTER'S FIVE FORCES ANALYSIS

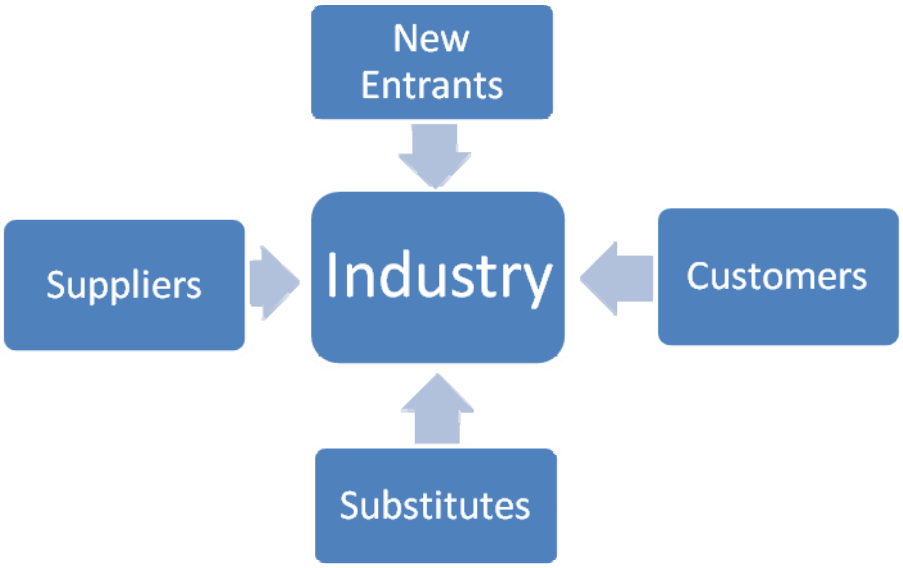

Figure 5. Porter's Five Forces Model
(Porter, 1979)

Understanding the dynamics of competitors within an industry is critical for two reasons. First, it can help to assess the potential opportunities of your venture, which is particularly important if you are entering this industry as a new player. Second, it can also be a critical step to better differentiate your company from others that offer similar products and services (Berry, n.d.).

Porter's Five Forces Model is a simple, but effective tool for understanding where power lies in a business situation. This model is useful, because it helps you understand both the strength of your current competitive position, and the strength of a position you're considering moving into. With a clear understanding of where power lies, you can take fair advantage of a situation of strength, improve a situation of weakness, and avoid taking wrong steps (Berry, n.d.). The essence of strategy formulation is coping with competition. The state of competition in an industry depends on the five basic forces that are diagrammed

in Figure 5. The collective strength of these forces determines the ultimate profit potential in an industry (Porter, 1979).

Additionally, this tool can help identify risk assumed by both the government and industry and through partnership, mitigate the risk carried forward by each party. By performing an analysis of the renewable energy industry, it can help the contracting officer make a better-informed decision on what to expect. Next is an analysis of the renewable energy market using each of the five forces: threat of new entrants, threat of substitutes, industry, bargaining power of customers, and bargaining power of suppliers.

1. Threat of entrants

New entrants to an industry bring new capacity, the desire to gain market share, and, often, substantial resources. The seriousness of the threat of entry depends on the barriers present and on the reaction from existing competitors that the entrant can expect. There are six major sources of barriers to entry: (1) economies of scale, (2) product differentiation, (3) capital requirements, (4) cost disadvantages independent of size, (5) access to distribution channels, and (6) government policy (Porter, 1979). If a company is considering entering the RE market, it can expect barriers in capital requirements and government policy. Each of these is discussed further in the following paragraphs.

In order for a company to provide renewable energy, significant capital requirements are needed to setup operations (up–front costs). After committing the funds, the company cannot expect a return on investment (ROI) for at least 8–10 years. To be competitive, the company must possess knowledge and experience in how to best yield the greatest efficiencies in implementing renewable energy projects; without this, it will be unable to sustain competitiveness. Past performance that is recent and relevant supplements this knowledge and experience. Lacking past performance affects the customer's willingness to accept the technical risk of choosing the unproven energy

company. Third-party financiers also use past performance to determine if it is an acceptable financial risk of vouching for the company's ability to execute.

