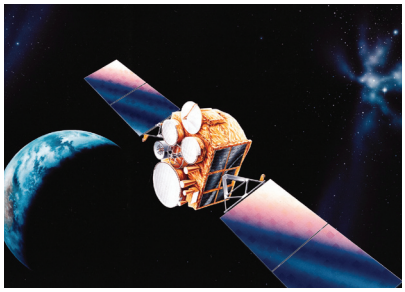

U.S. AIR FORCE

U.S. AIR FORCE ENERGY STRATEGIC PLAN

EFFECTIVE MARCH 2013

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FOREWORD

March 6, 2013

From aviation operations to installations and ground vehicles within the homeland and abroad, energy is essential for Air Force operations and a key to our national and economic security. Maintaining the Air Force's critical airpower contributions to national security requires significant amounts of energy. Accordingly, the Air Force has developed a comprehensive energy strategy to improve its ability to manage supply and demand in a way that enhances mission capability and readiness.

The Air Force Energy Strategic Plan reflects recent developments in the Department of Defense (DoD), such as the incorporation of energy into the Quadrennial Defense Review and a stronger focus on operational energy, as well as changes to how the Air Force approaches energy. Since energy management is an evolving process requiring systematic incorporation of new information, the Air Force is issuing an updated Air Force Energy Strategic Plan to replace the 2010 Air Force Energy Plan.

This plan focuses the scope of the Air Force's energy posture by incorporating energy security and operational energy into our strategic energy priorities, goals, and objectives. Additionally, it helps set the stage for the Air Force to meet federal energy legislative provisions, executive orders, and DoD directives. The Air Force Energy Strategic Plan aligns with the goals of the National Security Strategy, the DoD Operational Energy Strategy, and the Air Force Strategic Plan, and reflects the continuous evolution of the Air Force's energy program.

To continue sustaining and enhancing its capabilities, particularly in an era of increasing fiscal constraint, the Air Force must diligently manage its resources, including energy and water. Our priority is to make informed decisions and take appropriate actions to ensure that we continue to achieve our critical missions that provide *Global Vigilance, Global Reach, and Global Power*. By developing a robust, resilient, and ready energy posture, we will enable our warfighters, expand our operational effectiveness in air, space, and cyberspace, and enhance national security.

Michael B. Donley
Secretary of the Air Force

Mark A. Welsh III
General, USAF
Chief of Staff

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INTRODUCTION

Energy is a strategic imperative for the Air Force mission

The United States Air Force's mission is to *fly, fight, and win…in air, space, and cyberspace*. This mission requires maneuvering advanced aircraft, highly sophisticated equipment, and the best trained Airmen in the world. The Air Force plays a vital role in protecting and preserving our Nation's security interests, and helps our country maintain *Global Vigilance, Global Reach, and Global Power*. Every military capability, mission, and member of the Air Force depends on a reliable supply of energy. To ensure the Air Force can continue to achieve and sustain its mission, we must be agile and actively seek solutions to the energy challenges that pose a threat to our operations.

Energy is critical for the U.S. military's core national defense mission, yet it is simultaneously a vulnerability to the military's ability to confront 21st century challenges that are global and increasingly more complex. This "double-edged sword" is precisely why energy security is a core element of many of the national strategic policies and plans, such as the National Security Strategy, National Military Strategy, and the Quadrennial Defense Review (QDR). Transforming the way we use energy—including investing in innovation, and building an energy secure force—is critical to ensuring the Air Force is equipped to sustain the mission priorities of today while planning for the challenges of the future.

Current concepts of operations require more fuel and energy, with strategic and operational risks and consequences not faced by previous generations.

> Energy security means having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs

Since 2010, we have made great strides to integrate energy considerations into the full range of planning and force development activities and create an energy posture that is robust, resilient, and ready.

The Air Force recognizes that there are many national energy policy challenges, to include tackling the economic impacts of energy costs and addressing the national security implications of a high reliance on imported fuels. While addressing these challenges, it is of vital importance the Air Force have available the energy necessary to accomplish

its missions. Accordingly, the Air Force is improving its ability to manage supply and demand in a way that enhances mission capability and readiness, while helping address the Nation's broader energy challenges. The Air Force cannot address our energy security by ourselves. We must integrate our efforts, not only within DoD, but also with our local, regional, state, federal, and international partners.

