



U.S. AIR FORCE



# AIR FORCE INFRASTRUCTURE ENERGY PLAN 2010







The Infrastructure Energy Plan, an appendix to the Air Force Energy Plan, serves as the operational framework for all military and civilian Air Force personnel in communicating Air Force infrastructure energy goals, objectives, and metrics. The Infrastructure Energy Plan aligns with the goals outlined in the Air Force Energy Plan, the Air Force Strategic Plan, and is aligned under the Agile Combat Support Master Plan. The Infrastructure Energy Plan supports Air Force Policy Directive (AFPD) 90-17, *Energy Management* and Air Force Instruction (AFI) 90-1701, *Energy Management*. The Deputy Chief of Staff, Logistics, Installations and Mission Support (AF/A4/7) is the Office of Primary Responsibility (OPR) for the Infrastructure Energy Plan.

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# 1 Introduction

The Air Force Energy Plan is comprehensive and includes the full spectrum of energy activities across all operational and support areas, whether developing new weapons systems and fuel-efficient aircraft engines or responsibly operating bases and flying aircraft. The Infrastructure Energy Plan is one part of the Air Force Energy Plan, with specific activities in infrastructure, including facilities, ground fuels, and ground vehicles and equipment.

Major commands are required to defend the business case and prove the return on investment through life-cycle cost analysis in order to receive energy project funding.

The Infrastructure Energy Plan maps the “way ahead” for meeting energy mandates from now until Fiscal Year (FY) 2015 and requires accountability for success. The plan will be updated every three to five years or as conditions warrant, such as major changes to statutes, executive orders, Department of Defense (DoD) or Air Force policies, or a national crisis.

## Setting the Context

### *Air Force Mission and Core Values*

The mission of the United States Air Force—to *fly, fight, and win...* in air, space, and cyberspace—is both highly technical and energy-intensive. Energy uses of the Air Force include facility energy to power installations around the world, jet fuel for transport aircraft that carry our airmen to destinations both at

home and abroad, and fuel for ground vehicle fleets. Rigorously implementing the plan expands our strategic and tactical opportunities to improve the energy portfolio to meet Air Force missions, both today and in the future.

Our core values, Integrity First, Service Before Self, and Excellence in All We Do, set the standard for conduct across the Air Force as well as in our energy program. Integrity embraces the courage to act responsibly to make energy conservation our duty. Service Before Self means there are policies to which we will hold ourselves accountable. Excellence in All We Do directs us to develop a sustained passion for continuous improvement and innovation that will propel us to accomplish our energy goals today and tomorrow. We have inherited a history of excellence and courage that we must live up to, become part of, and pass on.

### *Air Force Energy Vision*

Our Air Force vision is to reduce demand through conservation and efficiency; increase supply through alternative energy sources; and create a culture where all airmen make energy a consideration in everything we do. Implementing this Infrastructure Energy Plan will achieve presidential goals within congressional law and guidelines. In pursuit of this vision, we will continue to be a federal energy leader by advancing energy independence through coordinated efforts aimed at minimizing energy costs and leveraging technology in conservation measures and renewable energy development, while matching system reliability and critical

asset security with Air Force mission requirements. These efforts effectively reduce dependence on commercial supply and delivery systems and enhance energy security for the Air Force. The Air Force is committed to reducing its greenhouse gas emissions and carbon footprint through the reduced use of fossil fuels consumed directly through vehicles and facilities or indirectly through the consumption of fossil fuel-generated electricity from the national electrical grids.

### *What the Plan Delivers and Why*

The Infrastructure Energy Plan suggests we invest almost \$1.7 billion in facility and vehicle conservation measures through FY2015 to meet a 30-percent energy intensity reduction (measured in millions of British thermal units per square foot (MBTU/SF)), a 16-percent water conservation goal (in gallons/SF), and a vehicle fleet that is right-sized and efficient to operate. Investing \$185 million in flex-fueled, hybrid, and low speed vehicles and rightsizing the vehicle fleet increases our ability to reduce fossil fuel consumption and maximize alternative and renewable energy sources to meet—and exceed—our mandates. Facility investments of \$1.5 billion provide an opportunity for a \$2.2 billion return through FY2015, or about \$1.50 returned for every \$1.00 invested. These investments focus on controlling cost growth through efficiency and conservation to mitigate the effect of rising unit costs. Energy costs have outpaced the rate of reduced consumption. For example, from September 11th, 2001 through 2007, the Air Force reduced overall energy consumption by 11 percent, but utilities costs rose by 49 percent (\$10.02/MBTU to \$14.90/MBTU). This plan will ensure that we narrow the gap between rising costs and predictable future budgets.



## 2 Scanning The Environment

The environment in which the Air Force operates shapes its infrastructure energy program. This environment is defined by both internal and external factors. Internal factors include the Air Force's policies and transformation initiatives, consumption and acquisition profiles, and energy security requirements. External factors, such as policies and statutes, technological changes, and economic realities, are not only key to understanding our operational environment, but can also affect the Air Force's internal programs, policies, and initiatives. A brief review follows of some of the internal and external factors that shape our operational environment and energy program.

### Policies and Statutes

The energy goals continue to evolve as federal mandates and Air Force programs mature. We will also adjust our strategic plan as DoD finalizes the overarching energy strategy for the military departments. An overview of current mandates is provided in Appendix A. Here is a list of the major statutory and policy drivers.

- Energy Policy Act (EPAAct) of 2005
- Energy Independence and Security Act (EISA) of 2007
- National Defense Authorization Acts (NDAA) of 2007 and 2008
- Executive Order (E.O.) 13221, "Energy Efficient Standby Power Devices" (2 Aug 01)

- E.O. 13423, "Strengthening Federal Environmental, Energy, and Transportation Management" (24 Jan 07)

### Energy Security

Privately and publicly operated commercial distribution systems like the national electric grids and commercial fuel pipeline systems have always been vulnerable to a loss of service from natural disasters, aging infrastructure, human error, or a physical or cyber attack from inside or outside the system. Short-term outages (minutes or hours) of these systems have well-exercised workarounds or methods for risk mitigation. However, the potential for long-term outages (i.e., months of loss of service) exists, and consequence management during a long-term outage is not well understood and certainly not exercised at our installations in a meaningful way. At some key combatant command installations, homeland defense mission execution is critically dependent upon uninterruptible commercial power and fuel distribution systems.

Risk to critical missions at installations is a site-specific problem that is being studied within the Air Force in concert with DoD, the Department of Homeland Security (DHS), and the Department of Energy (DOE), but the different parts of the problem are not yet integrated into a comprehensive plan. We can reduce some of this mission risk through conservation and expanded site-generated renewable energy. A number of steps are required to ensure more resilient electrical and logistics fuel systems support at Air Force

installations: Energy must be included in Air Force Critical Infrastructure Program plans, studied during Vulnerability Assessments, exercised during base response activities, and, ultimately, incorporated into full-spectrum operational planning to fully observe and consider the potential deleterious effects.

The actors and owners of commercial distribution systems operate outside of the Air Force sphere of influence, which impacts our direct ability to influence in a manner that eliminates our risks. As such, the focus of the Air Force Infrastructure Energy Plan is areas of energy management where we directly establish the priorities, control the actions, and benefit from the outcomes. When a federally coordinated or DoD energy security comprehensive plan becomes policy, we will incorporate the goals and objectives into this plan.

### Consumption and Costs

The Air Force builds on a history of past success, having met every federal mandate related to facility energy use since 1975. Most recently the Air Force reduced its facility energy intensity by over 30 percent in a 20-year period ending in 2005, surpassing 1999's E.O. 13123, Greening the Government through Efficient Energy Management, requirement. However, it will be harder to achieve the current 30 percent reduction goal from 2005-2015, so we need to get more aggressive. When new mandates are considered with previous mandates, the result attained will be an over 60 percent reduction in facility energy intensity from 1975 to 2015.

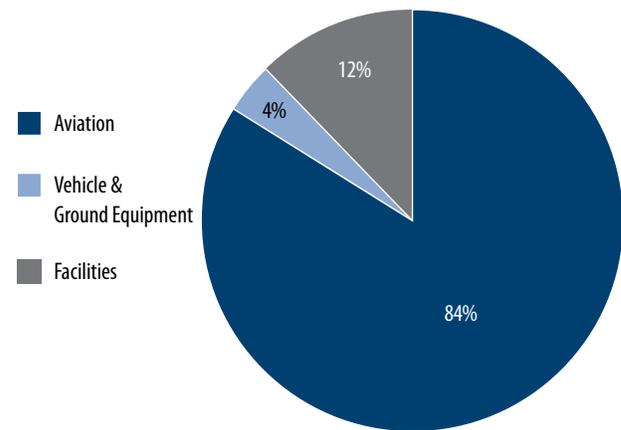
### FY2007 Consumption and Costs

Infrastructure energy is only a portion of the overall Air Force energy consumption (Figure 1). Aviation fuel use, which comprises 84 percent of the Air Force's energy budget, is aggressively being addressed in the comprehensive strategic approach. Infrastructure energy accounts for another 16 percent of consumption: facilities represent 12 percent and ground fuels 4 percent.

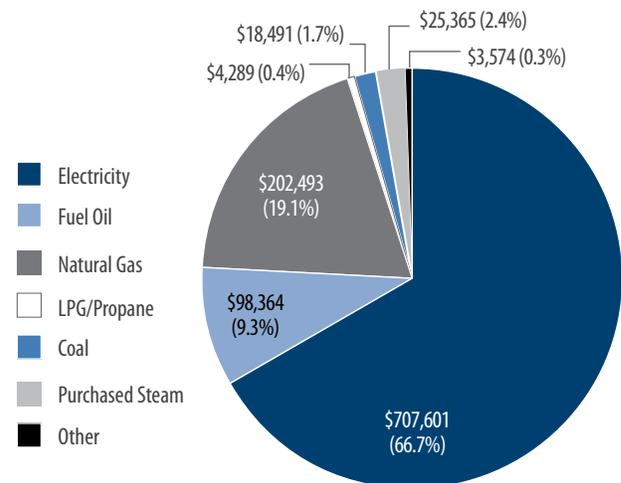
In FY2007, the vehicle fleet had a 0.04 percent reduction in fossil fuel consumption in comparison to FY2006, which did not meet the E.O. 13423 mandate to reduce vehicular petroleum consumption by 2 percent a year through FY2015. The Air Force also did not meet the goal of increasing alternative fuel consumption by 10 percent due to significant decreases in reported B20 (biodiesel) consumption. Reported B20 consumption was lower due to the EPA-mandated conversion from low-sulfur diesel (LSD) fuel to ultra-low sulfur diesel (ULSD) fuel throughout the Air Force. As bases converted from LSD to ULSD, B20 tracking had to be reestablished for accounting purposes. Vehicle fleet consumption of 85-percent ethanol fuel (E85) did increase by 61 percent in comparison to the FY2005 baseline; E85 consumption is expected to continue to increase because of ongoing efforts to identify off-base availability.

For the past five years, the Air Force has exceeded its EPCRA 2005 requirements for alternative fuel vehicle (AFV) acquisitions. As a result of its aggressive AFV acquisition policy and biodiesel fuel use, the Air Force in FY2007 earned AFV acquisition credits amounting to 119 percent of its EPCRA-reportable vehicle acquisitions, which is 44 percent higher than the 75 percent AFV acquisition requirement.

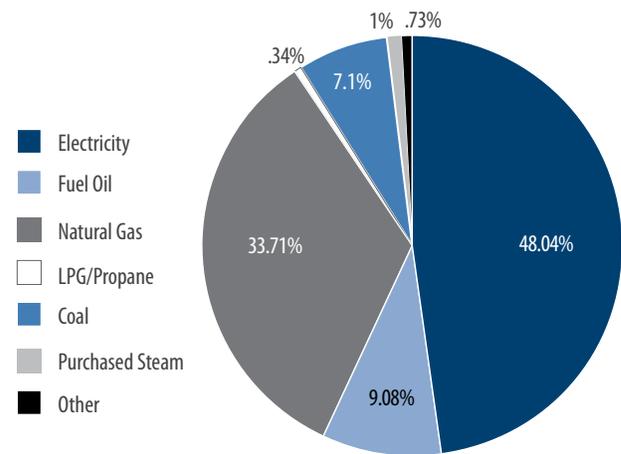
**Figure 1** Air Force Energy Consumption (percent of total energy costs)



**Figure 2** Facility Energy Costs and Consumption

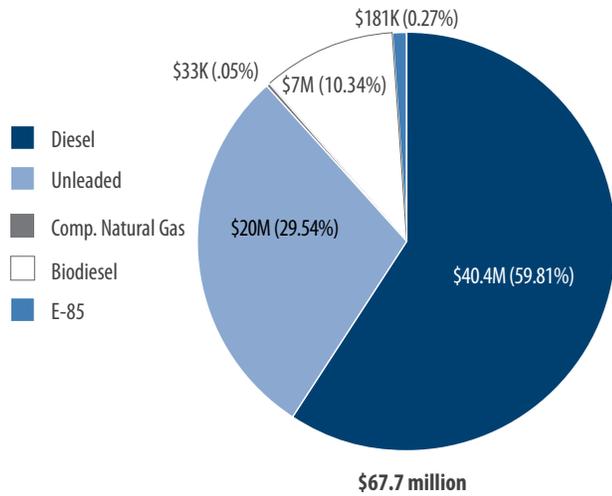


\$1.06 Billion

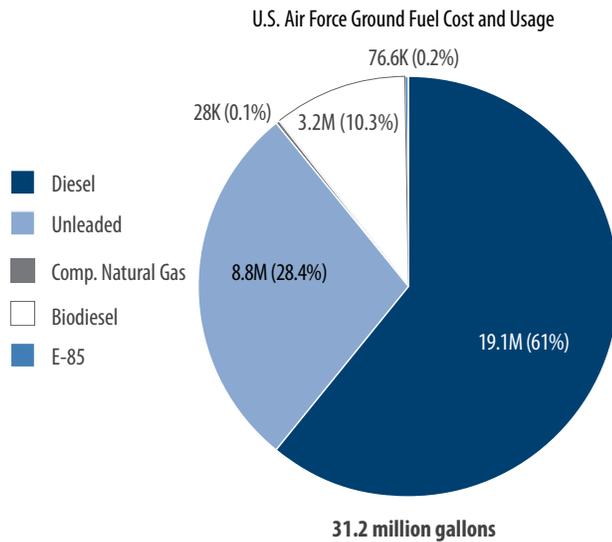


71,161,000 MBTUs

**Figure 3** Air Force Total Ground Fuel Energy Costs and Percent of cost (in million dollars)



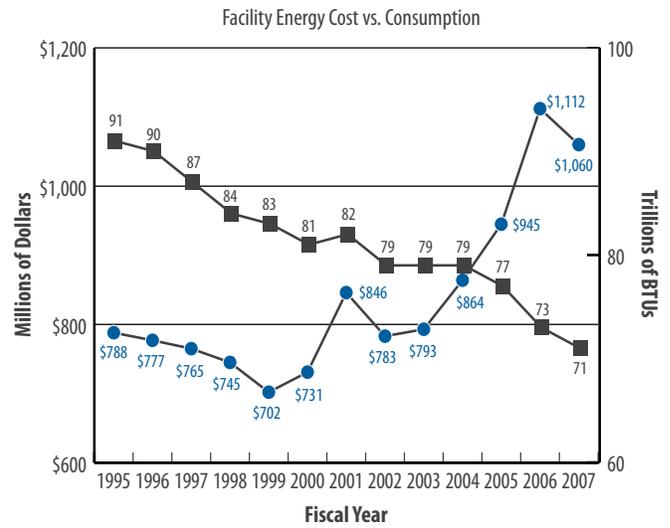
**Figure 4** Air Force Total Ground Fuel Usage (in million gallons)



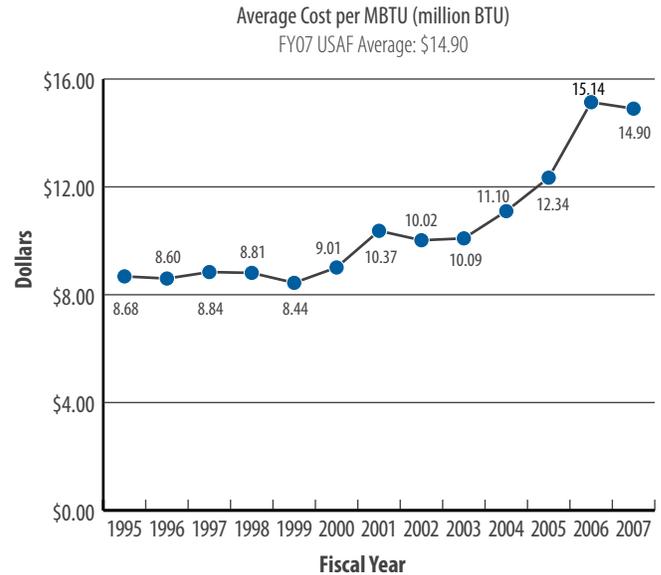
Within facilities, electricity is expensive: It accounts for 48 percent of total facility energy used, but disproportionately represents more than 66 percent of utility cost (Figure 2). By comparison, natural gas represents 33.7 percent of consumption, but only 19 percent of cost. The remainder of facility energy comprises fuel oil, coal, steam, hot water, and miscellaneous energy types. These consumption and cost charts indicate that different strategies will be necessary within facility operations to achieve the energy reduction and cost-savings goals.