Additionally, a majority of transactions occur in the non-commercial/industrial sector. For example, 2006 and 2008 ESCO industry revenues show 69% of the total industry share in municipal and state governments, universities and colleges, K–12 schools, and hospitals, and 22% in the federal government. The remainder falls within the commercial and industry sector (Satchwell, Goldman, Larsen, Giiligan, & Singer, 2010). Because of the significant governmental participation and almost nonexistent commercial and industrial participation in renewable energy, entry into the market requires a company to be willing to meet stringent government policy and procedures.

2. Threat of Substitutes

Substitute products that deserve the most attention strategically are those that (a) are subject to trends improving their price-performance trade-off with the industry's product, or (b) are produced by industries earning high profits. Substitutes often come rapidly into play if some development increases competition in their industries and causes price reduction or performance improvement (Porter, 1979).

The renewable energy market includes many types of sources: solar, wind, hydro, biomass, landfill and sewage methane gas, and geothermal. Substitute products are those products that are available in other industries that meet an identical or similar need for the end user (Berry, n.d.). Fossil fuel energy is the only substitute and the greatest threat to renewable energy. Specifically, the threat is disparity in price per kWh for fossil and renewable energy, respectively. As of April 2010, the average U.S. commercial retail price of electricity was 9.97 cents per kWh according to the Federal Energy Information Administration's monthly electricity report ("Average Residential Retail," 2010).

In contrast, according to a Solarbuzz (2010) consultancy report, the average price for solar energy is 23.91 cents per kWh ("Average Residential Retail," 2010). Because fossil fuel is relatively stable and predictable for the foreseeable future, the choice to switch or convert to renewable energy based purely on economics will fail due to the large differences in per kWh prices.

3. Industry

Rivalry among existing competitors takes the familiar form of jockeying for position-using tactics like price competition, product introduction, and advertising slugfests (Porter, 1979). The fossil fuel and renewable energy market does not experience typical rivalry, as say compared to the airlines, grocery stores, or fast food. It is a concentrated market, in which the market is held by a small number of firms. The National Association of Energy Service Companies lists 33 energy service companies across the United States, thus validating Porter's claim that if competitors are not numerous, it contributes to low rivalry. Additionally, high exit barriers discourage existing players to walk away from the market because of the high fixed costs and initial capital costs that will not reap an ROI until 8–10 years into the project. Finally, fossil fuels still dominate the energy market across both the U.S. and globally, thus leading to slow RE industry growth. The Department of Energy reports U.S. consumption for 2009 as 86% fossil fuel, 6% nuclear and 8% renewable energy and global consumption for 2007 as 82% fossil fuel, 10% nuclear and 8% renewable energy (Department of Energy, 2010d).

4. Bargaining Power of Customers

The power of customers (buyers) describes the impact customers have on an industry. Buyers wield more power when they can purchase large volumes, especially if heavy fixed costs characterize the industry or the products it purchases from the industry are standard or undifferentiated, allowing the buyer to find alternative suppliers and incur low switching costs when they change vendors (Porter, 1979).

In the RE market, the buyer does not possess much buying power for a number of reasons. The RE market is still an emerging market; buyers only have 33 reliable companies that provide RE. Buyers are not buying large volumes of RE; they are supplementing their fossil fuel energy consumption with RE. From a government buyer perspective and because the federal government has incorporated mandates to procure RE (3% by 2009, 5% by 2012, and 7.5% beyond), the buyer must seek out RE from suppliers and make a best effort to negotiate a favorable contract price. Finally, once they choose their supplier, they've locked into a contract term of 10–25 years.

5. Bargaining Power of Suppliers

Suppliers can exert bargaining power on participants in an industry by raising prices or reducing the quality of purchased goods and services. A supplier group is powerful if it is dominated by few companies and is more concentrated than the industry it sells to. It is also powerful if its product is unique or at least differentiated, or if it has built up switching costs. Switching costs are fixed costs buyers face in changing suppliers (Porter, 1979).

Suppliers do hold a better position relative to buyers of RE. They compete in an industry that has few players, therefore, leaving few options for buyers in supplier selection. There is only one substitute: fossil fuels. Because of this, buyers purchasing RE, and in the case of the government buyer, purchasing RE under a federal mandate, are left with few choices. Additionally, as highlighted in other forces, because the contract terms are 10–20 years, the supplier can forecast far into the future.