To meet its long-term energy vision to sustain an assured energy advantage in air, space, and cyberspace, the Air Force must maintain a clear picture of how energy affects the Air Force's critical capabilities and requirements. As it strives to achieve its vision, the Air Force is integrating energy considerations across the Air Force enterprise by focusing on four priorities: *Improve Resiliency, Reduce Demand, Assure Supply, and Foster an Energy Aware Culture*. These priorities provide the overarching framework through which the Air Force will address every dimension of the energy challenges we face, from security to supply and demand, as well as fostering a culture that values energy as a strategic resource.

The Air Force Energy Vision:
Sustain an assured energy advantage in air, space, and cyberspace

Our approach to energy also includes reducing our consumption of water, as the two are inextricably tied. Virtually every source of electricity—whether from coal, natural gas, nuclear, biofuels, or even concentrated solar—requires water in some manner, including for production, mining, and generation. By reducing the Air Force's demand for energy, it is also reducing the demand for water.

From aircraft and ground vehicle refueling requirements to satellite control and information dissemination capabilities, the Air Force must address the impacts of energy and the systems that support energy distribution. Our approach will enable the Air Force to understand the implications of energy and water supply and utilization across all operational domains, build the foundation for enhancing energy security, and instill energy management best practices through the development of an energy aware culture. By improving the efficiency of our processes, operations, facilities, and equipment, we increase our effectiveness and generate cost savings.

Energy consumption has a direct impact on greenhouse gas emissions, which may contribute to climate change. As described in the 2010 QDR, climate change has the potential to significantly impact future Air Force actions—from the environments where we operate to the missions we undertake and where our facilities can be located. It is essential that we consider the impacts to our capabilities and our energy security in future planning efforts. By reducing our energy consumption and increasing our use of renewable energy, we improve our energy security and reduce greenhouse gas emissions in support of U.S. climate policy initiatives.

This document communicates the Air Force's approach to energy and presents a formal structure to maintain an enterprise-wide approach and provide global oversight to solve the complex energy challenges facing the Air Force. It also provides a comprehensive framework for all Airmen to utilize in determining how to make energy and water part of operational considerations. From developing new energy options that provide secure and reliable energy alternatives to energy efficiency and conservation initiatives, the Air Force is making great strides in cultivating a culture within the Air Force that values energy as a mission critical resource and continues to evolve into a more sustainable force to *fly, fight, and win*.

Operational Energy

Of primary concern is supporting current operations and protecting our Nation. This requires having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs. For the Air Force, operational energy is the energy used by the Air Force that has a direct and immediate impact to missions. While this is largely aviation fuel, there are major mission energy requirements at our installations, where the denial or loss of energy can have tactical, operational, and strategic consequences.

AIR FORCE ENERGY PRIORITIES:

- Improve Resiliency
- Reduce Demand
- Assure Supply
- Foster an Energy Aware Culture

AIR FORCE ENERGY GOVERNANCE STRUCTURE

Effective energy governance helps the Air Force achieve its energy vision

To provide leadership and ensure energy is made a consideration in everything the Air Force does, the Air Force maintains governance bodies across the Air Force—at Headquarters Air Force (HAF), at the major commands (MAJCOM), and at installations. Generally, the role of these cross-functional bodies is to provide guidance and oversight, as well as evaluate the policies, programs, and resources needed to meet the Air Force energy goals and objectives. By integrating energy management across mission areas and implementing cross-function strategies and policies, the Air Force is able to improve it operational capabilities and maximize fiscal resources. Given developments in technology, shifts in resource availability, and changes in operational requirements, the Air Force approach to energy and water management will continue to evolve.

Air Force Energy Oversight

The Air Force energy governance structure is divided into three levels, headed by the Air Force Energy Council (Figure 1). The Energy Council provides the enterprise oversight and strategic guidance to address the complex energy challenges facing the entire Service. Co-chaired by the Under Secretary of the Air Force and the Vice Chief of Staff of the Air Force, and made up of senior leaders from both the HAF and MAJCOMs, the Energy Council acts as a dynamic and deliberative body responsible for developing the strategies and priorities that guide the Air Force's approach to energy.

The Energy Council provides oversight regarding attainment of Air Force energy goals, objectives, metrics, and plans, as well as identifying, integrating, and balancing the investments necessary to meet those energy goals. To ensure the Air Force achieves its energy vision and has the ability to meet its goals, the Energy Council has the ability to establish steering groups and other organizations to focus on particular issues, such as energy security, aviation operations, infrastructure and expeditionary energy, research, development, test, and evaluation (RDT&E), planning, and outreach.