In contrast, the percentages for ground fuel use and ground fuel costs were approximately equal (Figure 3 and Figure 4). For example, in 2007, for ground vehicles, diesel accounted for 61 percent of total fuels used and almost 60 percent of the total costs for fuel. Ratios of consumption to cost were similar for other fuel types: unleaded gasoline, compressed natural gas, biodiesel, and E85.

**Figure 5** Air Force Utility Costs



**Figure 6** Ground Fuel Consumption Trends in Relation to EPA Act



### Consumption and Cost Trends

From FY2002 to FY2007, annual utility costs have risen by 35 percent despite an 11 percent reduction in total consumption (Figure 5). This has occurred as a result of a 49 percent increase in the average unit price of energy.

Fuel costs have also dramatically increased since FY2003 (Figure 7). Since this time, total Air Force ground fuel cost has increased 173 percent despite a 9 percent decrease in total ground fuel consumption over the same period. Both figures demonstrate the effect Hurricane Katrina had on prices in 2006.

### Economic Pressure

The financial resources available to the Air Force in the next two decades will be considerably less than those of past decades. The pressures of maintaining a high readiness posture during budget and force reductions make further conservation of energy a necessity.

Furthermore, escalating unit commodity costs represent a risk to Air Force missions by diverting resources from other mission areas. The Air Force fuel bill (including aviation) exceeds \$10 million per day and every \$10/barrel increase drives up costs \$600 million per year. Our challenge is to use the available funding wisely to support initiatives that both improve energy efficiency and reduce consumption.

### Technological Change

As technology changes, new opportunities to save energy and energy costs are created. Ethanol, biodiesel, hydrogen fuel cells, waste-to-energy systems, and lithium-ion batteries are some of the technologies starting to evolve in the open market that will transform our vehicles, equipment, and facilities. The market price of these and other alternative and renewable energy technologies, such as solar photovoltaic, wind, and geothermal, will continue to drop. The Air Force will aggressively seek ways to use new and improved technologies to meet its strategic energy goals, while reducing its carbon footprint and our vulnerabilities to commercial sources of supply.

### Renewable Energy and Market Forces

Opportunities to develop renewable and alternative energy in any given locale are driven by four primary factors:

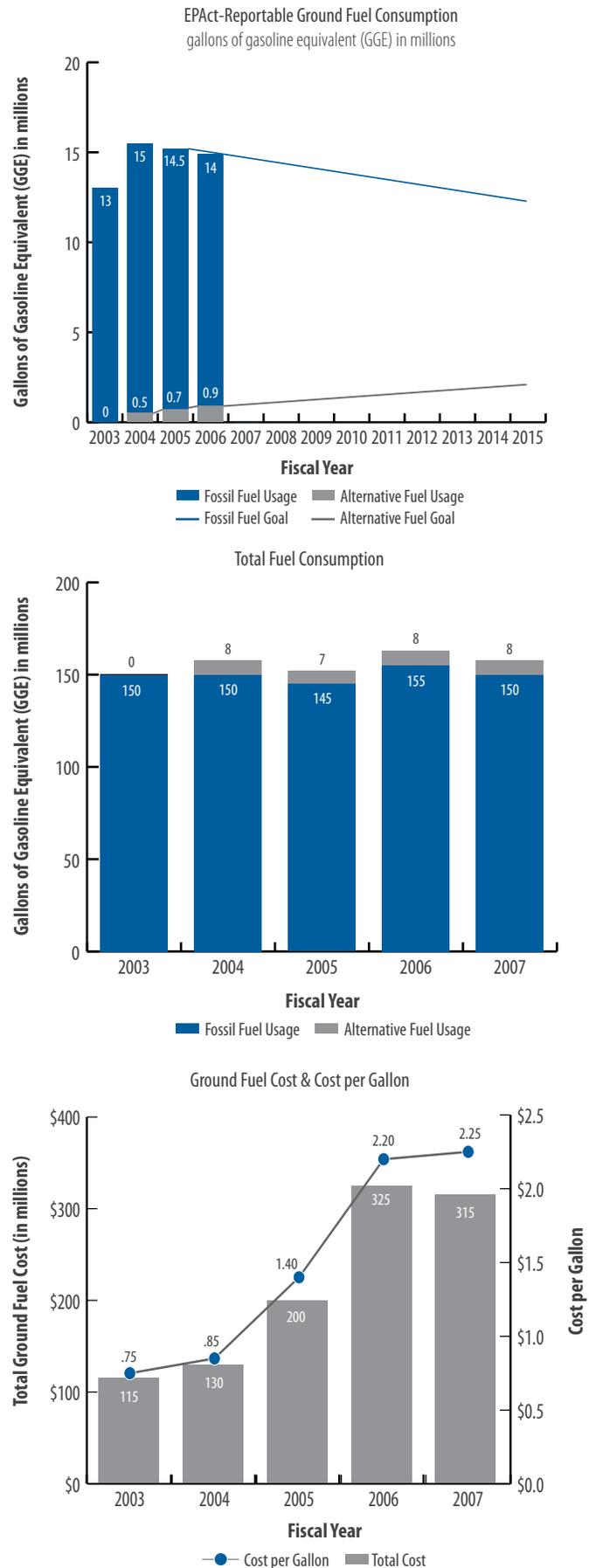
- Availability of renewable resources
- Utility and commodity cost
- Federal, state and local tax incentives, rebates, and mandates
- Deployment and sustainability

Capitalizing on development opportunities will require leadership, partnering with industry, and a cogent strategic approach. Commercialization and adoption of alternative energy and infrastructure in transportation and facilities is essential to transformation in a global market. However, as the Air Force transforms, we must ensure that our requirements for global reach capability (i.e., deployment and sustainability) are also met.

### Asset Management Transformation

The Air Force is undergoing a fundamental transformation in installation management under a concept called “Asset Management.” Asset Management is the use of systematic and integrated practices through which the Air Force optimally manages its natural and built assets and the associated performances, risks, and expenditures over the life cycle to a level of service to support missions and organizational goals. In essence, it is a structured, standardized approach that strives to make better-informed management decisions through business case analysis of risks, costs, and benefits. Energy management is leading the way in this transformation through a structured approach to understanding life-cycle cost.

Figure 7 Air Force Ground Fuel Cost and Usage





# 3 Strategic Approach

## Overview

The overarching goals of the Air Force Energy Plan are to *Reduce Demand, Increase Supply, and Culture Change*. Meeting these goals requires defining and meeting specific objectives—goals generated from federal mandates, from Air Force initiatives and requirements, and from the need to save money and resources. The primary Infrastructure Energy Plan goals are listed below:

- Reduce infrastructure costs by 20 percent by 2020
- Reduce facility energy intensity by 3 percent per annum through 2015
- Reduce base water use by 2 percent per annum through 2015
- Increase use of renewable energy at annual targets (3%, 5%, 7.5%, 25%) through 2025
- Reduce ground vehicle fuel use by 2 percent per annum through 2015
- Increase alternative fuel use by 10 percent per annum through 2015

Meeting these goals requires a strategy that combines many diversified elements—leadership, program development, investment, technology, supply, demand, and individual efforts—into a cohesive plan that ensures the Air Force remains a leader in energy management. It requires recognizing or creating opportunities to conserve energy and being prepared to exploit them.

## The Strategy

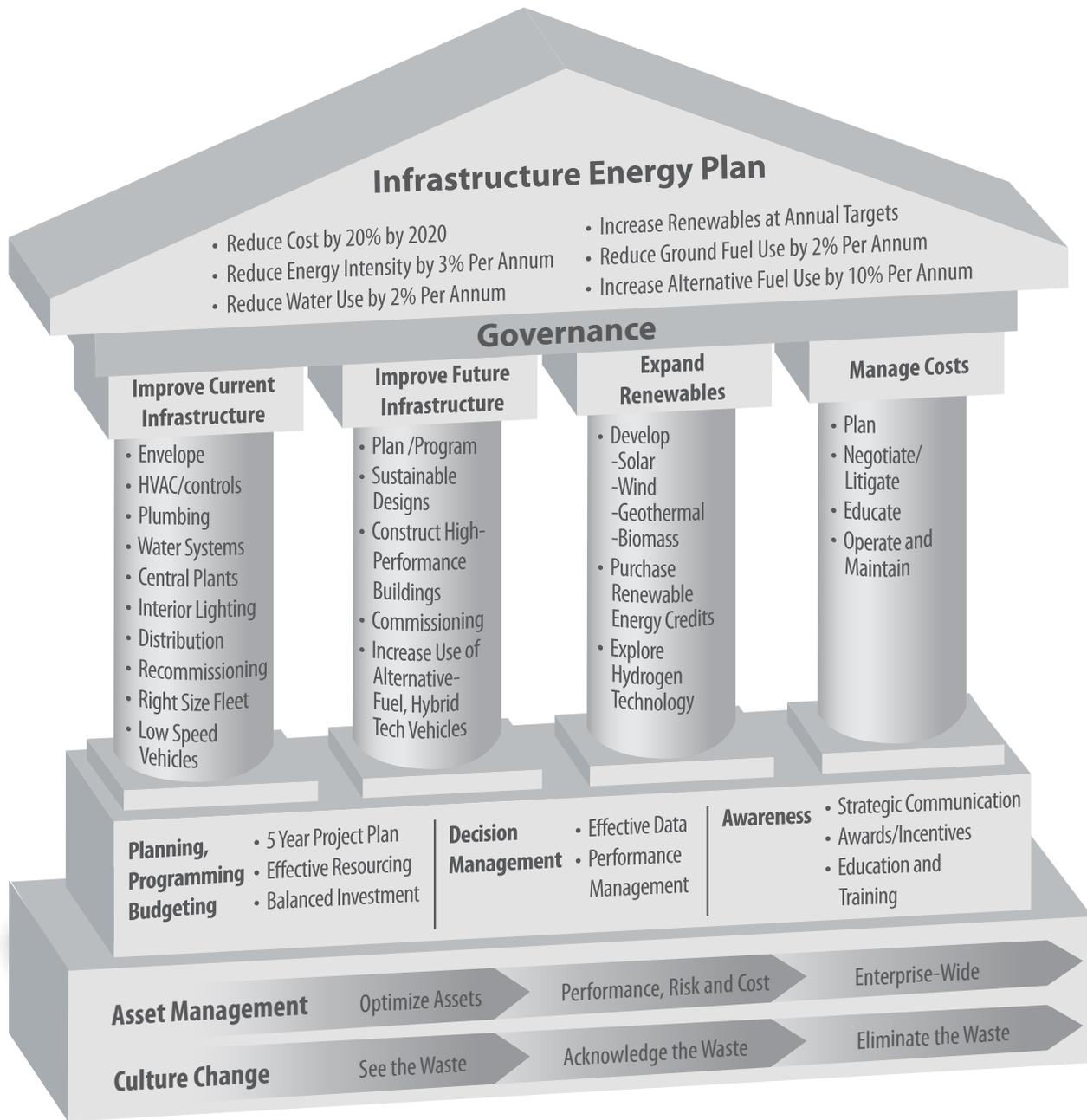
The Air Force Infrastructure Energy Plan is comprised of four “Pillars” supported by key enablers and a foundation of transformational concepts (Figure 8).

- Pillar 1—Improve Current Infrastructure
- Pillar 2—Improve Future Infrastructure
- Pillar 3—Expand Renewables
- Pillar 4—Manage Cost

These four Strategic Pillars provide specific “levers” that identify opportunities for reducing energy intensity, expanding renewable energy usage, and controlling costs. For example, returning building mechanical systems to optimal operating conditions through a program of recommissioning or “tuning up” is a specific action or lever that improves the energy performance of our existing physical plant. Rightsizing the vehicle fleet improves efficiency by adding more cost-effective and energy-saving assets to the inventory. Eliminating vehicle authorizations built on justifications that are no longer applicable saves energy and vehicle infrastructure. These are all examples of levers—specific actions that create positive change with verifiable results.

Supporting these pillars are enablers: Planning, Programming, and Budgeting; Decision Management; and Energy Awareness. These enablers are the keys to the organizational transformation that will enable us to reach or exceed our energy goals. The Pillars and

Figure 8 The Infrastructure Energy Plan



Enablers sit atop a foundation of Asset Management and Culture Change—concepts which are central to the Air Force’s installation management transformation. The business processes embodied in Asset Management maximize the value and utility of natural and built infrastructure. Together, the Pillars and Enablers form a conceptual framework for identifying specific initiatives and grouping related activities. They also provide a means for synchronizing planning and execution throughout the Air Force at all organizational levels. Overseeing the energy program is a governance structure that includes Energy Management Steering Groups at base, MAJCOM and Headquarters Air Force levels (See Governance, p. 21).

This strategic plan is built upon a framework of specific objectives with estimated completion dates (ECDs), offices of primary responsibility (OPRs), and in some cases, offices of collateral responsibility (OCRs). In many cases, our energy objectives are linked to specific Civil Engineer Strategic Plan objectives; these are noted where applicable (e.g., CE Strat Plan 3.1J; 3.6A, etc.). The objectives are listed in this document under the element they address: Pillars, Enablers, and Governance.

### Opportunity Assessment

Understanding our conservation and renewable energy development opportunities frames the discussion for investment. Over the 20-year period ending in FY2005, the Air Force avoided over \$2.9 billion in utility costs as a direct result of facility energy conservation measures (Figure 9). The projected opportunity to avoid an additional \$2.2 billion in gross utility costs (Figure 10) in the period 2005 to 2015 underscores the strong business case behind energy efficiency as a means to address broader economic pressures. Facility energy conservation investments of \$1.5 billion provide an opportunity for a \$2.2 billion cost avoidance through year 2015 with a \$0.72 billion return on investment. A portfolio approach to energy management will ensure that the Air Force meets all federal infrastructure energy mandates.