C. PUBLIC–PRIVATE PARTNERSHIPS

Now that we have evaluated the renewable energy industry, we will discuss a tool that has been used by the Air Force for some time at its maintenance depots and that has been identified as a way to help the Air Force meet the goals of its energy plan. According to the National Council for Public–

Private Partnership, a public–private partnership is a contractual agreement between a public agency (federal, state, or local) and a private–sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to sharing resources, each party shares in the risks and rewards in the delivery of the service or facility.

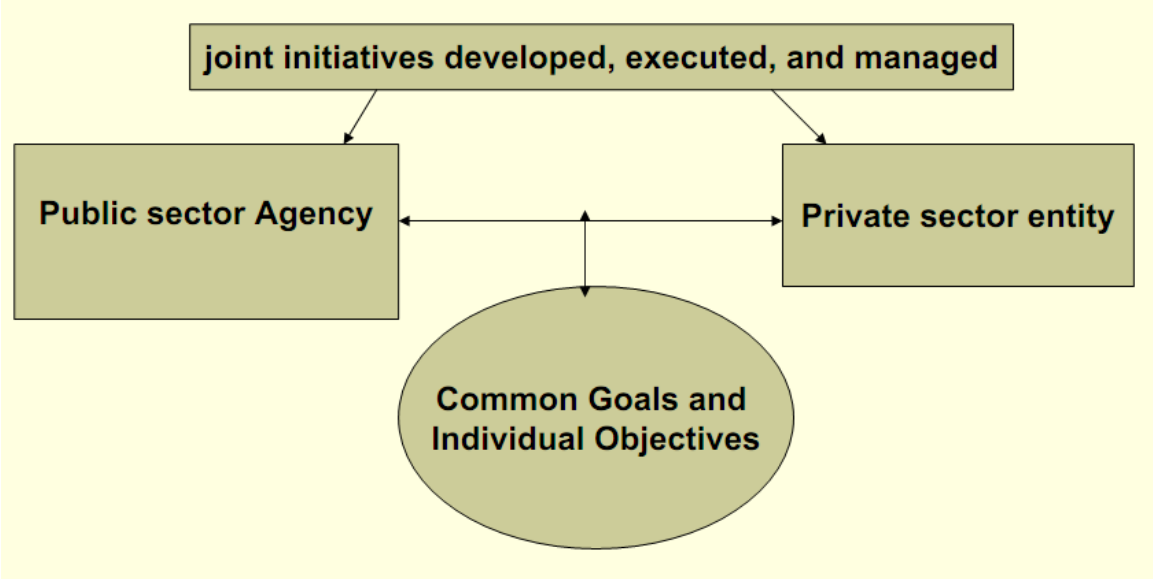

Figure 6. Public–Private Partnership Concept
(Kahn, n.d.)

As stated in Air Force Instruction (AFI) 63-101, Acquisition and Sustainment Lifecycle Management, dated April 17, 2009, "the purpose of public-private partnership is to leverage the optimal capabilities of both the public and private sectors in order to enhance support to the warfighter. The intended goals of partnering are more responsive product support, improved facility utilization, reduced cost of ownership, and more efficient business processes" (Secretary of the Air Force [SECAF], 2009). This section defined the public–private partnership, next is the make-up of these partnerships.

As an agency considers the partnership, the parties must meet the goals and objectives listed in Table 3. Each partnership must identify and provide

supporting rationale for each of the claimed objectives in the business case analysis that supports the creation of the public–private partnership. The principal government partner involved with the business activities must also identify and track appropriate metrics that help indicate whether the claimed objectives are actually being achieved.

Table 3. Goals and Objectives of Partnership
(Air Force Material Command, 2009)

More responsive, timely, reliable support to warfighter	**Leverage private sector investments to recap depot maintenance activities (facilities and equipment)**
Sustain parts availability, reduce repair cycle times, enhance readiness supportability and reliability	**Enhance industrial base to improve and sustain manufacturing & repair capabilities (organic and private)**
Sustain core capabilities	**Introduce improved business practices & updated technology to DoD maintenance operations and products**
Reduce DoD cost of ownership in operations and maintenance, and environmental remediation	**Improve government facility utilization**
Improve use of available organic capability	**Improve Air Force 50–50/Core posture**

As found in the Air Force energy plan, the Air Force is developing innovative funding strategies to meet the challenge of achieving aggressive energy goals. Funding all energy programs and projects using traditional funding methods will not enable the Air Force to reach its energy goals. The Air Force is meeting the energy funding challenge by exploring partnerships with industry through innovative programs, such as the power purchase agreement and enhanced use lease programs. This program and others like it will allow the Air Force to develop mutually beneficial projects for both the Air Force and private companies with minimal expense to the Air Force.