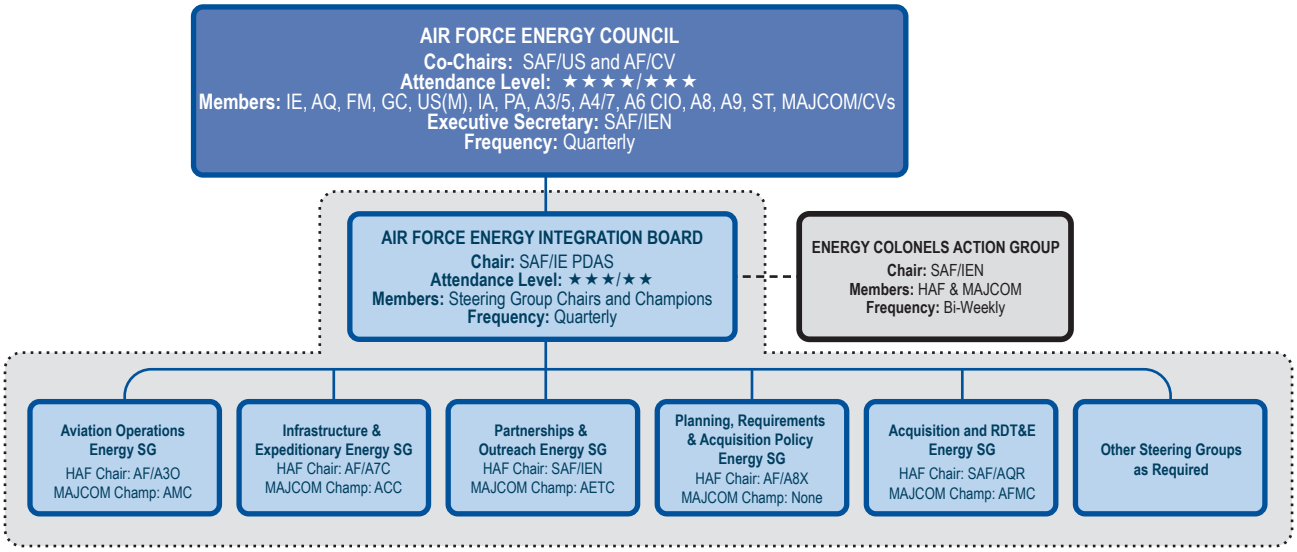
While the Air Force Energy Council handles the strategic oversight, the Deputy Assistant Secretary of the Air Force for Energy (SAF/IEN) is responsible for the strategic management and oversight of the Air Force's energy efforts and policy development across all domains of Air Force energy. As energy is a resource that crosscuts all Air Force functions, SAF/IEN coordinates across the Air Force and provides energy leadership on policy, innovation, partnerships, and program development.

The Energy Strategic Plan is one part of the Air Force's comprehensive energy master plan, as required under 10 U.S.C §2911. Along with the strategic plan, which outlines our management system and energy goals, the Air Force also develops an annual implementation plan to lay out specific activities and tasks for the next year, as well as discussing generally the long-term activities necessary to achieve our goals and objectives. The final piece of our master plan is our annual budget request, which represents the starting point for what activities we will be able to fund to meet our energy goals.

Energy Governance at MAJCOMs and Installations

Energy is a strategic imperative and requires the systematic incorporation of new information, rigorous insertion of technological advancements, and continuous improvement of processes and practices. To enable the Air Force to meet its goals, it has established energy governance organizations, such as energy management steering groups, at its MAJCOMs and installations. These organizations are chaired by the commander or vice commander and are responsible for the execution, monitoring, and programing necessary to meet Air Force energy goals and objectives.

Figure 1: Air Force Energy Governance Structure



SETTING THE CONTEXT OF THE AIR FORCE ENERGY LANDSCAPE

A strong energy posture *enables* our warfighters, *expands* operational effectiveness, and *enhances* national security

Energy is essential to all five operational domains of the United States military—air, land, sea, space, and cyberspace—and is the core requirement to fuel the force and sustain our national security posture. Maintaining global mobility and air superiority requires significant amounts of energy, a vital resource enabling the operational capabilities required by our Airmen to *fly, fight, and win*. Air Force energy demand is ever present, fueling our training, force sustainment, humanitarian relief efforts, intelligence gathering, and combat operations.