### Energy Intensity Reduction Opportunity Assessment

Energy intensity is a measure of how efficiently we use energy. From the 2003 baseline established by the EAct, the Air Force reduced facility energy intensity by 12.7 percent by the end of FY2007, putting us well on our way to meeting the EISA goal of 30 percent by 2015 (Figure 11). The majority (22 percent) of the energy intensity reductions leading to the 30-percent goal will come from efficiency improvements to existing Air Force infrastructure—Pillar 1. These reductions will actually help the Air Force exceed the mandated goal.

The opportunity to reduce energy intensity through new construction—Pillar 2—is more limited, constrained by the very slow infrastructure recapitalization rates (over 100 years) that result from undersized MILCON and O&M restoration and modernization budgets. However, there is a \$250 million per year energy project initiative in the FY2010-2015 POM. Major

Commands and installations will be tasked to provide viable, executable projects each year to ensure the best investment

Figure 9 Twenty years of utility cost avoidance

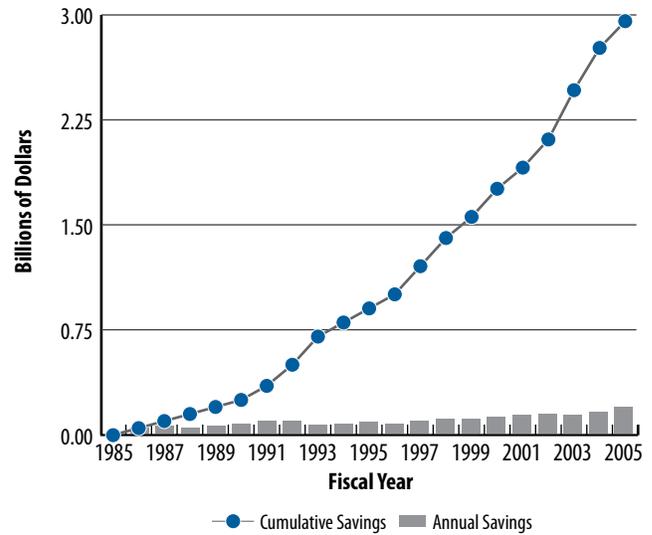


Figure 10 Return on Investment in Energy Initiatives

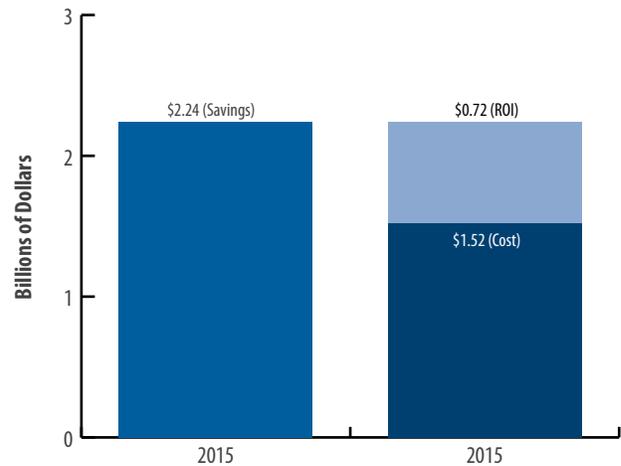
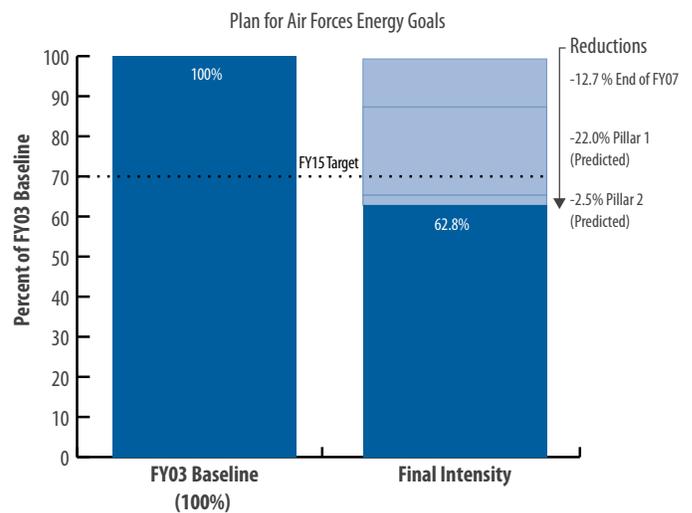


Figure 11 Plan for all Air Force Energy Goals



opportunities are identified. Projects must have detailed programming documentation (DD Form 1391s), Building Life-Cycle Cost (BLCC) data with a Savings-to-Investment Ratio (SIR) greater than 1.2, a simple payback of less than 10 years, and show significant energy or water reduction in order to be considered valid.

Between FY2008 and FY2015, the number of new high-performance buildings projected (through the MILCON and BRAC appropriations) is approximately three to four percent of our physical plant (700 million square feet). There must be a sequential removal of five to 10 percent of our worst energy-performing infrastructure through optimal space utilization and demolition.

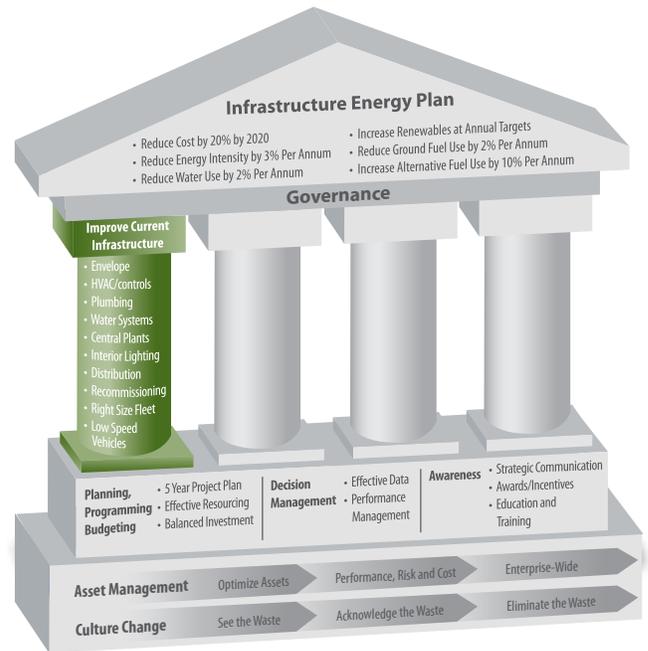
Building new facilities that include durable, low maintenance, sustainable products with high efficiency heating, cooling, and ventilation equipment will identify best practices and point the way forward for upgrades to existing infrastructure. The good news is that, when properly resourced and given the proper leadership emphasis, there are abundant opportunities to achieve these results.

## Renewable Energy Opportunity Assessment

The Air Force is the largest federal purchaser of renewable energy in the United States. Annually we acquire nine to 11 percent of our total electrical power through the purchase of renewable energy credits (RECs)—certificates that attest to the renewable origin of the power source. In the coming years, we will focus on developing additional renewable energy on Air Force installations. Current projections indicate the Air Force will be able to meet up to 11 percent of its future energy needs through focused development of on-base renewable power that is cost-competitive. The renewable energy market will continue to be constrained for the foreseeable future not only by the limited local availability of renewable resources, but by prevailing utility commodity costs and the availability of economic incentives, such as federal, state, and local tax incentives and rebates.

## Pillar 1: Improve Current Infrastructure

This pillar focuses on increasing energy efficiency in our current facilities, vehicles, and equipment as well as actively conserving water through a variety of specific actions such as improving building envelope thermal resistance; installing energy-efficient lighting; recommissioning (tuning up) building systems; maximizing space utilization; rightsizing the vehicle fleet; and replacing inefficient system components with high-efficiency ones. In Air Force energy management, these actions are basic and common to all installations.



### Improve Current Infrastructure

#### Objectives Synopsis

- |      |  |
|------|--|
| 1.1  | Meet/exceed energy & water intensity goals   |
| 1.2  | Ensure 15 percent of existing buildings meet/exceed sustainable building standards |
| 1.3  | Consider life-cycle costs for purchases  |
| 1.4  | Develop installation-level consolidation & demolition plans                        |
| 1.5  | Increase use of water meters   |
| 1.6  | Expand use of water leak detection systems   |
| 1.7  | Develop a program to rightsize the fleet   |
| 1.8  | Convert 30% of light-duty vehicles (LDVs) to low-speed vehicles (LSVs)             |
| 1.9  | Purchase 100% of alternative/flex-fuel vehicles for LDVs or LSVs                   |
| 1.10 | Reduce fossil fuel consumption in vehicles   |
| 1.11 | Catalog LSVs available for replacing vehicles above light-duty category            |
| 1.12 | Test hydrogen vehicles and infrastructure  |

**Objective 1.1:** Meet or exceed mandated annual and FY2015 energy and water intensity reduction goals for current infrastructure. (ECD: Annually/OPR: MAJCOM A4s and A7s/CE Strat Plan 3.6)

**Objective 1.2:** Develop a validation mechanism through major renovation and MILCON programs to ensure 15 percent of existing building inventory will meet or exceed the Federal High Performance Building Memorandum of Understanding (MOU) for energy efficient sustainable buildings by FY2015. (ECD: Mar 2009/OPR: AFCEE and AFCESA/OCR: MAJCOM A7s/CE Strat Plan 3.6)

**Objective 1.3:** Develop a policy and a mechanism for life-cycle cost considerations for purchases of bench stock consumables and replacement parts that relate to water and energy consumption. (ECD: Dec 2008/OPR: AFCESA/CENF/CE Strat Plan 3.1I, 3.6C-D)

**Objective 1.4:** Develop installation-level consolidation and demolition plans that include resource requirements, utility savings, and financial savings analyses that target facilities with poor energy performance. (ECD: Dec 2008/OPR: MAJCOM A7s, Installations/OCR: AF/A7CA/CE Strat Plan 3.3A-D; 3.6D)

**Objective 1.5:** Increase use of water meters by issuing a water meter specification and policy. At a minimum meters should be installed at facilities where usage is estimated to be 100,000 gals/yr or greater. (ECD: Dec 2008/OPR: AFCESA/OCR: AFCEE/CE Strat Plan 3.6D)

**Objective 1.6:** Publicize the effectiveness and expand the use of water distribution system leak detection and repair. Provide a statement-of-work template to implement similar projects. (ECD: Dec 2008/OPR: AFCESA/OCR: AFCEE/CE Strat Plan 3.6D)

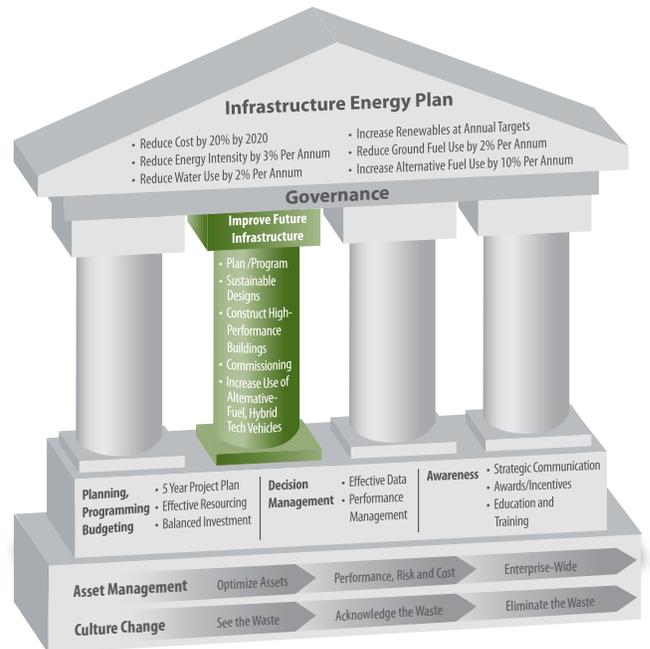
- Objective 1.7:** Develop a program to rightsize the fleet through a series of 30 installation vehicle validation visits while creating a new baseline for each functional community to follow as a model for requirements. (ECD: FY2009/OPR: VEMSO or AFVESA)
- Objective 1.8:** Convert 30 percent of the light-duty vehicle fleet authorizations to low-speed vehicles (LSVs). (ECD: FY2012/OPR: VEMSO and MAJCOMs)
- Objective 1.9:** Purchase 100 percent of light-duty alternative or flex-fuel vehicle acquisitions where commercially available. (Note: This is 25 percent above the mandated requirement in EAct 2005.) (ECD: Annually/OPR: VEMSO/WR-ALC)
- Objective 1.10:** Reduce overall fossil fuel consumption in vehicles by 2 percent annually (2005 baseline) until 2015, and steadily increase the overall fleet average miles per gallon (MPG). (ECD: Annually/OPR: MAJCOMs/OCR: A4RE)
- Objective 1.11:** Catalog LSVs available on the market for replacing vehicles above the light-duty category of 8,500 lbs and over. Consider viability of LSVs in 5 passenger pickup truck, telephone maintenance utility trucks, and multi-stop maintenance vans. (ECD: FY2009/OPR: VEMSO and MAJCOMs/Installations)
- Objective 1.12:** Continue testing hydrogen vehicles and infrastructure at Selfridge ANGB, Mich., Robins AFB, Ga., and Hickam AFB, Hawaii, and report results in Dec 2010. (ECD: FY2009/OPR: APTO, Installations)



Researchers at Tyndall Air Force Base, Fla., have designed a transportable waste-to-energy system, shown here, that will use waste material to produce electricity at forward-deployed locations.

## Pillar 2: Improve Future Infrastructure

This pillar focuses on improving processes and applying sustainable energy-efficiency standards to accelerate the delivery of high-performance buildings, alternative-fuel vehicles, and supporting infrastructure into the Air Force inventory. The facilities initiative centers on planning, programming, design, construction, and commissioning new and renovated facilities through MILCON and Operations and Maintenance appropriations. The vehicles and ground fuels initiatives focus on recapitalization of the fleet and sustaining the most cost-effective vehicles while using hybrid technology and E85 (85 percent ethanol), B20 (20 percent biomass), solar, electric, and hydrogen fuel sources. We will link enhanced standards with best practices to secure future operational results.