The Air Force innovative financing advisory working group will evaluate best practices and facilitate the dissemination of information that can be utilized in securing funding for energy projects. The U.S. federal government is increasingly exploring public–private partnerships in the execution of energy development projects. As federal regulations continue to emerge around renewable and alternative energy, demand for technological innovation will also emerge and require adequate financing streams that can be accomplished through public–private partnerships. Innovative financing will provide the Air Force with innovative energy sources and innovative energy savings. Leveraging interagency and industry partnerships will enable the Air Force to apply best-in-field knowledge without over-extending its own personnel (U.S. Air Force, 2010a).

The Air Force typically enters a public–private partnership with three documents, the strategic partnering agreement, the partnership agreement and the implementation agreement. A *strategic partnering agreement*, which is not mandatory, is a broad, overarching agreement that describes the project, sets the partnership parameters, and provides organizational commitments necessary to establish specific relationships. A *partnership agreement* establishes the organizational interactions, assumptions, and processes the stakeholders will follow during the partnership. The partnership agreement is coordinated through all stakeholders and signed by the principals involved with the business efforts,

typically the air logistics center commander (or designee) as the government signatory and an equivalent level of authority representing the industry partner. An *implementation agreement* describes the efforts to be completed as envisioned by the approved partnership agreement. The implementation agreement also describes the specific deliverable line items and associated documents and processes to be used in executing the requirements.

Public–private partnerships for depot-level maintenance are cooperative arrangements between a depot-level maintenance activity and one or more private sector entities to perform DoD or defense related work, to utilize DoD depot facilities and equipment, or both. Other government organizations, such as program offices, inventory control points, and materiel/systems/logistics commands, may also be parties to such agreements.

Each of the depots are encouraged to use public–private partnerships to maximize the utilization of capacity, reduce or eliminate cost of ownership, reduce cost of products, leverage private sector investment in plant and equipment recapitalization and promotion of commercial business ventures, and foster cooperation between the armed forces and private industry (Department of Defense Inspector General [DoDIG], 2010). Now that we have defined public–private partnerships and discussed their use at the depots, it's time to identify how the Air Force energy plan recommends its implementation into the procurement of renewable energy

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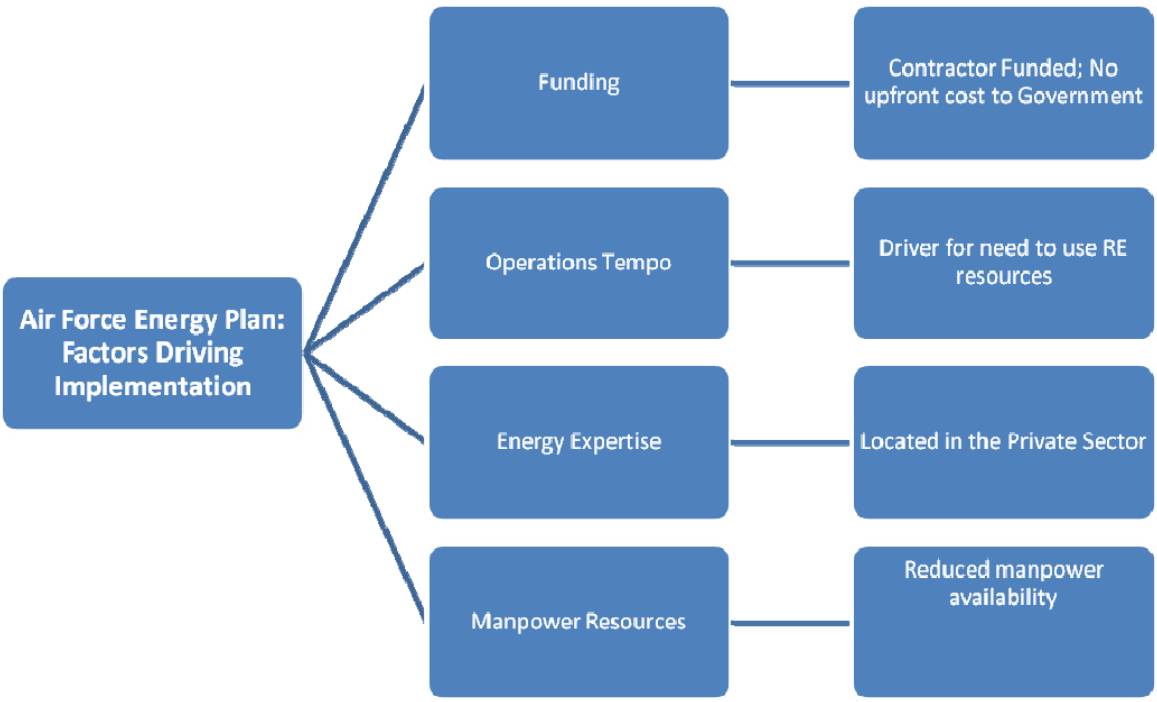