Current State

Energy is a constraining resource requiring long logistics tails that affects how we engage across the full spectrum of operations. As a result, energy represents a critical vulnerability for both the Nation and the military.

To put Air Force energy use in perspective, it is important to understand how much energy the Air Force consumes in relation to the U.S., the federal government and the DoD. According to the U.S. Energy Information Administration, the U.S. consumed over 97 quadrillion BTUs of energy from fossil fuels, nuclear power, and renewable energy sources in 2011, an amount that continues to increase. Within the U.S., the federal government accounts for approximately one percent of the total U.S. consumption, the majority of which is consumed by the DoD (Figure 2).

The Air Force alone accounts for 48 percent of the total DoD energy consumption and slightly more than 50 percent of the total DoD energy costs, with the vast majority of this for aviation fuel (Figure 3). This equates to approximately 2.5 billion gallons of aviation fuel and 64 trillion BTUs each year, as well as significant greenhouse gas emissions—35 trillion metric tons of carbon dioxide (CO_2) equivalent. Yearly energy costs for the Air Force are $9 billion and this amount is expected to rise at the same time fiscal resources become more constrained. The Air Force spends an additional $150 million for water each year, generally consuming about 27 billion gallons annually.

Figure 2: Energy Consumption in the U.S.

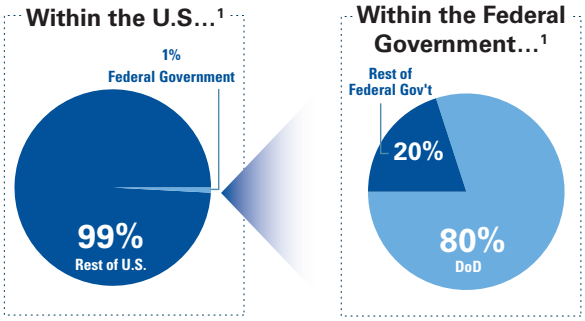
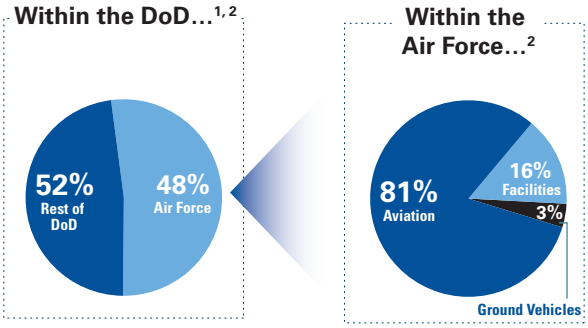


Figure 3: Energy Consumption in the DoD



To help address its energy vulnerabilities and leverage the cumulative market shares, the Air Force is collaborating with other federal agencies and private industry to identify best practices and implement solutions to improve its energy security posture. Moving forward, the Air Force will continue to engage in partnerships to help ensure that it meets its strategic energy priorities and reduce the financial impacts of its energy consumption.

Future State

For the foreseeable future, the Air Force will continue to consume large quantities of energy to support its mission, and it is important to have a strong energy posture that ensures energy is available where and when we need it. Air Force aircraft have long life cycles and while retrofits can be used to improve performance, the engines will continue to require fuels containing petroleum to operate. Our energy priorities—*Improve Resiliency, Reduce Demand, Assure Supply, and Foster an Energy Aware Culture*—will help lead the Air Force toward an energy secure future state where the Air Force:

- Identifies and integrates energy and water efficiency throughout business and planning processes
- Maintains a robust, resilient, and ready energy posture to ensure the freedom to operate
- Continues a leadership position where energy, the mission, and Air Force core competencies intersect
- Promotes integration of new technologies to reduce costs and increase effectiveness, and leverages investments in a constrained resource environment

Air Force Energy Challenges

The Air Force relies heavily on specific resources to meet its energy demands. Today, the Air Force's primary source of energy is fuel made from petroleum—we need it for aviation operations, ground vehicles, equipment, and back-up power generation. Aside from this fuel requirement, the Air Force relies heavily upon electricity to support our installations, which is mainly obtained from the commercial electric grid and generated by public utility companies. While the electricity is generated using a mix of fuel sources, such as coal, natural gas, nuclear, and renewable energy, the grid distributing the power is aging and vulnerable to both natural disasters and attacks. These vulnerabilities can affect all installation-based Air Force missions, including cyber and space missions.