### Improve Future Infrastructure

#### Objectives Synopsis

- |      |   |
|------|---|
| 2.1  | Meet/exceed mandated energy/water intensity reduction goals   |
| 2.2  | Meet/exceed mandated energy/water intensity reduction goals   |
| 2.3  | Ensure that 100% of new construction is capable of achieving LEED Silver certification              |
| 2.4  | Develop metrics & measurement capabilities to track energy performance of facilities                |
| 2.5  | Create baseline inventory of buildings that meet/exceed Federal High Performance Building standards |
| 2.6  | Construct and utilize alternate fuel stations and vehicles while modernizing fleet                  |
| 2.7  | Reduce fuel consumption by 2% annually & increase fleet's average MPG performance                   |
| 2.8  | Develop a program to rightsize the fleet  |
| 2.9  | Install at least 1 alternative fuel pump at each installation refueling station                     |
| 2.10 | Test hydrogen vehicles & infrastructure   |
| 2.11 | Procure and Construct alternate fuel stations & vehicles, while modernizing fleet                   |
| 2.12 | Catalog LSVs available for replacing LDVs   |

**Objective 2.1:** Meet or exceed mandated annual and FY2015 energy and water intensity reduction goals for future infrastructure. (ECD: Annually/OPR: MAJCOM A4s and A7s/CE Strat Plan 3.5C, 3.6)

**Objective 2.2:** For all major renovation and MILCON projects, eliminate roadblocks in the planning/programming/design/construction/commissioning processes that inhibit delivery of high-performance and sustainable buildings. (ECD: Continuous improvement process/OPR: AFCEE/CE Strat Plan 3.1G, 3.5C, 3.6)

**Objective 2.3:** Starting with the FY2009 MILCON program, maximize Leadership in Energy and Environmental Design (LEED) project points through meeting criteria established by LEED, the Federal High Performance Building MOU, and other applicable federal building efficiency mandates. Ensure that 1) 100 percent of new construction is capable of

achieving LEED Silver certification; 2) 5 percent of the program is certified LEED Silver; and 3) 10 percent is certified LEED Silver in FY2010 and thereafter. (ECD: 30 Sep 2009 and annually thereafter/OPR: AFCEE/OCRs: AFCESA, MAJCOM A7s, A7CP/CE Strat Plan 3.1G, 3.5C, 3.6)

**Objective 2.4:** Develop metrics and measurement capabilities to track execution and energy performance of facilities constructed through the major renovation and MILCON programs. (ECD: Mar 2009/OPR: AFCEE and AFCESA/CE Strat Plan 3.5C, 3.6)

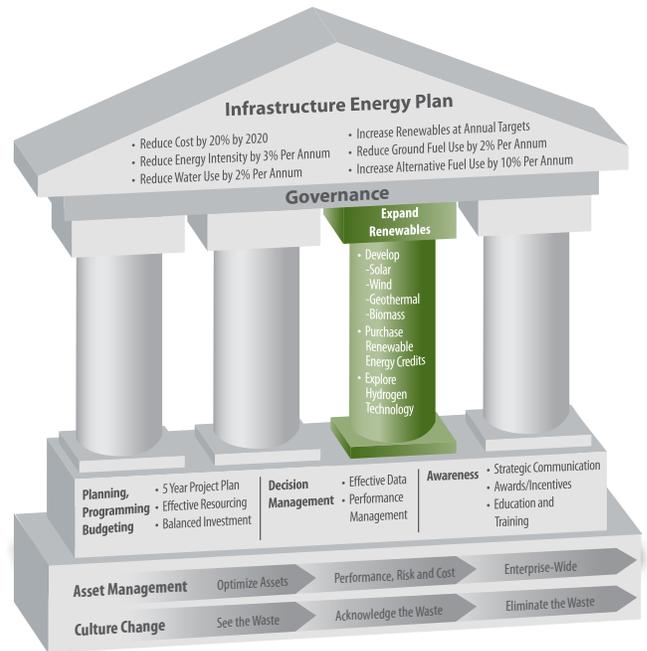
**Objective 2.5:** Create a baseline inventory of buildings that currently meet or exceed the Federal High Performance Building MOU for use in identifying the gap for investment toward meeting the 15 percent target in FY2015 (E.O. 13423, Section 2). (ECD: Sep 2010/OPR: AFCEE and AFCESA/OCR: A7CP, A7CI/CE Strat Plan 3.6)

- Objective 2.6:** Procure/construct/sustain alternate fuel stations and vehicles while modernizing the fleet by converting 30 percent of it to low-speed vehicles. (ECD: FY2012/OPR: A4RE/OCR: DESC, A7C)
- Objective 2.7:** Reduce overall fuel consumption by 2 percent annually and increase the fleet's average MPG performance. (ECD: Annually/OPR: VEMSO, AFVESA)
- Objective 2.8:** Continue developing a program to rightsize the fleet through a series of 30 vehicle validation reviews while creating a baseline for each functional community to follow as a model for requirements. (ECD: FY2009/OPR: VEMSO, AFVESA)
- Objective 2.9:** Install at least 1 renewable fuel pump at each federal fleet refueling center at each installation that issues more than 100 thousand gallons of ground fuel annually. (ECD: Jan 2010/OPR: DESC, AFPA, Installations)
- Objective 2.10:** Continue testing hydrogen vehicles and infrastructure at Selfridge ANGB, Mich., Robins AFB, Ga., and Hickam AFB, Hawaii. Expand testing of hydrogen vehicles at McGuire AFB, N.J. (an MEBI base) beginning in FY2009. (ECD: FY2009/OPR: APTO, Installations)
- Objective 2.11:** Procure/construct/sustain alternate fuel stations and vehicles while continuing to modernize the fleet by fielding 30 percent of the light-duty fleet as LSVs. (ECD: FY2012/OPR: VEMSO, AFVESA, WR-ALC/OCR: A7C)
- Objective 2.12:** Catalog LSVs available on the market for replacing vehicles above the light-duty category of 8,500 lbs and over. Consider the viability of LSVs in five-passenger pickup trucks, telephone maintenance/utility trucks, and multi-stop maintenance vans. (ECD: FY2009/OPR: WR-ALC, VEMSO, AFVESA, and MAJCOMs/Installations)

## Pillar 3: Expand Renewables

This pillar promotes the development of renewable and alternative energy for use in facilities and ground vehicles and equipment. Examples of renewable and alternative energy include solar, wind, biomass, and geothermal for use in facilities and biofuel, hydrogen, and solar-charging for use in vehicles. Renewable electrical energy is purchased directly from the local utility provider in its generation mix, through RECs (most common), or through direct purchase. At times it is generated on base through either government-owned or third-party-financed or -owned capacity. For the Air Force, on-base generation is the preferred approach, to increase supply security and decrease stress on the national electrical grid.

Today, the Air Force is engaged with DoD and DOE to define, develop, and implement net-zero energy installations—bases that produce more energy (on-site from renewable sources) than they consume. DoD is establishing goals for on-base generated renewable energy to be 25 percent of base consumption in the year 2025 and for “islanding” bases and nearby communities from the national energy supply through plans to generate in excess of 100 percent of base requirements with renewable energy.



### Expand Renewables

#### Objectives Synopsis

- 3.1 Meet all federal renewable energy mandates
- 3.2 Construct on-base renewable energy production
- 3.3 Identify renewable energy project candidates
- 3.4 Complete reviews of hydrogen testing & deploy in vehicles and fuel infrastructure where cost-effective

**Objective 3.1:** Meet all federal renewable energy mandates. (ECD: See specific goal/OPR: MAJCOMs/OCR: A4R, A7C/CE Strat Plan 3.6E)

**Objective 3.2:** Construct on-base renewable energy production to achieve one percent of Air Force consumption by FY2012 and three percent by FY2015. (ECD: FY2012 and FY2015/OPR: AFCESA/OCR: AFCEE, MAJCOM A7s, and A7CA/CE Strat Plan 3.1A, C; 3.6E)

**Objective 3.3:** Identify renewable energy project candidates for feasibility studies at all Air Force bases. Recommended course of action is by contract. (ECD: Jan 2009/OPR: AFCESA/OCR: MAJCOM A7s/CE Strat Plan 3.1M, 3.6E)

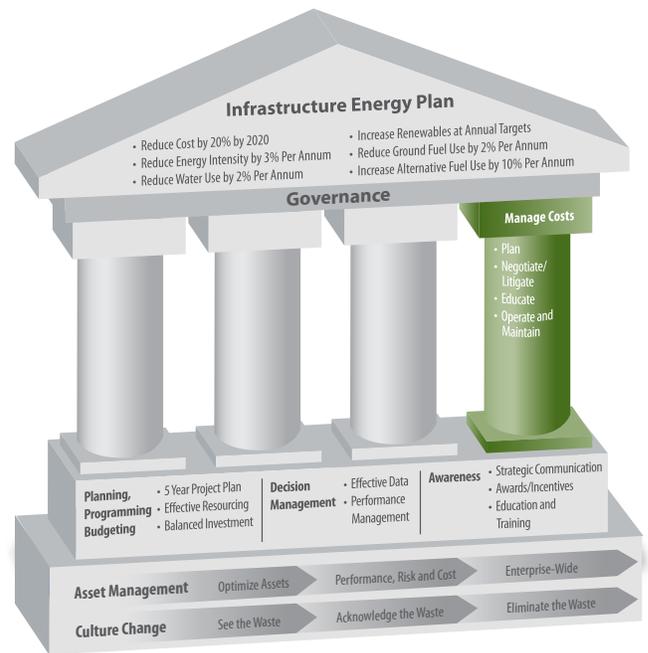
**Objective 3.4:** Complete reviews of hydrogen testing and deploy in vehicles and fuel infrastructure where cost effective. (ECD: FY2009/OPR: APTO/OCR: A4R)



Solar panels absorb the sun as they produce energy at the 180th Fighter Wing's alternative energy site in Swanton, Ohio, Aug. 10, 2008. The panels are part of the wing's renewable energy project, which is funded by the Department of Defense in an effort to reduce the unit's fossil fuel use and dependence on foreign energy sources.

## Pillar 4: Manage Cost

This pillar focuses on methods to significantly reduce or stabilize utility costs through favorable terms, services, and rates. Purchased utilities include electricity, natural gas, fuel oil, liquid propane, coal, steam, and hot water. Water and sanitary sewer are two additional non-energy utility categories that are managed under this pillar. Utility bills must be examined across all cost components, including commodity purchases, fees, demand charges, and late payments. Capturing this opportunity requires additional resources, removal of roadblocks, a robust review process, and data transparency. The key actions in this pillar include cost planning, negotiation and litigation of utility rates, accounting management, prompt bill paying, and cost-avoidance education.



### Manage Cost

#### Objectives Synopsis

- |     |  |
|-----|--|
| 4.1 | Identify installations that paid late fees & determine root causes                               |
| 4.2 | Perform utility acquisition evaluations  |
| 4.3 | Develop & implement a utility contract training program  |
| 4.4 | Develop a plan to update policies/guidance to reflect changes in energy markets and requirements |
| 4.5 | Evaluate on-base utility system inefficiencies   |
| 4.6 | Advertise current rebates, incentives, & credits for use on Air Force bases                      |
| 4.7 | Centralize purchasing of natural gas   |

**Objective 4.1:** Identify installations that paid late fees and determine root causes. Present findings and course of action to Provide Infrastructure Working Group (PIWG) (See Governance section on p. 21). (ECD: Dec 2008/OPR: MAJCOM A7s/OCR: AFCESA/CE Strat Plan 3.7A)

**Objective 4.2:** Perform utility acquisition evaluations at 10 Air Force bases annually by contract to determine the best rate schedule and most favorable contract terms. (ECD: Annually/OPR: AFCESA/CE Strat Plan 3.3B)

**Objective 4.3:** Develop and implement a utility contract training program for contracting and engineering personnel. (ECD: FY2009/OPR: AFCESA/OCR: MAJCOMs)

**Objective 4.4:** Develop a plan to update policies and guidance to reflect changes in energy markets and requirements. (ECD: Jan 2009/OPR: AFCESA/CE Strat Plan 3.6F)

**Objective 4.5:** Evaluate on-base utility system inefficiencies from distribution losses and quality issues (e.g., power factor, harmonics, water quality, etc.) and determine corrective actions. (ECD: Annually/OPR: Installations and MAJCOM A7s/CE Strat Plan 3.6C-D)

**Objective 4.6:** Partner with DOE to advertise current rebates, incentives, and credits for utilities and renewable energy to maximize their use on Air Force bases. (ECD: Dec 2009/ OPR: AFCESA, VEMSO, AFVESA/CE Strat Plan 3.6E)

**Objective 4.7:** Centralize purchasing of natural gas based on buying recommendation performed at AFCESA or by contract to purchase natural gas on a hedging basis. (ECD: Sep 2008/ OPR: AFCESA, MAJCOM A7s/CE Strat Plan 3.1J, 3.6F)

## Enablers

The Infrastructure Energy Plan pillars are supported by three enablers, which sit atop the foundational concepts of Asset Management and Culture Change: Planning, Programming, and Budgeting; Decision Management; and Energy Awareness.

### Planning, Programming and Budgeting

A fully supported program is the result of requirements identification, programming, and effective resource advocacy. Planning, Programming, and Budgeting (PPB) is the process for identifying requirements and resources required to meet or exceed our energy mandates and optimize available sources of funds. Facility energy requirements are identified at the base level through energy audits, as prescribed by EISA 2007 (Sec 432).

The Air Force Civil Engineer (CE) has adopted the DOE-developed Building Life Cycle Cost (BLCC) software as our standard tool for financial analysis and prioritization based on return on investment. The BLCC software has historically been used to produce simple payback calculations for the Energy Conservation Investment Program, but we will expand its use for prioritization of projects for Air Force direct investment. All projects should be entered into the Automated Civil Engineer System's Project Management (ACES-PM) module using the energy project categories established in 2008. The PIWG (see Governance section on pgs. 21-22) is the primary forum for requirements advocacy and provides oversight of the business case for investment through the Air Force Corporate Structure, the Energy Senior Focus Group (SFG), and the Air Force Smart Operations for the Twenty-First Century (AFSO21) Process Council.

To optimize return on investment and program outcomes, our financial portfolio will include requirements identification, self-investment through Air Force appropriations (public sector) and third-party (private sector) financing. Manpower requirements must be clearly articulated at all functional levels to ensure energy risk is properly valued and energy becomes a managed asset.

**Requirements Identification:** We will establish requirements through energy and water audits and infrastructure assessments.

**Objective PPB 1:** Establish Air Force comprehensive energy and water audit program policy and guidelines to address all pillars of the Infrastructure Energy Plan and meet the EISA 2007 requirement to audit 25 percent of installation "covered" facilities. (ECD: Mar 2009/OPR: AFCESA/ OCR: MAJCOM A7s/ CE Strat Plan 3.5, 3.6C-E)

**Objective PPB 2:** Develop, schedule, and identify required resources to execute energy and water audits (EISA Sec 432). (ECD: Mar 2009/OPR: MAJCOM A7s/OCR: Installations/CE Strat Plan 3.5, 3.6C-E)

**Objective PPB 3:** Integrate the findings from all MAJCOM annual infrastructure assessment team visits into energy requirements and opportunities

supporting all pillars of the Infrastructure Energy Plan. (ECD: Nov 2008/OPR: AFCESA/ OCR: MAJCOM A7s/CE Strat Plan 3.5, 3.6C-D)

**Self Investment:** The Air Force established a modest Headquarters Air Force (HAF) facility energy fund, starting with FY2008, used to enhance energy management at HAF, MAJCOM, and base levels and to initiate a strategic investment program. Principle avenues for funding energy initiatives are new construction via the MILCON (3300) appropriation and the Sustainment, Restoration, and Modernization accounts (S/R&M) and the Facilities Operations account in the Operations and Maintenance (3400) appropriation (see Appendix B for others). MAJCOMs are required to defend the business case and prove the return on investment through building life-cycle cost analysis in order to receive funding.

**Objective PPB 4:** Develop and annually review a requirements-based 5-Year plan to strategically invest in energy initiatives that maximize resources through multiple appropriations (Appendix B) and third-party financing ready for the FY2012-2017 POM. Develop sequel plans at AFCESA, AFCEE, MAJCOMs, and all bases. Involve stakeholders through a governance board for funding, programming, and execution decisions. (ECD: Mar 2009/OPR: AFCESA/ OCRs: MAJCOM A7s, AFCEE, and AF/A7CAE/CE Strat Plan 3.5, 3.6C-D)

**Objective PPB 5:** Report actual execution and returns from funding applied in all appropriations towards energy requirements to the PIWG and relate to the energy metrics (Appendix C) through a program management review. (ECD: Twice each FY/ OPR: MAJCOM A4s and A7s/CE Strat Plan 3.5, 3.6C-D)

**Objective PPB 6:** Brief the Energy Senior Focus Group (see Governance Section on pgs. 21-22) and Air Force Corporate Structure annually on return on investment and program results for program advocacy. Adjust investment approach as required. (ECD: Annually/OPR: A7CAE, A7CI/ CE Strat Plan 3.5, 3.6C-D)

**Objective PPB 7:** Establish policy and procedures to capture energy savings from conservation measures for reinvestment at base level in accordance with NDAA 2007 language. (ECD: May 2009/OPR: SAF/FM/OCR: A7C/CE Strat Plan 3.5, 3.6C-D)

**Third-Party Financed Projects:** Budgetary pressures have expanded the use of third-party financing such as Energy Savings Performance Contracts (ESPCs), Utility Energy Service Contracts (UESCs), Enhanced Use Leases (EULs), and Standard Leases. The Air Force can use third-party financing of projects to meet federal mandates rather than rely on military appropriations or other traditional forms of federal financing. The idea behind third-party financing is that an intermediary, other than the U.S. Treasury, can raise money in private capital markets to fund energy projects.