Figure 7. Air Force Energy Plan: Factors Driving Implementation
(U.S. Air Force, 2010a)

The four factors of funding, operations tempo, energy expertise, and manpower resources are a big part of why the Air Force energy plan exists. These factors are the challenges to executing the plan. Answering the challenges within those factors is a difficult task, but one that can be conquered through the use of public–private partnership principles as identified in Figure 7. Public–private partnerships, when employed correctly, enhance innovation in the financing, contract terms, and construction of renewable energy projects. A recent example, outside the federal government, demonstrates how New Jersey has successfully implemented public–private partnerships.

New Jersey consistently operates at the cutting edge of RE use in the United States. In 2009, New Jersey ranked #2 in the U.S. for grid connected photovoltaic capacity, second only to California. Additionally, its solar financial model has been considered the most impressive aspect of the New Jersey solar development (Bush, 2010). Recently, Morris County, NJ, has completed a test project for renewable energy where it competitively awarded renewable energy for the municipalities and attained over 35% reduction in actual energy consumed within the districts. The success of this project highlights and reinforces the need for the use of public–private partnership. All parties involved worked together to come up with innovative ways to finance, contract, and build these renewable energy projects.

Seven local governments took part in the pilot program, financing 3.2 MW of solar projects for 19 buildings, parking structures, and a surface parking lot. Local governments are paying electric utility bills based on a tariff of 15 cents/kWh, locked in a 15-year, fixed escalation power purchase price beginning at 10.6 cents/kWh that only increases to present market rates at 16 cents/kWh in the final year of the contracts. With renewable energy you have the ability to award firm-fixed price contracts like this because the cost of renewable energy is not volatile like that of traditional fossil fuels. According to a 2008 report by the government-sponsored National Renewable Energy Laboratory, "whether a utility owns its renewable generation or purchases renewable energy through a power purchase agreement, the price is known and essentially fixed over time." This plan results in an overall programmatic operating budget savings for participating local governments of over 35%. Moreover, with the competitively-sourced solar development firm taking all of the development and debt repayment risk, the local government participants were able to obtain the benefits of renewable energy while contributing towards New Jersey's 2020 Energy Master Plan goal of 30% renewable energy sources without increasing their debt load by a single penny (Pearlman & Scerbo, 2010). Though public–private partnership offers

tremendous opportunity, it is not the answer to all our renewable energy challenges as we will discuss in the next paragraph.

Challenges are present with the public–private partnership approach. The Air Force did not have adequate controls in place to ensure that baselines and metrics were established and BCAs were completed for public–private partnerships reviewed. The Air Force did not adequately document its public–private partnership decisions for enhancing overall product support, at the Depot level, and the type of partnership arrangement selected, and it did not adequately monitor them once they were established. The field operating agencies will have to ensure these mistakes are not repeated when using public–private partnerships for their renewable energy procurement (DoDIG, 2010).