Although the Air Force's energy needs are currently met, the global demand for finite energy resources is continuing to increase. In addition, even though a large portion of the Nation's energy supplies are produced domestically or in nearby countries, such as Canada and Mexico, energy exists in a fungible, global market where even small changes in production and disruptions in supplies can be felt worldwide. The shrinking gap between global supply and demand increases competition for energy, which could increase fuel prices and the potential for conflicts as resources become limited, as well as increases the possibility for supply disruptions.

Energy is becoming a larger share of the Air Force budget, going from three percent of the total Air Force budget in 2003 to over eight percent in 2011, and it is becoming more difficult for the Air Force to forecast and plan for the rise in energy costs. With the austere fiscal environment facing the Air Force and the Nation, energy can pose a financial risk to the Air Force's ability to plan, develop, and acquire the technologies and equipment necessary to sustain air, space, and cyberspace superiority.

In expeditionary operations, energy can be a significant vulnerability where the logistics chain for fuel and water remains open to disruption and attack. To address these vulnerabilities, the Air Force is pursuing resilient and reliable energy supplies, improving energy and water efficiency, and diversifying the types of energy in supply chains.

1: U.S. Energy Information Administration. 2011 Annual Energy Review. 27 September 2012
2: U.S. Air Force energy data

A STRATEGIC APPROACH TO ENERGY IN THE AIR FORCE

Improving energy security directly translates to improving national security

The Air Force is proud to be a leader in the Nation's ongoing quest to increase the use of alternative energy, decrease energy consumption, and reduce the Nation's dependence on energy imports. Optimizing energy and water use not only saves resources and money, but is also a force multiplier that allows the Air Force to apply resources and airpower more efficiently and effectively.

> The Air Force Mission is to *fly, fight, and win…in air, space, and cyberspace*

A Vision for the Future

The Air Force Energy Vision is to sustain an assured energy advantage in air, space, and cyberspace. By making the best use of energy and water resources, the Air Force achieves an edge to help ensure operational supremacy.

Energy is a necessity for all Air Force missions and operations, and the Air Force recognizes energy as an integral part of its systems and not simply as a commodity. The manner in which the Air Force manages and consumes energy has a direct impact on mission success or failure. By establishing a cradle-to-grave approach to energy and considering present and future needs, the Air Force will continue to build its energy advantage.

A Framework for Energy Management

The Air Force Energy Strategic Plan provides a framework for energy management to achieve our energy goals, with an aim to continually improve energy utilization to maximize efficiency and promote alternative energy platforms. Our approach to energy is built upon four priorities—*Improve Resiliency, Reduce Demand, Assure Supply, and Foster an Energy Aware Culture*—and each priority is defined and further developed to include enterprise-wide goals and objectives essential to help us achieve our energy vision, sustain readiness, and support the mission. Any time-bound objectives are expected to be completed by the end of the target year. Under each priority, a key initiative shows how the Air Force is addressing some of its strategic goals.

Table 1: Summary of the Intent and Expected Outcomes of the Four Energy Priorities

AIR FORCE ENERGY STRATEGIC PLAN		
PRIORITY	**INTENT**	**EXPECTED OUTCOME**
Improve Resiliency	↗ Identify vulnerabilities to energy and water supplies, such as physical and cyber attacks or natural disasters ↗ Mitigate impacts from disruptions in energy supplies to critical assets, installations, and priority missions	↗ Improved responsiveness to disruptions to energy and water supplies ↗ Increased ability to quickly resume normal operations and mitigate impact to the mission ↗ Prioritized response plans and solutions to mitigate risk from the tail (logistics supply chain) to the tooth (energy demand in operations)
Reduce Demand	↗ Increase energy efficiency and operational efficiency for Air Force systems and processes without losing mission capabilities	↗ Decreased amount of energy required by Air Force systems and operations ↗ Increased flexibility, range, and endurance in all operations
Assure Supply	↗ Integrate platform-compatible alternative sources of energy ↗ Diversify drop-in sources of energy ↗ Increase access to reliable and uninterrupted energy supplies	↗ Access to backup energy resources and supply chains based on asset and mission priorities ↗ Increased flexibility in all operations ↗ Increased ability to sustain mission
Foster an Energy Aware Culture	↗ Integrate communication efforts using training and education opportunities to increase awareness of energy impacts to mission ↗ Ensure the acquisition process reflects energy as a mission enabler	↗ Increased understanding and awareness of energy and its impacts to the mission ↗ Reduced energy demand through more efficient uses of energy resources ↗ Increased ability to integrate energy considerations in planning activities and other decisions