ESPCs, UESCs, and EULs remain vital tools for the Air Force to achieve our goals and mandates. However, we will enhance our management of third-party financed projects through expanded services at Air Force centers of expertise to address the growing use of these technically, legally, and financially complex contract instruments. For details, see the Air Force ESPC and UESC Policy (HAF/A7C Memo, 30 Oct 2007).

**Objective PPB 8:** Conduct a third-party financed projects lean improvement event for ESPCs and UESCs to improve planning, project approval processes, execution, and required documentation. (ECD: Dec 2008/OPR: AFCESA/OCR: A7C/CE Strat Plan 3.1C, 3.6C-E)

**Objective PPB 9:** Identify conservation project requirements for execution through ESPCs and UESCs using the facility energy audit results and submit annually to AF/A7C. (ECD: Annually/OPR: MAJCOM A7s/OCR: AFCESA/CE Strat Plan 3.1, 3.6C-E)

**Objective PPB 10:** Develop annual call for ESPC and UESC projects and submit to AF/A7C. (ECD: February annually/OPR: AFCESA/OCR: MAJCOM A7s/CE Strat Plan 3.1, 3.6C-E)

**Objective PPB 11:** Establish a data warehouse for basic documentation on all ESPCs and UESCs to improve portfolio management at the Air Force's program management office, the Air Force Facility Energy Center. (ECD: Dec 2008/OPR: AFCESA/CE Strat Plan 3.1, 3.6C-E)

**Objective PPB 12:** Establish portfolio management for ESPCs at the Air Force Facility Energy Center to ensure managed risk and benefits through enhanced planning, execution, and performance evaluation and validation of fiscal, energy and water savings. (ECD: Mar 2009/OPR: AFCESA/CE Strat Plan 3.1, 3.6C-E)

**Manpower:** Energy Management is not a task that is executed effectively at base level by one or two people; it requires a team of multi-skilled engineers and technicians to operate facility equipment and control systems. In most squadrons today, energy management is a part-time job or an "additional duty," performed by an Energy Manager who is heavily tasked with non-energy activities, unable to focus on identifying real energy saving projects and potential investments. To balance risk across the demand for conservation and alternative sources of supply, energy investment must become a managed asset, and base-level energy management a full-time job. Consequently, HAF will fund Resource Efficiency Managers (REMs)—contracted and credentialed energy managers—at all bases, beginning with high energy intensity installations, then funded in accordance with MAJCOM priorities. Although this strategy establishes a full-time base energy management capability, it falls short of the resources needed to execute energy requirements; therefore, a case can be made for realignment of existing engineer and technician resources to form an energy section within the Civil Engineer Squadron. An Energy Management Section within the Asset Optimization Branch of the Asset Management Flight can be carved

out of existing authorized manpower and should combine the talents of degreed engineers and technicians and maintainers. The section utilizes other CE Squadron organic resources to plan, program, design, and execute energy requirements and performs tasks such as auditing, monitoring, and controlling energy consumption; analyzing data and building life-cycle costs; establishing and prioritizing requirements; and charting investment strategies.

**Objective PPB 13:** Develop and implement an Air Force REM program including a standard statement of work, a standard REM performance evaluation system, a program evaluation system, and funding profile through FY2015. (ECD: Dec 2008/OPR: AFCESA/OCR: MAJCOM A7s/CE Strat Plan 2.1, 3.6C-E)

**Objective PPB 14:** Develop a draft manpower standard for an Energy Management Section within the CE Squadron and test at the two Model Energy Bases, Barksdale and McGuire. (ECD: Jan 2009/OPR: A7CA/OCRs: MAJCOMs, AFCESA, A7CAE, and A7CR/CE Strat Plan 2.1, 3.4B, 3.6C-E)

**Objective PPB 15:** Develop a draft manpower standard for Energy Management at all staff levels. (ECD: Jan 2009/OPR: A7CA/OCRs: MAJCOMs, AFCESA, A7CAE, and A7CR/CE Strat Plan 2.1, 3.4B, 3.6C-E)

### Decision Management

Decision Management (DM) is the set of activities that converts raw data into actionable information on the efficiency and performance of energy systems. The integration of energy considerations into corporate decisions across MAJCOMs, wings, and installations enhances enterprise asset management. Decision Management incorporates four key elements:

- Energy Management Plans
- Management Information Systems
- Performance Measurement
- Energy and Asset Management

**Energy Management Plans:** Plans must be developed at MAJCOMs, wings, installations, and field operating agencies to document strategies that mirror the Air Force Infrastructure Energy Plan, including its pillars and objectives; articulate resource requirements; and reflect verifiable conservation and cost management results.

**Objective DM 1:** Develop and publish an Air Force Installation Energy Management Plan template that incorporates the elements within the Air Force's energy strategic and implementation plans. (ECD: Feb 2009/OPR: AFCESA/OCR: A7CAE, A4R/CE Strat Plan 3.6C-E)

**Objective DM 2:** Develop and publish Installation and MAJCOM Energy Management Plans using the Air Force template. (ECD: 120 days after publication of the template or Apr 2009, whichever is sooner/OPR: CE Squadron Commanders/OCR: MAJCOM A7s/CE Strat Plan 3.3B, 3.6C-E)

**Effective Management Information Systems:** Modern information technology (IT) is enterprise-wide and provides accurate, relevant, near real-time data that is readily available and easily interpreted. Wise asset management decisions and energy stewardship result when consumption is understood and unit and individual accountability is created. IT is a key enabler of effective performance measurement and metrics. We will deploy enhanced energy management tools through the Air Force Civil Engineer's IT system modernization effort, Agile Installation Management (AIM).

**Objective DM 3:** Establish an Air Force Energy Database and Information Center and normalize existing data across all existing energy-related databases in preparation for deployment of AIM. (ECD: Mar 2009/OPR: A7CI and AFCESA/CENF/CE Strat Plan 3.6C-E, 3.7B)

**Objective DM 4:** Measurement and Reporting – Deploy energy management functionality within the AIM system to give senior leadership at all levels the ability to promote energy stewardship through unit and individual accountability. (ECD: FY2009/OPR: A7CI/OCR: A7CAE, AFCESA/CENF/CE Strat Plan 3.6C-E, 3.7B)

**Objective DM 5:** Enhance energy performance measurement capabilities and data analysis through advanced meters and Defense Utility Energy Reporting System modernization. (ECD: FY2009/OPR: AFCESA/CE Strat Plan 3.6C-E, 3.7B)

**Performance Measurement:** Performance measurement is built upon effective information management systems that tie meaningful outcome metrics and performance indicators to the Air Force's key business processes. Infrastructure energy decisions are based upon performance measures tied to the overall energy strategy of reducing energy intensity, increasing renewable energy use, constructing sustainable facilities, and proactively managing utility costs. To improve communication of results to all levels of the Air Force through the Energy Management Steering Groups (EMSGs) and the SFG Governance, the Infrastructure Energy Metrics have been standardized across the Air Force (see Appendix C).

**Objective DM 6:** Develop metrics and measurement capabilities to track execution and energy performance of vehicles and alternative energy sources. (ECD: Aug 2008/OPR: VEMSO or AFVESA)

**Energy and Asset Management:** Energy is an important asset to be managed. We will identify best practices through our Asset Management transformation across the Air Force, as well as through beta testing at our Model Energy Bases, so that asset

life-cycle decisions will be informed by verifiable energy and water conservation impact, total cost of ownership, and other key financial performance indicators.

**Objective DM 7:** Develop a scoring system, incorporating criteria based on the four Installation Energy Plan pillars, for CE Commanders to rank projects at the Wing Facilities Utilization Board. (ECD: Jan 2009/OPR: AFCESA/CE Strat Plan 3.6C-E)

### *Energy Awareness*

Energy Awareness is about the human element and behavioral change. It bridges the gap between the actions and technology that can conserve energy and the people who must accept and use them to create actual energy savings. Making energy a consideration in all we do requires cultural change and the modifications in behavior and attitude that accompany it. Our strategy for enhancing energy awareness includes four key elements:

- Education and Training
- Awards and Incentives
- Strategic Communication
- Strategic Partnerships



A solar wall collects rays at Elmendorf Air Force Base, Alaska. Two of these walls hang on the outside of the 3rd Logistics Readiness Squadron, and have saved base officials \$15,000 in energy costs since November 2008 when they were built.

**Education And Training:** Properly trained Energy Managers and technical personnel of the Energy Section are fundamental to identifying energy opportunities, developing plans and programs, and tracking progress. An educated workforce and populace will be equipped to implement energy initiatives and effectively manage energy resources.

- Objective EA 1:** Annually review the energy education and training program at the Program Review Committee chaired by AF/A7C to ensure alignment of courses with current policy and guidance and senior leader vision. (ECD: Jun 2009/ OPR: AFCESA/OCR: MAJCOM A7s, AFIT/CE Strat Plan 2.3A, 3.6C-E)
- Objective EA 2:** Develop an energy training course to be applied at all technical CE schools. (ECD: Jun 2009/OPR: AFCESA/OCR: MAJCOM A7s, AFIT/CE Strat Plan 2.3B, 3.6C-E)
- Objective EA 3:** Develop annual energy refresher course for technical staff and base contracting personnel. (ECD: Jun 2009/ OPR: AFCESA/OCR: MAJCOM A7s, AFIT/CE Strat Plan 2.3B, 3.6C-E)
- Objective EA 4:** Develop an Air Force-wide base facility manager’s energy handbook. (ECD: Sep 2008/OPR: AFCESA/OCR: MAJCOM A7s, AFIT/CE Strat Plan 3.4, 3.6C-D)
- Objective EA 5:** Develop an Air Force-wide distance learning energy course for the base populace that can be incorporated into ancillary training programs. (ECD: May 2009/OPR: AFCESA/OCR: MAJCOM A7s, AFIT/CE Strat Plan 3.4, 3.6C-E)

**Awards and Incentives:** Promptly recognizing and generously rewarding exceptional performers can inspire others to change their behavior. Awards generate support and pride within an organization and foster continued success. Publicizing award-winning efforts promulgates energy best practices across the Air Force. There are many Air Force and other federal programs that recognize individual and groups. For example, the Commander-in-Chief’s Annual Awards for Installation Excellence use energy as a criterion to promote energy awareness and to “make energy a consideration in all we do.”

- Objective EA 6:** MAJCOMs and bases develop Energy Awards Programs. (ECD: 2009/OPR: MAJCOM A7s/ OCR: AFCESA/CENF/CE Strat Plan 3.4, 3.6C-E)
- Objective EA 7:** Publish an article annually in the Air Force Civil Engineer magazine on all energy awards received in the past fiscal year to coincide with the Energy Awareness Month and the FEMP Award Program. (ECD: Oct each year/OPR: AFCESA/CENF/CE Strat Plan 3.4, 3.6C-E)

**Strategic Communication:** Successfully executing any strategic plan requires continuously and effectively communicating three things to both internal and external audiences: 1) where we are; 2) where we’re headed; and 3) how we’re going to get there. For the purposes of this plan, internal audiences are defined as those internal to the

Air Force—stakeholders in achieving the vision to “make energy a consideration in all we do.” External audiences are defined as “strategic partners” who play a role in assisting the Air Force to meet its goals; DOE is a prime example of an Air Force strategic partner.

The Air Force Model Energy Base Initiative is a primary means of testing concepts for Air Force-wide adoption. As it develops, this initiative will provide an opportunity to test specific measures, to expand strategic partnerships, and to communicate both lessons learned and how a focused energy effort can achieve results.

This plan and its companion implementation plan form the basis of the Air Force’s approach to managing infrastructure energy initiatives and for measuring attainment of our goals. As such, it facilitates alignment of policies and implementation plans among all Air Force levels, to maximize the opportunity for success across the entire Air Force. A sampling of methodologies for communicating with target audiences is given in Appendix D.

- Objective EA 8:** Develop standard messaging and requirements briefs to be used at all MAJCOM EMSGs to ensure overall Air Force metrics are promulgated and awareness programs reach all members. (ECD: Nov 2008/OPR: AFCESA and A4R/OCR: MAJCOMs/CE Strat Plan 3.4, 3.6C-E)
- Objective EA 9:** Develop a strategic communication plan in conjunction with Public Affairs for outreach to the base populace on a semiannual basis, such as October for DOE’s Energy Awareness Month campaign and April for Earth Day. (ECD: March and September annually/OPR: AFCESA/OCR: MAJCOMs/CE Strat Plan 3.4, 3.6C-D)
- Objective EA 10:** Provide lessons learned from the Model Energy Bases and meeting minutes from EMSGs to the Energy Community of Practice. (ECD: Quarterly/ OPR: AFCESA/CE Strat Plan 3.4, 3.6C-E)

**Strategic Partnerships:** The DOE is a key strategic partner for the Air Force. The DOE plays a role in developing policy and supplying technical expertise, as well as facilitating the cross-flow of information and best practices between federal agencies. The Air Force actively participates in the Inter-Agency Energy Management Task Force, chaired by DOE, as well as several of its sub-working groups. A table listing other strategic partners and external audiences can be found in Appendix D.

- Objective EA 11:** Correlate research and development milestones and achievements among DoD Services to CE and Logistics Readiness mission capabilities and present to Energy Senior Focus Group annually. (ECD: Oct 2008/ OPR: AFCESA and A4R/OCR: MAJCOM A4s and A7s/CE Strat Plan 3.6C-E)



# 4 Governance Structure

## Energy Senior Focus Group

The energy program governance includes Energy Management Steering Groups (EMSGs) at base, MAJCOM, and Air Force levels that link decision-making and advocacy to optimize resources and program performance. The Energy Senior Focus Group (SFG) with its working groups (Figure 12) constitutes the senior governance structure for energy matters in the Air Force. The SFG, which was recognized in 2007 with the Presidential Award for Leadership in Federal Energy Management, acts as a coordinating body for cross-functional issues, working through the offices having primary responsibility for policy and execution (Appendix E). The Air Force Smart Operations for the 21st Century (AFSO21) Process Council is responsible for identifying and institutionalizing Air Force-wide efficiency initiatives.

**Objective GOV 1:** Formally charter an EMSG at the Wing, MAJCOM, and HAF levels that mirrors the Air Force SFG and meets to promote energy programs, review performance, and allocate resources to ensure attainment of Air Force and command goals. (ECD: Jan 2009 / OPR: MAJCOM CVs and Wing Commanders / CE Strat Plan 3.6C-E)

**Objective GOV 2:** All EMSGs must meet at least twice annually to plan local and MAJCOM Energy Awareness Month (October) activities. (ECD: annually / OPR: MAJCOM and Installation EMSGs / CE Strat Plan 3.6C-D)

As the senior energy management steering group, the SFG's scope extends to all energy use and conservation issues within the Air Force, including seeking alternative energy opportunities, at all Air Force installations, within ground transportation and support equipment/systems, aviation fuel use, and associated science and technology opportunities. The SFG is chaired by the Air Force's Senior Energy Official, the Assistant Secretary of the Air Force for Installations, Environment, and Logistics (SAF/IE). Infrastructure energy issues are governed by the Provide Infrastructure Working Group (PIWG), which is chaired by the Air Force Civil Engineer (HAF/A7C) and acts as the conduit to the SFG for MAJCOM infrastructure energy policy and initiatives.