D. SUMMARY

In conclusion, this chapter began with the Porter's Five Forces Model analysis to set the tone of where risk lies and who bears it within the energy market. Next, the public–private partnership was defined, including the makeup of a public–private partnership, different types, and what is involved in setting the partnership into motion. From there, we presented examples of public–private partnerships in action, both effectively, as in the case of Morris County, NJ, and ineffectively, as highlighted in the Air Force's depot maintenance approach. Finally, challenges were synopsized on what more can be done to best capitalize on this tool.

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V. SUMMARY, CONCLUSION, AND AREAS FOR FURTHER RESEARCH

This chapter provides a brief overview of the findings from the literature review, a summary of the Air Force field operating agencies that specialize in renewable energy transactions, the tools available to the Air Force contracting officer to successfully execute RE transactions, and the recommendations for the use of public–private partnerships as a catalyst to making these types of transactions a commonly recognized method of contracting in the Air Force. This chapter includes a conclusion based on the literature that is presented in this report. Finally, while performing research for this report, the authors noted specific areas worthy of further analysis. These areas will be discussed in further detail later in this chapter.

A. SUMMARY

Chapter 2 provided the literature review, by defining key terms in renewable energy transactions. We included the definition of fossil fuels—a rather important definition to begin the chapter—because although the goal is to rely more on renewable energy and less on fossils, in reality, fossil fuels provide 86% of all the energy consumed in the United States (Department of Energy, 2010d). Next, we defined renewable energy, and further broke down the different types of renewable energy sources, specifically, solar, wind, hydro, landfill and sewage methane gas, biomass and geothermal. From there, defining renewable energy certificates gives the reader the economics perspective of renewable energy deals; that is, renewable energy credits are considered the currency of renewable electricity and green power markets. They define the generation source, serve as a tradable commodity and allow owners to claim 1MW of renewable electricity generation.

Next was a brief description of the six-phase contract management process. From there, we described the different contract vehicles including the

energy savings performance contract, utility energy savings contract, power purchase agreement, enhanced use leases, and public–private partnerships, of which, the latter three receive further detailed research in Chapters 3 and 4. The chapter concluded with an overview of policy and guidance in place to assist federal agencies in pursuing and executing renewable energy initiatives.

We listed the policy and guidance in hierarchal sequence, in that we started at the federal level, then moved to the DoD level, and concluded with the Air Force level. The Energy Policy Act of 2005 provided government-wide goals for all agencies, starting in 2007 through 2013 and beyond. Its intent is to transform the DoD's reliance on energy from fossil fuels to renewable energy sources. Executive Order 13423 takes the goals set in the Energy Policy Act of 2005 and sets the mark higher. It includes implementation instructions, reducing energy intensity, increasing the use of renewable energy, reducing water intensity, and designing and operating sustainable buildings. Both the Energy Policy Act of 2005 and EO 13423 address renewable energy initiatives at the federal level, U.S.C. title 10, section 2911 established additional energy performance-goals for the DoD. Finally, the chapter concluded with the Air Force Energy Plan.

The Air Force leads the U.S. federal government in energy consumption, accounting for $9 billion in fueling aircraft and vehicles and utility services for fiscal year 2008 alone (U.S Air Force, 2010a). Additionally, it purchases more renewable energy than any other agency. The plan sets forth very specific goals to continuously improve; it identifies objectives and establishes metrics to validate progress.

Those goals, objectives, and metrics are tracked in the AF Energy Plan under three pillars: reduce demand, increase supply, and encourage culture change. The plan further breaks out the constraints and assumptions that stand as barriers to implementation; these include funding, operations tempo, energy expertise, and manpower resources. Each of these is targeted in the plan and

the Air Force has established methods to overcome these barriers. The Air Force identified the public–private partnership as one method to execute energy development projects. This summarizes the literature review. Next, Chapter 3 narrowed the scope and research and examined how the Air Force contracting officer can utilize the FOAs for knowledge and expert advice and the tools needed to execute the power purchase agreement and enhanced use lease.

The AFCESA is a field operating agency that supports Air Force civil engineering capabilities at the base and contingency level. They presently staff over 50 professionals skilled in energy procurement and directly assist in identifying, evaluating and implementing technologies and funding strategies that will aid the Air Force in meeting and surpassing renewable energy goals. Another field operating agency, the AFRPA offers similar assistance in meeting energy goals.