Accomplishing these priorities, goals, and objectives requires a convergence of conditions: appropriate investment to make our energy vision a reality, personnel to execute energy-related endeavors, and an evolving knowledge of existing and emerging energy issues affecting the Air Force. Given the critical role of energy in Air Force operations, the benefits of energy investments should be carefully weighed against the initial and recurring costs. Doing so will allow energy initiatives to be evaluated and appropriately funded along with other Air Force priorities in order to maximize the use of Air Force resources. Table 1 provides a synopsis of the intent and expected outcome of each priority.

Priority 1 – Improve Resiliency

Energy and water supplies are susceptible to physical shortages and price volatility due to existing and increasing global competition, as well as to disruptions resulting from natural disasters, physical attacks, and cyber attacks. To maintain freedom of operations, the Air Force will continue to *Improve Resiliency,* ensuring we have the ability to recover from energy interruptions and sustain the mission. It is essential for the Air Force to: have the oversight, programs, plans, and tools to systematically consider these risks; address potential short- and long-term disruptions of energy and water supplies, especially from the commercial electric grid; and ensure that the appropriate redundancies for critical missions are in place.

Identifying and planning for potential threats to its energy supplies serves as the foundation for energy security at our installations. These goals and objectives support those planning activities and help ensure the Air Force has the capabilities needed to:

- Evaluate and prioritize risks to energy and water supplies efficiently, consistently, and with minimal burden
- Mitigate impacts from disruptions in energy and water supplies
- Assure continuity in operations when energy and water supplies are interrupted
- Accommodate highly uncertain fluctuations in energy availability and cost

These goals and objectives will also help the Air Force identify the resources (e.g., trained Airmen, planners, architects, engineers) and processes (e.g., planning, programming, budgeting, research, and design) needed to develop and sustain capabilities required to ensure a resilient energy supply. The Air Force's general approach to attain this priority involves the exploration of different mechanisms, including:

- Alternative paths to sustain existing operations
- Diversification of the existing energy supply chain (i.e., incorporate a variety of fuel types and sources), with a focus on domestically derived supplies where appropriate
- Improvement of operational efficiency and energy efficiency for existing systems
- Implementation of planning and acquisition activities (i.e., scenarios) to prepare for disruption in energy supplies
- Development of advanced smart meters and microgrids to improve energy management, flexibility, security, and reliability

KEY INITIATIVE: INSTALLATION ENERGY SECURITY

Installation energy security is complex and each priority under this strategy is part of the total systems approach in place to improve that security. The application of energy security differs among operations as dictated by mission need and varies by the function supported, criticality of the mission, and the time of need or phase of operation. The Air Force is continually identifying the energy requirements for each mission, understanding our options, and developing and exercising response plans that contribute to a ready energy posture. By reducing the energy needed and diversifying generation and distribution options, the Air Force puts less reliance on an already vulnerable electrical grid system.

PRIORITY 1 Goals and Objectives	
GOALS	**OBJECTIVES**
Identify and assess risks	Identify macro-level, energy-related threats and risks to the Air Force at the asset, mission, and installation levels by 2013
	Develop mitigation options for energy-related risks by 2014
	Assess risk of energy infrastructure loss on ability of critical assets to support strategic missions
Implement required systems and tools that support risk, energy performance, and life cycle analysis	Identify energy assessment methodology to enhance decision-making by 2013
	Refine risk assessment framework by 2013 to evaluate energy threats to assets, missions, and installations
	Identify opportunities to align data requirements, data systems, and data management efficiencies
	Develop methodologies to better incorporate energy security as a factor in budget processes by 2015
Mitigate likelihood for disrupted energy and water supplies to impede operations	Identify where and how alternative fuels and energy can be integrated into the Air Force energy portfolio
	Identify alternative supply options for delivering energy and water sources to Air Force operations
	Analyze back-up power capability to support on-going mission support requirements in case of commercial power failures
Ensure planning activities identify and address risks in energy and water supplies	Integrate energy risk assessments into planning activities to address potential disruptions in primary fuel, power, or water to critical assets, missions, and expeditionary operations
	Ensure continuity of operations plans address energy and water security and risks

Priority 2 – Reduce Demand

The Air Force is engaged every day in global operations, from overseas contingency operations and humanitarian and disaster relief operations, to defending the homeland and providing strategic deterrence. With energy costs continuing to increase and budgets becoming more fiscally constrained, we are looking to *Reduce Demand* through operational and logistical efficiencies and new technologies as a way to improve our energy security posture while enhancing mission effectiveness. By integrating energy efficiency and fuel optimization measures, the Air Force can stabilize and reduce operational and infrastructure energy demand while enhancing our mission and range.