## Provide Infrastructure Working Group

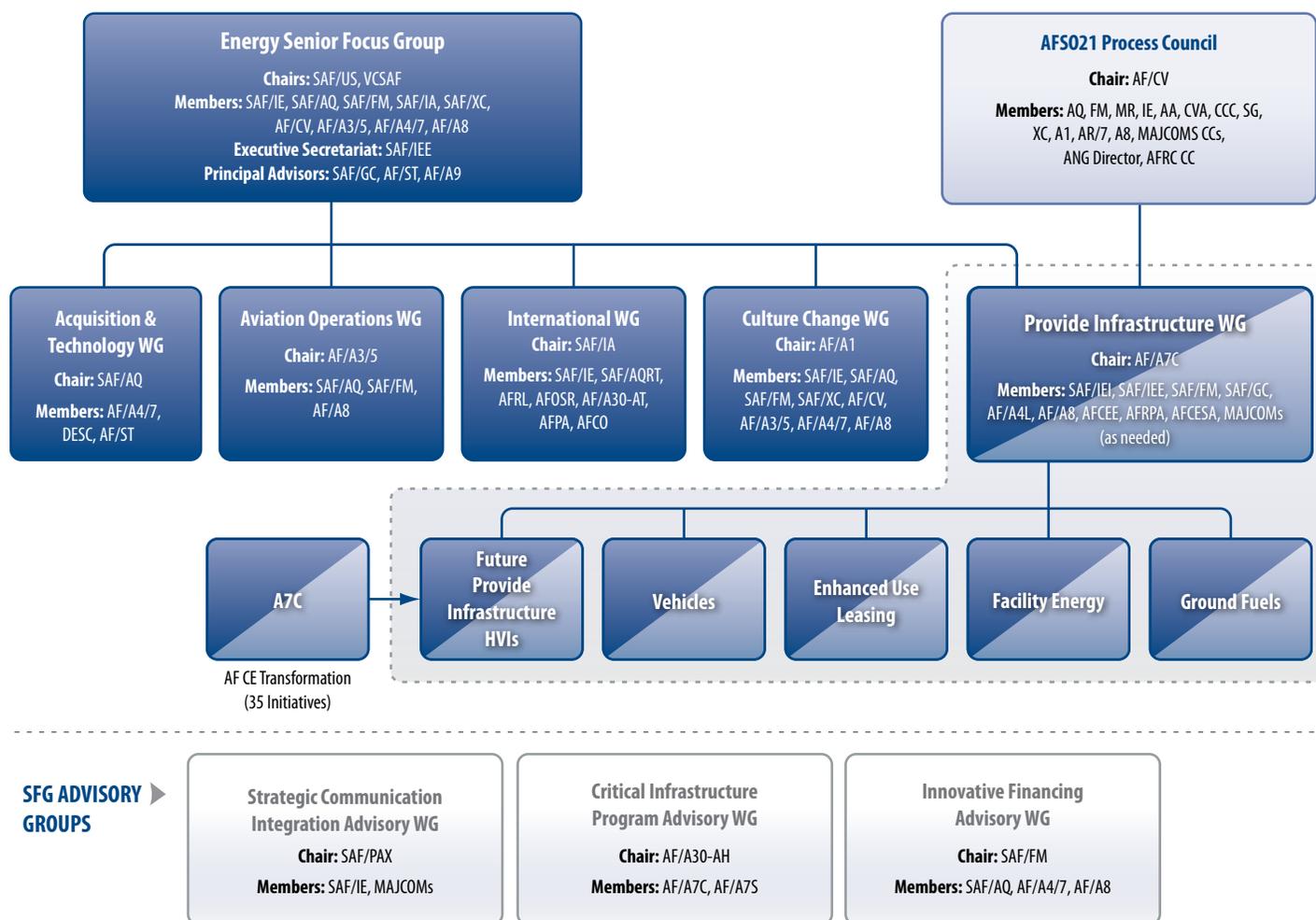
The PIWG addresses facilities, infrastructure, ground vehicles and equipment, and ground fuels initiatives, and reports to the SFG as well as to the AFSO21 Process Council, the Air Force Corporate Structure, and other senior-level forums on all infrastructure transformation issues, including energy. The PIWG is the advocate for MAJCOM initiatives and resource requirements through the corporate process. It links base-level EMSG priorities through the

respective MAJCOM steering group to advocacy at the corporate Air Force level. The PIWG is chaired by the Air Force Civil Engineer (HAF/A7C) with functional representation spanning the full scope of the Infrastructure Energy Plan.

### Energy Management Steering Group

EMSGs are essential to the implementation of the Air Force Energy program. The EMSG is a cross-functional working group comprising mission owners and subject-matter experts, in areas such as aviation, logistics readiness, vehicles, ground fuels, communications, public affairs, and facilities engineering. It sets the tone of the energy program; provides command emphasis and direction; develops initiatives, ideas, and potential strategies; and further develops command policy, guidance, and execution strategies.

Figure 12 Air Force Energy Governance Structure





## 5 Conclusion

The Infrastructure Energy Plan, when embraced and followed by all Air Force members, will produce verifiable reductions in energy consumption and provide alternative and renewable energy sources that will drastically increase our energy independence and enhance our energy security. It will also save money—money that can be used in other ways to support to the Air Force’s mission. The projected monetary savings over the next 5-10 years can approach \$3.0 billion.

The Air Force has a history of being a leader in energy management, a history achieved by many individual acts and events of energy conservation. To turn today’s energy goals into tomorrow’s achievements requires not only sustained leadership and funding, but the efforts of every individual, with energy a consideration in everything we do. This plan is simple and elements of it can be achieved by every Air Force member every day.

Learn the strategy; apply leadership; make smart energy choices; achieve the goals, and along the way, keep an eye on your wingman. This way we’ll make it.

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# Appendix A Statutory and Policy Mandates and Drivers



Drivers	EPACT 2005 (P.L. 109-58) except as noted	Executive Order 13423	EISA 2007	Implementing Instructions	Air Force Policy
Facility Energy Efficiency	<p>Beginning in FY06, reduce facility energy intensity (MBTU/sf) 2% per year based on 2003 baseline</p> <p>(Title I, Subtitle A, Section 102)</p>	<p>Beginning in FY06, reduce facility energy intensity (MBTU/SF) 3% per year based on 2003 baseline (30% by 2015).</p> <p>(Section 2)</p>	<p>Repeat E.O. 13423 goal of 3% per year based on 2003 baseline (30% by 2015)</p> <p>(Title IV, Subtitle C, Section 431)</p>	<p>DoDI 4170.11 (22 Nov 05)</p> <p>New version being updated to include EISA requirements.</p>	<p>AFEPPM 04-1 (Nov 2004)</p> <p>AFEPPM 07-01 (draft)</p> <p>AFPD 90-17 (16 Jul 09)</p> <p>AFI 90-1701 (16 Jul 09)</p>
Renewable Energy	<p>Set annual goals for electricity generated with renewables:</p> <ul style="list-style-type: none"> <li>• 3% in FY07–FY09</li> <li>• 5% in FY10–FY12</li> <li>• 7.5% in FY13–thereafter</li> <li>• 25% by 2025 (10 USC 2911)</li> </ul> <p>(Title II, Subtitle A, Section 203)</p>	<p>50% of statutorily required renewable energy must be from sources placed into service after 1 Jan 1999. Includes various "counting" rules</p> <p>(Section 2)</p>	N/A	<p>2007 Federal Renewable Energy Requirement Guidance for EPACT 2005 and E.O. 13423</p>	<p>AFPD 90-17 (16 Jul 09)</p> <p>AFI 90-1701 (16 Jul 09)</p>
Building Performance/Sustainability	<p>Establishes building performance standards--30% below ASHRAE 90.1 if life cycle cost effective</p> <p>(Title I, Subtitle A, Section 109)</p>	<p>All MILCON and major renovations comply with MOU on sustainability. Must incorporate into 15% of existing buildings by end of FY15</p> <p>(Section 2)</p>	<p>Section 436. Federal High-Performance Green Building</p>	<p>DOE published final rule effective date of 22 Jan 08 for 10 CFR 433, 434, and 435 to meet the EPACT 2005 performance standards.</p> <p><a href="http://www1.eere.energy.gov/femp/pdfs/fr_notice_cfr433_434_435.pdf">http://www1.eere.energy.gov/femp/pdfs/fr_notice_cfr433_434_435.pdf</a></p> <p>The guiding principles of the signed MOU are located at this website: <a href="http://www.wbdg.org/eferences/mou.php">http://www.wbdg.org/eferences/mou.php</a></p>	<p>Air Force Sustainable Design and Development (SDD) Policy (31 Jul 07).</p> <p>Leadership in Energy and Environmental Design (LEED) is the AF standard.</p> <p>Beginning with the FY09 Military Construction (MILCON) program:</p> <ul style="list-style-type: none"> <li>• 100% capable of achieving LEED Silver certification</li> <li>• Program SDD costs at 2% of primary facility cost</li> <li>• 5% per FY for formal LEED certification</li> <li>• 10% LEED certified in FY10 and after</li> <li>• All S/R&amp;M projects shall consider using LEED principles where financially feasible</li> </ul>

Drivers	EPACT 2005 (P.L. 109-58) except as noted	Executive Order 13423	EISA 2007	Implementing Instructions	Air Force Policy
Advanced Utility Meters	Meter all facilities for electrical where economically feasible by 2012.  (Title I, Subtitle A, Section 103)	N/A	Adds requirement for steam and natural gas meters by 2016.  (Title IV, Subtitle C, Section 434)	DoE Electric Metering Guidance (Feb 2006)  DoE/FEMP Metering Best Practices (Oct 2007)	Defines “cost effectiveness” <ul style="list-style-type: none"> <li>• Meter steam at plant</li> <li>• Electric, gas, and water meters on renovations over \$200K</li> <li>• Meter all buildings over 35K SF for electrical and over 50K SF for natural gas.</li> </ul> (A7C Memo, 27 Apr 06)
Utility Meter Reporting	Electric meter reports (annually)  (Title I, Subtitle A, Section 103)		DOE to field Web-based tool for certification of reports (FY09 2Qtr)  Benchmarking metered facilities (Title IV, Subtitle C Section 432)  OMB/DoE Annual Renewable reports (Title V, Subtitle C, Section 528)	DoE to provide Web-based certification and benchmarking system within 1 year after enactment of law  (ECD Dec 08)  OMB will issue Energy scorecards semi-annually	
Energy Star Products	Must purchase Energy Star rated or FEMP designated products.  Specific products: electric motors (1 to 500 HP) and air conditioning/ refrigeration equipment.  (Title I, Subtitle A, Section 104)		Refers to residential boiler efficiencies.  (Title III, Subtitle A, Section 303)	The FEMP product Web site contains guidance on all associated products including a link to Energy Star:  <a href="http://www1.eere.energy.gov/femp/procurement/index.html">http://www1.eere.energy.gov/femp/procurement/index.html</a>	Can be waived if the agency head determines in writing that no ENERGY STAR® or FEMP-designated product (a) meets the functional requirement of the agency; (b) is not cost-effective over the life of the product taking energy cost savings into account; or (c) the product requirement is combat-related.
Solar Hot Water			New/renovated facility with a hot water requirement must be 30% solar generated.  (Title V, Subtitle C, Section 523)	FEMP Web site on solar hot water design and specifications:  <a href="http://www1.eere.energy.gov/solar/sh_basics_water.html">http://www1.eere.energy.gov/solar/sh_basics_water.html</a>	

Drivers	EPACT 2005 (P.L. 109-58) except as noted	Executive Order 13423	EISA 2007	Implementing Instructions	Air Force Policy
Reduce Fossil Fuel Usage in New Facilities			<ul style="list-style-type: none"> <li>• 55% by 2010</li> <li>• 65% by 2015</li> <li>• 80% by 2020</li> <li>• 90% by 2025</li> <li>• 100% by 2030</li> </ul> (Title IV, Subtitle C, Section 433)	DoE will publish rule within 1 year from date of EISA for new Federal buildings and Federal buildings undergoing major renovations or of buildings of at least \$2.5M in cost.	
Commissioning, Decommissioning, and Retro-Commissioning			Verification and documentation, during the period beginning on the initial day of the design phase of the facility and ending not earlier than 1 year after the date of completion of construction.  (Title IV, Subtitle C, section 432)		
Energy Audits			25% of audits per year in “covered” facilities will be “comprehensive” audits for energy and water.  (Title IV, Subtitle C, Section 432)	DoD Energy Management Handbook 2005 DoE to define “covered” facilities and what “comprehensive” entails	
Storm Water Runoff			Provides guidelines for facilities over 5000 SF.  (Title IV, Subtitle C, Section 438)		
Water Conservation		Beginning in FY08: <ul style="list-style-type: none"> <li>• 2% reduction per year based on 2007 baseline</li> <li>• 16% by 2015</li> </ul> (Section 2)		Establishing Baseline and Meeting Water Conservation Goals of E.O. 13423, Jan 08  (DoE Supplemental Guidance)	Water use is defined as all water used at federal facilities that is obtained from public water systems or from natural freshwater sources such as lakes, streams, and aquifers, where the water is classified or permitted for human consumption. The 2007 Water Intensity baseline has been established for the Air Force as 55.8 gal per SF per year.  (Air Force Guidance 28 March 08)

Drivers	EPACT 2005 (P.L. 109-58) except as noted	Executive Order 13423	EISA 2007	Implementing Instructions	Air Force Policy
Greenhouse Gases		Reduce greenhouse gas emissions through reduction of energy intensity.  (Section 2)			
Ground Vehicles	75% AFV Acquisitions at agency level, (WR-ALC)	Increase purchase of alternative fuel, hybrid, and plug-in hybrid vehicles when commercially available.	Section 141, Agencies must procure LDV or MDVs that are low in greenhouse gases.	DoD 4500.36-R (16 Mar 07)	A4R Policy Letter, 100% acquisition/ lease where available. (AFI 23-302, Oct 2007)
Petroleum Conservation	100% utilization of alternative fuels in AFVs  (Section 701)	Reduce petroleum consumption in vehicle fleet by 2% annually through 2015, 20% total by 2015	Petroleum Reduction and Alternative Fuel Use  (Section 142)		AFI 23-302, Oct 2007
Alternative Fuel Use	100% utilization of alternative fuels in AFVs  (Section 701)	Increase alternative fuel consumption at least 10% annually.	Petroleum Reduction and Alternative Fuel Use.  (Section 142)	OSD Policy Directive Memorandum (27 Dec 07)	AFI 23-302, Oct 2007