The AFRPA's mission is to acquire, manage, and dispose of all Air Force–controlled real property worldwide. One of the many tools available to AFRPA in managing their portfolio is the enhanced use lease. The Strategic Asset Utilization division is specifically tasked with managing value-based transactions, and uses the enhanced use lease as a means to achieve maximized results. It is through the enhanced use lease that the Air Force can identify non-excess capacity to turn it into a renewable energy initiative.

The power purchase agreement gives an agency a variety of benefits including no up-front capital costs, tax incentives, long-term energy pricing, minimal risk, and relief from operations and maintenance responsibilities. The Air Force was the first in the DoD to execute a power purchase agreement with Nellis Air Force Base procuring a 140-acre photovoltaic solar array. At contract award, it was the largest PV array in the DoD (Snook, Dumont, & Warwick, 2008).

The enhanced use lease opens up the door for the Air Force to partner with private industry in leasing their underdeveloped and/or non-excess property

at a fair market rental value. Some assets that are considered include land, office space, vacant buildings, energy co-generation plants/facilities, conference centers, and others. The enhanced use lease is executed in four phases and can see a life cycle up to 50 years. The Air Force has not completed (or signed) any renewable energy leases as of yet, but has a number of projects in the works. However, the Army does report on the first renewable energy enhanced use lease in the DoD and reports overwhelming success from both a business and an operational perspective.

Chapter 4 begins with an industry analysis of the renewable energy industry using the Porter's Five Forces Model. This analysis captured the dynamics of the energy industry, including the barriers to entry, the threat of substitutes, the competitive rivalry, the bargaining power of buyers, and the bargaining power of suppliers. From there, public–private partnership was defined and the Air Force's goals and objectives of establishing a public–private partnership within the renewable energy arena were identified.

Next, challenges were highlighted through the DoD Inspector General's reporting. All parties face the challenges in getting together in a collaborative environment, which is a dichotomy of the traditional methods of contracting. Because of this movement toward a completely new way of doing business, by educating oneself, reading of the successes and failures, and learning lessons, each will contribute to making the public–private partnership successful. This chapter concludes the research paper by providing lessons learned and presenting further research opportunities.

B. CONCLUSION

This paper presented the complexities involved in procuring renewable energy. As highlighted, there are many moving parts in the procurement process. This procurement process includes additional parties not normally involved in the traditional contract transaction. Those additional parties, the stakeholders, include third party financers, utility companies, state and local

governments, and local communities, with each playing a significant role in whether the renewable energy deals are executed successfully.

The DoD is poised to change the dynamics of the renewable energy market. Because of established federal, department, and agency goals, renewable energy procurement has been pushed to the near front of the line. Private industry has not embraced the renewable energy market yet, because it is prohibitively expensive. Therefore, it is the DoD that will essentially flood the market with RE procurement, which will in turn increase competition and ultimately drive prices down.

The Porter's Five Forces Model highlighted a number of risks associated with the RE industry. Linking the characteristics of Porter's model and applying an analysis of risks to the use of PPP in practice today resulted in a number of observations. The threat of entrants identified both risk in capital investment and governmental policy obstacles. The New Jersey public–private partnership identifies a capital investment in 19 buildings, parking structures and a surface parking lot, all at the debt payment and development risk of the solar developer. Governmental policy is also present as this public–private partnership is a partnership between seven local governments and a solar developer. The Air Force public–private partnership model looks to leverage private sector investment in plant and equipment recapitalization with the private industry, a capital investment risk on behalf of the contractor.

The threat of substitutes is the competitive price of fossil fuels. The average U.S. commercial retail price of electricity was 9.97 cents per kWh in April 2010 ("Average Residential Retail," 2010). The New Jersey PPP was able to successfully mitigate the risk of substitutes by negotiating a fixed escalation purchase price beginning at 10.6 cents per kWh that only increases to present market rates at 16 cents per kWh in the final years of the contracts.

Applying the analysis of industry to the New Jersey public–private partnership, rivalry benefited the buyer because of the small number of

competing firms. High exit barriers also proved to benefit the buyer because the solar developer (supplier) was locked into a 15-year contract with the seven local governments.

The bargaining power of the customer (buyer) faces risks of negotiating favorable contract prices and establishing long-term contract terms. Using the PPP approach allowed the buyer, the local (New Jersey) government participants, to obtain the benefits of renewable energy while contributing towards New Jersey's 2020 energy master plan goal of 30% renewable energy sources without increasing their debt load by a single penny (Pearlman & Scerbo, 2010).