Similar to energy, water is also a limited resource with the potential to cause disruptions and instability in several regions across the world. In the near-term, conserving energy and water results in immediate savings the Air Force can use for other programs. From a long-term perspective, increased competition for this resource in water-scarce regions can both affect energy production and provoke potential conflicts.

Reducing demand for energy is the single, best action the Air Force can take to improve its energy security. It decreases reliance on foreign energy sources and an aging commercial infrastructure, reduces the financial resources the Air Force needs to commit to energy, and increases the impact on-base renewable sources can have. The *Reduce Demand* goals and objectives address demand-side energy management issues and support various activities to build and sustain the capabilities needed to decrease the amount of energy required to operate Air Force systems and conduct operations. Part of this is ensuring that the Air Force has the ability to collect and analyze energy data to manage consumption effectively by using advanced tools and management systems, such as smart meters. These goals and objectives target aviation fuel, expeditionary fuel, tactical and non-tactical ground fuels, water consumption, and installation energy, without compromising safety or mission capabilities to help the Air Force:

- Improve aviation energy efficiency across all aircraft types by focusing on training and operational effectiveness through innovation and cost-effective investments
- Reduce ground vehicle fuel, facility energy, and water consumption, which will help reduce dependence on commercial supply and delivery systems
- Implement requirements for reduced energy demand (where practicable and feasible) in specifications for design, production, and operation activities
- Promote RDT&E initiatives to develop more energy efficient advanced propulsion and aircraft aerodynamic technologies to enhance operational capability
- Implement planning activities to identify, evaluate, and/or prioritize opportunities to decrease energy demand, including changes in existing operations

In order to *Reduce Demand,* the Air Force must improve energy performance of operational platforms and enhance the energy efficiency of fixed infrastructure. By building more efficient platforms and more effectively utilizing resources, the Air Force can improve the range and endurance of our platforms without sacrificing capability.

KEY INITIATIVE: PROCESS ENERGY REDUCTION

A large portion of the energy consumed by the Air Force goes directly towards a variety of industrial processes, such as maintenance, equipment overhaul, aircraft rehabilitation, and fixed operational sites such as simulators and ground based stations. The Air Force is evaluating the energy consumed at its Air Logistics Centers, Engineering Development Centers, data centers, and other high energy consuming facilities to identify ways to improve energy efficiency and reduce consumption. This could include updating equipment to more energy efficient models, ensuring proper equipment maintenance, or implementing procedural changes to reduce energy consumption. As part of this initiative, the Air Force will develop an implementation plan by the end of 2013 detailing an approach to reduce its process energy consumption.

PRIORITY 2 Goals and Objectives

GOALS	OBJECTIVES
Reduce aviation fuel consumption through efficient flying operations	Improve aviation energy efficiency 10% by 2020 (2011 baseline)
	Develop and implement a plan to evaluate technologies for potential improvements in energy and operational efficiency
	Share best practices with domestic and international partners for efficient fuel usage
Reduce built infrastructure energy and water consumption	Reduce total facility energy consumption by 15% by 2020 (2010 baseline)
	Reduce energy intensity by 30% by 2015 (2003 baseline) and 1.5% annually through 2020 (2015 baseline)
	Ensure 100% of new vertical construction and major renovations meet federal requirements for high performance and sustainable buildings
	Ensure energy performance remains on track to meet all applicable requirements from laws, regulations, and executive orders
	Reduce potable water consumption intensity by 26% by 2020 (2007 baseline)
	Reduce industrial, landscaping, and agricultural water consumption by 20% by 2020 (2010 baseline)
	Ensure all installed facility electricity, gas, and steam smart meters are integrated with the appropriate computer network by 2016
Reduce reliance on petroleum fuels for ground-based vehicles	Reduce petroleum consumption by all ground vehicles by 2% annually through 2020 (2008 baseline)
	Ensure the most fuel efficient, fit-for-purpose vehicle is procured to meet mission requirements
Develop, demonstrate, and implement technological, operational, and management innovations to improve energy efficiency and reduce energy demand	Identify and assess near-, mid-, and long-term energy efficiency technologies
	Determine approach to better assess appropriate technology transitions by 2013
	Identify potential Air Force energy test bed locations by 2013
	Engage international partners in cooperative research and development for energy technologies
Decrease energy demand from process and cyber operations	Develop an approach by 2013 to decrease Air Force process energy consumption
	Consolidate Air Force data centers and reduce servers by 2015
	Identify and adapt tools and practices to decrease energy consumption and improve energy efficiency at remaining Air Force data centers