# Appendix B Funding Sources/Programming Avenues



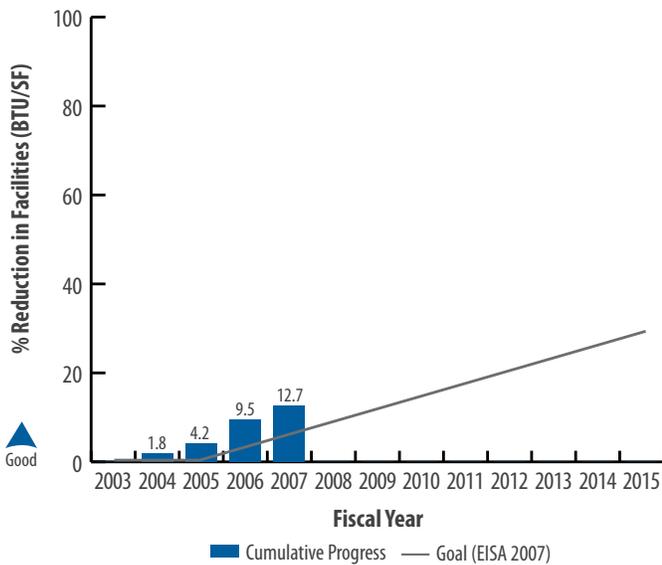
Program	Appropriation	Account
<ul style="list-style-type: none"> <li>Energy Service Performance Contract (ESPC)</li> <li>Utility Energy Service Contract (UESC)</li> <li>Enhanced Use Lease (EUL)</li> </ul>	<ul style="list-style-type: none"> <li>3400</li> </ul>	<ul style="list-style-type: none"> <li>Facility Operations</li> <li>Sustainment, Restoration, and Modernization</li> </ul>
<ul style="list-style-type: none"> <li>Energy Conservation Investment Program (ECIP)</li> <li>New Construction</li> <li>Major Renovation</li> </ul>	<ul style="list-style-type: none"> <li>MILCON (3300)</li> </ul>	
<ul style="list-style-type: none"> <li>Productivity Enhancing Capital Investment (PECI)</li> <li>Fast Payback Capital Investment (FASCAP) Program</li> <li>Productivity Investment Fund (PIF) Program</li> </ul>	Various: <ul style="list-style-type: none"> <li>3080</li> <li>MILCON (3300)</li> <li>3400</li> </ul>	
<ul style="list-style-type: none"> <li>Host Nation Funding</li> </ul>		
<ul style="list-style-type: none"> <li>Strategic Environmental Research and Development Program (SERDP)</li> </ul>	<ul style="list-style-type: none"> <li>Basic and applied research and technology development instead of demonstration and validation of existing technologies.</li> </ul>	
<ul style="list-style-type: none"> <li>Environmental Security Technology Certification Program (ESTCP)</li> <li>Tax credits and incentives (federal and state), utility rebates</li> </ul>		

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# Appendix C Energy Metrics



## EISA 2007 Energy Reduction Status



**Goal:** 30% reduction in energy use per SF at AF installations in 2015

**Metric:** 3% per year increased energy efficiency from a 2003 baseline (EISA 2007)

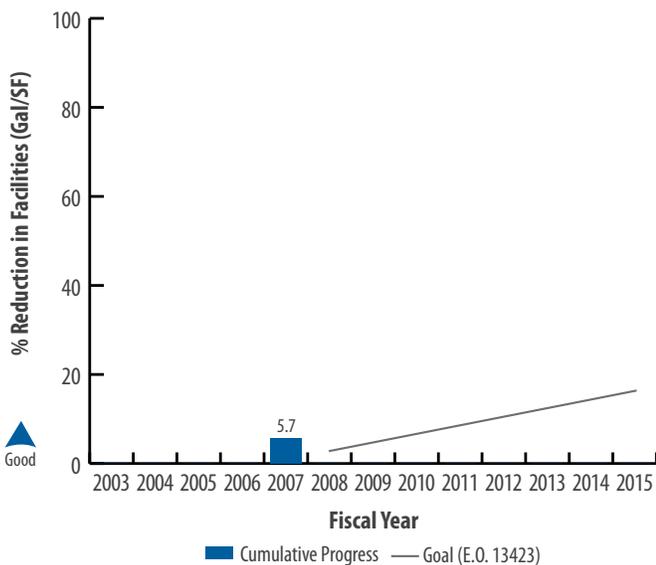
**Outcome:** Achieve EISA, EPAct, E.O., and OSD mandated goal

**Notes:**

1. Percent energy reduction numbers do not include renewable energy credits, which phase out by 2012
2. Baseline adjustment of 3.2% for privatized MFH & exempted facilities



## E.O. 13423 Water Reduction Status



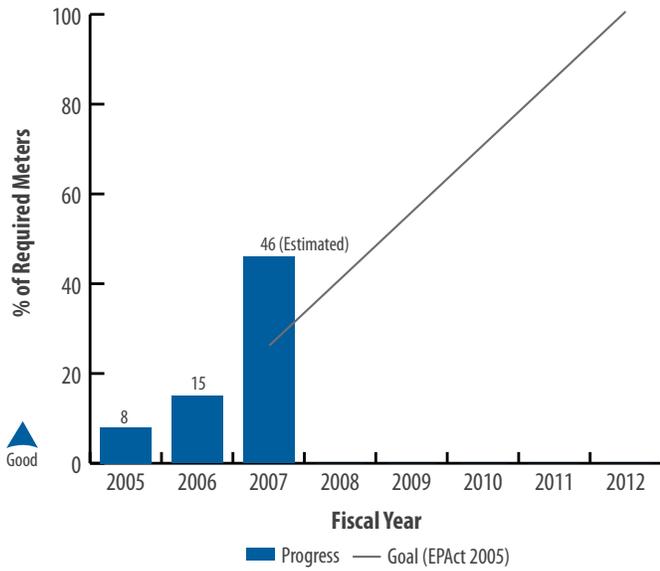
**Goal:** 16% reduction in water use per SF at AF installations in 2015

**Metric:** Starting 2008 2%/year increased water efficiency from a 2007 baseline (EO 13423)

**Outcome:** Achieve EO & OSD mandated goals



## EPAct 2005 Metering Status



**Goal:** 100% by FY12 (EPAct) where cost effective.

**Metric:** 15% per year starting 2008 per OSD

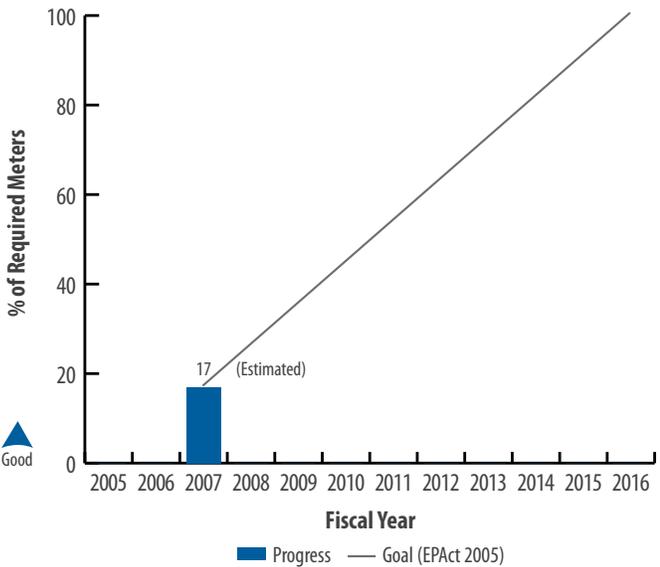
**Outcome:** Better control of facilities/reduced energy usage (meet EPAct mandate)

**Note:** Target is 8,400 bldgs out of 45,221 total in DUERS.

**Source:** AFCESA 22 Apr 08



## EISA 2007 Natural Gas Metering Status



**Goal:** 100% by FY16 (EISA) where cost-effective

**Metric:** 15% per year starting 2008

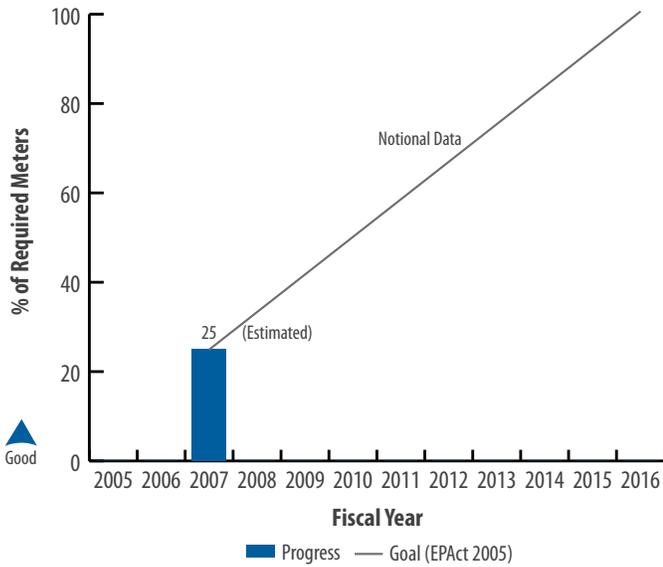
**Outcome:** Better control of facilities/reduced energy usage (meet EPAct mandate)

**Note:** Target is 2,415 bldgs out of 45,221 total in DUERS.

**Source:** AFCESA 22 Apr 08



## EISA 2007 Steam Metering Status



**Goal:** 100% by FY16 (EISA) where cost effective

**Metric:** 10% per year starting 2008

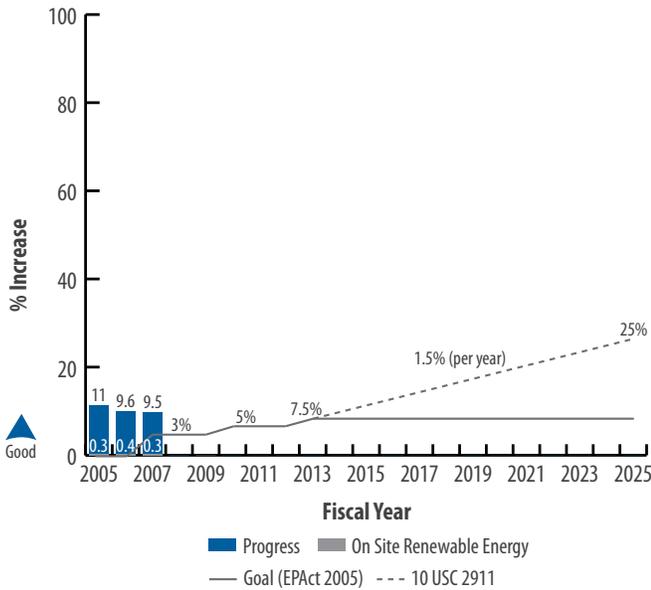
**Outcome:** Better control of facilities/reduced energy usage (meet EAct mandate)

**Note:** Target requirement is presently unknown, 24 Apr 08

**Source:** Data Pending



## EPA 2005 Renewable Power Status



**Goal:** 3% Renewables by FY07, 5% by FY10 and 7.5% by FY13 and 25% by 2025 (10 USC 2911)

**Metric:** Renewable energy % of total electric energy consumed (EPA 2005)

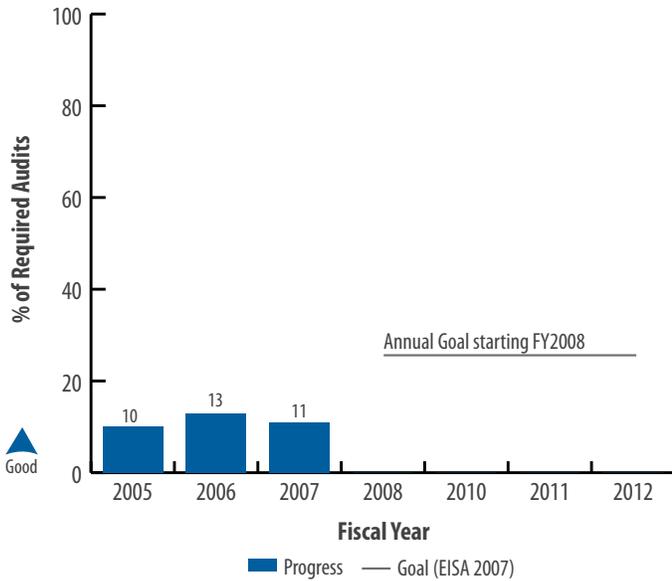
**Outcome:** Achieve EAct mandate

**Note:** On-Site renewable energy (GREEN BAR) is a growing component of AF's renewable energy portfolio.

**Source:** FY07 Annual Report to Congress



## EISA Energy and Water Audits Status



**Goal:** Perform energy and water audits on all “covered” facilities every four years

**Metric:** 25% of audits per year (EISA 2007)

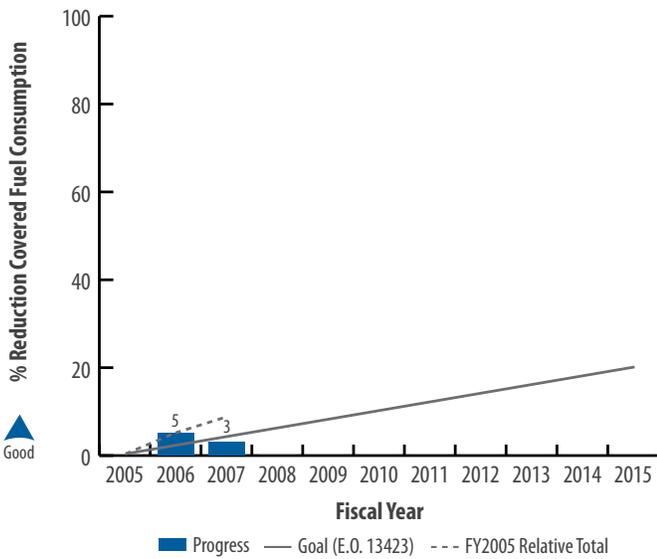
**Outcome:** Identifies potential energy products

**Notes:**

1. Total opportunity for audits = all AF facilities (616.2 M SF) in FY07 Annual Energy Report to Congress
2. Entire facility SF to be audited on a four-year cycle
3. Source: FY07 Annual Report to Congress



## EPA-Reportable Fleet Fossil Fuel Consumption

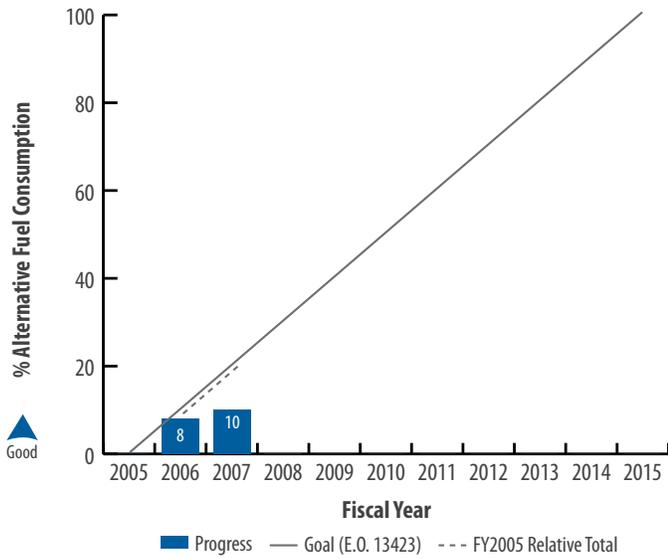


**Goal:** 2% annual fuel reduction through 2015 using FY05 baseline (EO 13423)

**Outcome:** 20% total reduction through 2015



## Alternative Fuel Consumption

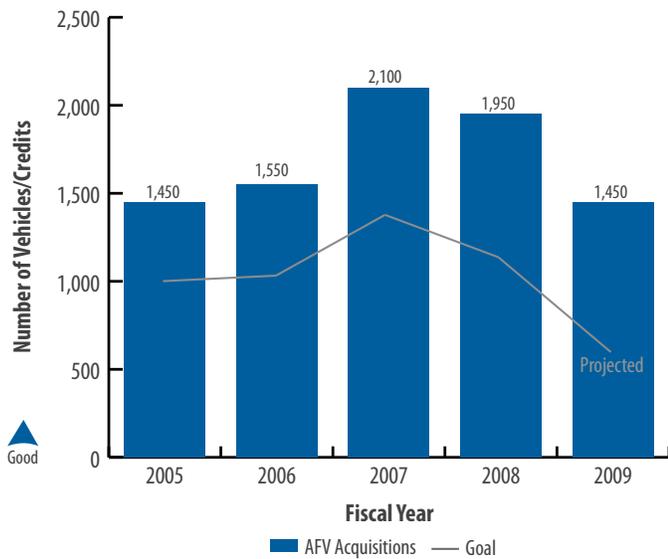


**Goal:** 10% annual increase through 2015 using FY05 baseline (EO 13423)

**Outcome:** 100% increase through 2015



## AFV Acquisitions



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# Appendix D Communication Methods with Target Audiences