The bargaining power of the supplier is best captured in their ability to negotiate longer-term contracts, as is the case in the New Jersey public–private partnership, with a 15-year contract period. One of the Air Force's Inspector General findings included a lack of adequate monitoring of public–private partnerships once established; this is advantageous to the supplier in that they are able to operate with little oversight and reap the benefits of the partnership.

Although the Air Force leads the DoD in renewable energy, has established instruction for the use of public–private partnerships, and has highlighted its use as an effective method of project execution, it has merely dabbled in public–private partnerships. This report provided ample support to justify the need to use the public–private partnership approach through the use of the power purchase agreement and the enhanced use lease and to prepare for the 10–20 year contract terms with a public–private partnership approach.

C. RESEARCH QUESTIONS

1. How is contracting for renewable energy different from that of a typical commodity or service contract?

In a typical commodity or service contract, the contracting professional uses contract instruments, such as the purchase order, indefinite delivery indefinite quantity contract, or singular contract to procure the requirement. While there

are IDIQ contracts for renewable energy, including the energy savings performance contract and utility energy savings contract, procuring renewable energy outside of these instruments requires the contracting professional to execute tools not used in government contracting, including the power purchase agreement and enhanced use lease.

Government contracting typically receives the requirement, advertises the requirement, awards to the best contractor, and administers contract performance. In a renewable energy requirement, the term is typically 10, 15 and 20+ years. Because of this protracted period of performance, procurement planning requires establishing a long-term relationship with the local community, field operating agencies like the Air Force Real Property Agency and Air Force Civil Engineering Support Agency, and the utility company. Additionally, the contract relationship involves the customer, the developer (construction firm), and a third-party financier which is not found in a typical contract.

2. How can Air Force contracting professionals better support renewable energy procurement?

Air Force contracting professionals can better support renewable energy procurement by getting better integrated into the procurement planning phase, earning the trust of their customer by providing expertise and consistent participation within the entire renewable energy process, and by embracing the public–private partnership concept and enabling that process to drive the acquisition process. Contracting professionals have a lot on their plates. With renewable energy, the mindset from customers is you're either with us or against us. Air Force contracting professionals need to earn a spot on the team by providing expertise within all areas of the contract management process and attain a preferred status with the engineering community. To better support renewable energy procurement, contracting professionals must display a willingness to commit to the team and bring with them a valued expertise as a business advisor.

3. What is the role of public–private partnership in renewable energy procurement?

As found in the Air Force energy plan, the Air Force is developing innovative funding strategies to meet the challenge of achieving aggressive energy goals. Funding all energy programs and projects using traditional funding methods will not enable the Air Force to reach its energy goals. The Air Force is meeting the energy funding challenge by exploring public–private partnerships with industry through innovative programs, such as the power purchase agreement and enhanced use lease programs. This program and others like it will allow the Air Force to develop mutually beneficial projects for both the Air Force and private companies with minimal expense to the Air Force.

The Air Force innovative financing advisory working group will evaluate best practices and facilitate the dissemination of information that can be utilized in securing funding for energy projects. The U.S. federal government is increasingly exploring public–private partnerships in the execution of energy development projects. As federal regulations continue to emerge around renewable and alternative energy, demand for technological innovation will also emerge and require adequate financing streams that can be accomplished through public–private partnerships. Innovative financing will provide the Air Force with innovative energy sources and innovative energy savings. Leveraging interagency and industry partnerships will enable the Air Force to apply best-in-field knowledge without over-extending its own personnel (U.S. Air Force, 2010a).

D. FURTHER RESEARCH

The research in this report focused on the implementation of the public–private partnership as a method to successfully execute renewable energy transactions. As the research highlighted, the procurement of renewable energy is virtually unknown in the contracting community, with the exception of headquarters–level professionals and contracting personnel assigned to

AFCESA and AFRPA. As the Air Force continues to strive to meet and exceed federal mandates for renewable energy use, the following questions can be further researched:

- How can renewable energy be procured strategically within the Air Force?
- Would a stakeholder analysis of the public–private partnership process improve outcomes?
- What are the challenges involved with procuring renewable energy at the agency, DoD, and federal level?

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