Internal Audiences—Stakeholders	Sample Methods of Communication
<ul style="list-style-type: none"> <li>• Base personnel and organizational commanders</li> </ul>	<ul style="list-style-type: none"> <li>• Wing Energy Management Steering Group, base newsletters, commanders' speeches, staff meetings, Energy Awareness Month programs, AFSO21 events such as Rapid Improvements, SECAF Letter to Airmen, CSAF Vector and CMSAF Perspectives (available on <a href="http://www.af.mil">http://www.af.mil</a>)</li> </ul>
<ul style="list-style-type: none"> <li>• MAJCOM staffs</li> </ul>	<ul style="list-style-type: none"> <li>• HQ USAF/A7C monthly VTC, MAJCOM Energy Management Steering Group</li> <li>• HQ USAF/A4R annual Vehicle Transformation Advisory Council, (VTAC)</li> <li>• USAF/A4RE Quarterly Vehicle Management VTC</li> </ul>
<ul style="list-style-type: none"> <li>• HQ Air Force, SAF, FOAs and functional staffs at all levels</li> </ul>	<ul style="list-style-type: none"> <li>• Senior Focus Group Meetings</li> </ul>
<ul style="list-style-type: none"> <li>• Energy professionals</li> </ul>	<ul style="list-style-type: none"> <li>• DoE and industry conferences and trade shows, AFCESA Energy Community of Practice website, continuing education, DoE and AF energy audits and email communication, newsletters</li> </ul>
External Audiences—Stakeholders	Sample Methods of Communication
<ul style="list-style-type: none"> <li>• Office of the Secretary of Defense</li> </ul>	<ul style="list-style-type: none"> <li>• Working Groups/Task Forces</li> <li>• Semi-Annual Energy Scorecard SubmissionsThe annual Federal Automotive Statistical Tool, (FAST) Report</li> </ul>
<ul style="list-style-type: none"> <li>• Sister Services</li> </ul>	<ul style="list-style-type: none"> <li>• Working Groups/Task Forces</li> </ul>
<ul style="list-style-type: none"> <li>• Department of Energy and other federal entities such as the Environmental Protection Agency</li> </ul>	<ul style="list-style-type: none"> <li>• Working Groups/Inter Agency Energy Management Task Force, DoE and industry conferences and trade shows</li> <li>• Semi-Annual Energy Scorecard Submissions</li> </ul>
<ul style="list-style-type: none"> <li>• Providers of utility and energy services – Energy Service Companies (ESCOs) and utility providers</li> </ul>	<ul style="list-style-type: none"> <li>• Working Groups/Task Forces, federally-sponsored Industry Forums</li> </ul>
<ul style="list-style-type: none"> <li>• American Public/Local Community</li> </ul>	<ul style="list-style-type: none"> <li>• Print and broadcast media, industry trade shows</li> </ul>

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# Appendix E Roles and Responsibilities



**Headquarters United States Air Force (HQ USAF)** — Provides the policy, guidance, oversight, and resources to ensure an effective strategy is employed at all levels. The Air Force Senior Focus Group (SFG) leads this level. The SFG stimulates energy conservation opportunities and energy technology implementation across the full spectrum of Air Force energy applications. The Air Force Provide Infrastructure Working Group (PIWG) reports to the SFG and is responsible for all facility energy, infrastructure, ground vehicles, and ground fuels initiatives.

**MAJCOMs**—Develop plans to support or supplement Air Force goals and strategies, execute programs (includes planning and programming requirements to support the various energy program mandates), evaluate energy usage of subordinate units, provide inputs required by HQ USAF for annual reports, and nominate their most successful units for energy awards.

**Air Force Civil Engineer Support Agency (AFCESA)** — Advises HQ USAF, providing assistance to the MAJCOMs and installations developing plans and strategies to meet mandated energy goals. Manages and facilitates execution of energy programs as the home to the Air Force Facility Energy Center (AFFEC), the central Program Management Office for facility energy. Develops guidance to implement energy programs and projects. Provides technical, contractual, and legal review and analysis support for energy and utility initiatives. Acts as the Air Force's Subject Matter Expert in various technical areas required to support the pillars of the strategic plan. Acts as the consolidator and central repository for data in support of energy goals and reporting. Member of the PIWG.

**Air Force Center for Engineering and the Environment (AFCEE)** — Advises HQ USAF, providing assistance to the MAJCOMs and installations developing plans and strategies to meet mandated sustainable design and construction goals. Manages and facilitates the Air Force MILCON program. Develops guidance to implement construction programs and projects, provides technical, contractual, and legal review. Acts as the consolidator and central repository for data in support of sustainable development goals and reporting.

**Air Force Real Property Agency (AFRPA)** — Acts as the center of real estate excellence within the Air Force. Establishes EUL implementation guidelines and resolves program issues. Advises Source Selection Authorities during the selection and approval process. Oversees and ensures necessary support to the MAJCOM and installation teams as needed to execute projects. Reviews performance standards to monitor progress of EUL transactions. Advocates use of Air Force and DoD resources to fund EUL

project development. Reviews and reports progress of EUL projects to the Air Force Board Structure and OSD, as required, and serve as a member of the SAF/IEI-chaired Privatization Executive Steering Group and the PIWG.

**Air Force Petroleum Agency (AFPA)** — Provides the warfighter with technical support and specialized capabilities in petroleum, propellants, cryogenics, chemicals, and gases for all aerospace vehicles, systems and equipment. Develop quality assurance and surveillance specifications and standards. Provide professional (analytical, scientific, and engineering) services to Air Force installations. Develops standardized policy and procedures for operations and maintenance for the fuels community.

**Air Force Advanced Power Technology Office (APTO)** — Advises HQ USAF, providing assistance to MAJCOMs and installations developing plans and strategies to support installation and end user alternative power solutions to meet mission needs. Manages the identification and integration of advanced power, alternative energy, and alternative fuel technologies into the Air Force's inventory: ground vehicles, support equipment, basic expeditionary airfield resources, fuel-cell equipment/applications, and base infrastructure. Provides technology demonstration/validation and acts as the bridge between research and development and acquisition and deployment.

**Air Force Vehicle Equipment Support Activity (AFVESA)** — Provides a responsive and dynamic Global Logistics Support Capability to the war-fighter, as it relates to vehicles, equipment commodities, War Readiness Materiel, and Base Expeditionary Airfield Resources, using standardized processes to deliver high-level, sustained logistical support.

**Installations** — Develop plans to support or supplement Air Force and MAJCOM goals/strategies. They execute those plans, measure and evaluate their base energy usage, provide inputs required by their MAJCOM for annual reports, and nominate their most successful people and units for energy awards.

**Base Level Energy Manager** — Every installation is required by the Energy Independence and Security Act of 2007 to have an energy manager. Within the Civil Engineer Squadron, the Energy Manager is a member of the Asset Management Flight. The Energy Manager is normally supplemented by a Utility Manager, who deals with daily management of utility contracts and reimbursements. Where a Resource Efficiency Manager is assigned, the Energy Manager provides daily management and oversight. The scope of the Energy Manager's duties includes primary responsibility and/or oversight for the following areas:

- Installation Energy Management Plan (including water conservation strategies)
- Awareness (energy steering groups, outreach programs)
- Education and Training
- Energy Audits
- Energy Maintenance (HVAC, controls, and lighting, power, and water technical experts)
- EMCS Operations
- Utility Company Interface and Contracts Management
- Utility Billing
- Utility Resale (reimbursable)
- Utility Budget Development
- ESPCs and UESCs
- Capital Program and Business Case Development (ECIP, ESPCs, UESC, S/R&M, PECL, RDTE, Grants, SERDP, ESTCP, EEUL, PPA)
- Data Management and Reporting
- Sustainable Design and Master Planning Coordination
- Energy Security Assessments in Support of Continuity of Operations

# Appendix F Abbreviations and Acronyms



## A

<b>ACES</b>	Automated Civil Engineer System
<b>AF</b>	US Air Force
<b>AFCEE</b>	Air Force Center for Engineering and Environment
<b>AFCESA</b>	Air Force Civil Engineer Support Agency
<b>AFEPPM</b>	Air Force Energy Policy Procedural Memorandum
<b>AFFEC</b>	Air Force Facility Energy Center
<b>AFIT</b>	Air Force Institute of Technology
<b>AFMA</b>	Air Force Manpower Agency
<b>AFPA</b>	Air Force Petroleum Agency
<b>AFRPA</b>	Air Force Real Property Agency
<b>AFSO21</b>	Air Force Smart Operations for the Twenty-First Century
<b>AFV</b>	Alternative Fuel Vehicle
<b>AFVESA</b>	Air Force Vehicle Equipment Support Activity
<b>AIM</b>	Agile Installation Management
<b>AMP</b>	Activity Management Plan
<b>APTO</b>	Advanced Power Technology Office
<b>ASHRAE</b>	American Society of Heating, Refrigerating, and Air-Conditioning Engineers

## B

<b>BCE</b>	Base Civil Engineer
<b>BLCC</b>	Building Life Cycle Cost
<b>BRAC</b>	Base Realignment and Closure

## C

<b>CE</b>	Civil Engineer
<b>CEM</b>	Certified Energy Manager
<b>CMSAF</b>	Chief Master Sergeant of the Air
<b>CSAF</b>	Chief of Staff of the Air Force

## D

<b>DESC</b>	Defense Energy Support Center
<b>DHS</b>	Department of Homeland Security
<b>DLA</b>	Defense Logistics Agency

<b>DoD</b>	Department of Defense
<b>DoDI</b>	Department of Defense Instruction
<b>DoE</b>	Department of Energy
<b>DRU</b>	Direct Reporting Unit
<b>DUERS</b>	Defense Utility Energy Reporting System

## E

<b>ECD</b>	Estimated Completion Date
<b>ECIP</b>	Energy Conservation Investment Program
<b>EISA</b>	Energy Independence and Security Act of 2007
<b>EMCS</b>	Energy Management Control System
<b>EMSG</b>	Energy Management Steering Group
<b>EO</b>	Executive Order
<b>EPA</b>	Environmental Protection Agency
<b>EPAct</b>	Energy Policy Act of 2005
<b>ESCO</b>	Energy Services Company
<b>ESPC</b>	Energy Savings Performance Contract
<b>ESTCP</b>	Environmental Security Technology Certification Program
<b>EUL</b>	Enhanced Use Lease

## F

<b>FAST</b>	Federal Automotive Statistical Tool
<b>FEMP</b>	Federal Energy Management Program
<b>FM/RA</b>	Financial Manager/Resource Advisor
<b>FOA</b>	Field Operating Agency
<b>FUB</b>	Facility Utilization Board
<b>FY</b>	Fiscal Year

## G

<b>Gal</b>	Gallons
<b>GGE</b>	Gasoline Gallon Equivalent
<b>GHG</b>	Greenhouse Gas

## H

<b>HAF</b>	Headquarters Air Force
<b>HQ</b>	Headquarters
<b>HVAC</b>	Heating, Ventilation, and Air Conditioning
<b>HVI</b>	High Value Initiatives

## I

<b>IT</b>	Information Technology
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## L

<b>LDV</b>	Light-Duty Vehicles
<b>LEED</b>	Leadership in Energy and Environmental Design
<b>LIMFAC</b>	Limiting Factor
<b>LSV</b>	Low Speed Vehicle

## M

<b>MAJCOM</b>	Major Command
<b>MDV</b>	Medium Duty Vehicles
<b>MILCON</b>	Military Construction
<b>MIS</b>	Management Information Systems
<b>MBTU</b>	Million British Thermal Units
<b>MOU</b>	Memorandum of Understanding

## N

<b>NAF</b>	NAF Non-Appropriated Funds
<b>NDAA</b>	National Defense Authorization Act

## O

<b>O&amp;M</b>	Operations and Maintenance
<b>OCR</b>	Office of Collateral Responsibility
<b>OPR</b>	Office of Primary Responsibility

## P

<b>PBD</b>	Program Budget Decision
<b>PECI</b>	Productivity Enhancement and Capital Investment
<b>PIWG</b>	Provide Infrastructure Working Group
<b>POM</b>	Program Objective Memorandum
<b>PPA</b>	Power Purchase Agreement

## Q

<b>QOL</b>	Quality of Life
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## R

<b>RDTE</b>	Research, Development, Test, and Evaluation
<b>REC</b>	Renewable Energy Credit
<b>REM</b>	Resource Efficiency Manager
<b>ROI</b>	Return on Investment
<b>RP</b>	Real Property

## S

<b>S/R&amp;M</b>	Sustainment, Restoration and Modernization
<b>SAF</b>	SAF Secretary of the Air Force
<b>SDD</b>	Sustainable Design and Development
<b>SECAF</b>	Secretary of the Air Force
<b>SERDP</b>	Strategic Environmental Research & Development Program
<b>SF</b>	Square Feet
<b>SFG</b>	Senior Focus Group
<b>SIR</b>	Savings to Investment Ratio

## U

<b>UESC</b>	Utility Energy Services Contract
<b>UP</b>	Utility Privatization

## V

<b>VEMSO</b>	Vehicles and Equipment Management Support Office
<b>VTC</b>	Video Teleconferencing

# Appendix G References



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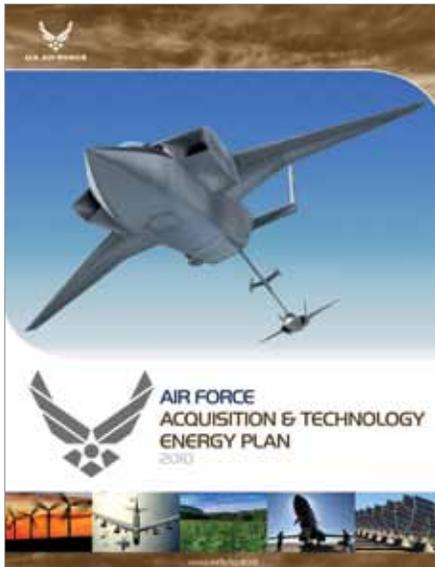
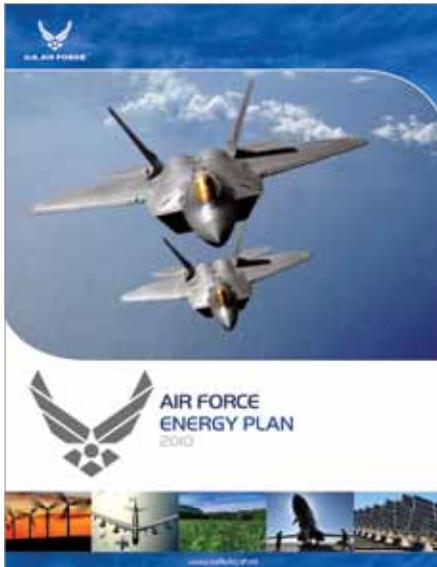
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