Priority 3 – Assure Supply

The Air Force is committed to diversifying the types of energy and securing the quantities necessary to perform its missions as a way to *Assure Supply*, both for near-term benefits and long-term energy security. Air Force operations are heavily dependent upon petroleum and petroleum-derived fuels, and this dependency poses significant strategic and security vulnerabilities where long-term disruptions would put pressure on energy supplies for the U.S. and our allies. The ability of the Air Force to ensure continuity of operations is dependent upon not only the delivery of reliable and uninterrupted energy supplies in the necessary quantities, but also on the adaptability of mission platforms to operate on diverse energy sources, such as alternative fuels.

Assuring our energy supply is not limited to our aviation operations; it also includes our facilities, ground vehicles, and equipment. The Air Force is focused on developing on-site sources of renewable energy, particularly those sources that can insulate the Air Force from grid failure or other supply disruptions. Increased use of on-site renewable energy can provide the Air Force with consistency in energy pricing, as well as promote positive environmental benefits by avoiding greenhouse gas emissions.

The Air Force is expanding its use of alternative fueled and plug-in electric vehicles. The use of such vehicles could help insulate the Air Force against fuel price volatility, improve energy security by decreasing dependence on foreign oil, and address environmental concerns, such as air quality.

Assure Supply addresses supply-side issues and is critical to sustaining an energy advantage. These goals and objectives support various planning, programming, investment, and research activities to build and sustain the capabilities needed to assure energy supplies. The Air Force applies these different types of activities, in various forms, among our different groups of energy consumers. The different applications of these shared activities help the Air Force:

- Identify and implement requirements for renewable and alternative energy (where practicable and feasible), in specifications for design, production, and operations, as well as specifications for products and equipment
- Promote research, development, test and evaluation initiatives to advance new technologies and evaluate new sources of energy that increase the Air Force's ability to incorporate alternative energy throughout the portfolio of energy-consuming platforms
- Utilize third-party investment mechanisms for utility-scale projects that increase the capacity to produce renewable and alternative energy and the capabilities to better distribute and utilize these supplies, with a goal to achieve 1,000 megawatts of on-site capacity by 2016
- Identify and implement infrastructure that supports the use of alternative energy supplies
- Implement technologies that create capabilities to consume alternative energy throughout the portfolio of energy consumers

KEY INITIATIVE: ALTERNATIVE AVIATION FUELS

The Air Force is focused on increasing and diversifying its energy supplies to improve our energy security. To demonstrate its strong commitment to this effort, the Air Force set a very ambitious goal to ensure our aircraft could fly on commercially available fuels by 2016, as long as those fuels are drop-in fuels that are cost competitive with traditional petroleum-based jet fuels, and meet our environmental and technical specifications. As the market grows for these fuels and prices decrease, the Air Force intends to increase its use of alternative aviation fuel blends for non-contingency operations to 50% of total consumption by 2025. To get there, we are certifying our aircraft to fly on different alternative fuel blends, including biofuel blends. By preparing for a variety of alternatives, the Air Force is ensuring it will be ready for whatever private industry is able to bring to market.

Priority 3 Goals and Objectives	
GOALS	**OBJECTIVES**
Increase use of alternative aviation fuels	Increase use of cost-competitive drop-in alternative aviation fuel blends for non-contingency operations to 50% of total consumption by 2025
	Certify 100% of the aviation fleet for a bio-based alternative aviation fuel blend by 2013
	Establish an integrated policy and investment strategy for alternative fuels, in accordance with DoD guidance, by 2013
	Ensure interoperability by working with domestic and international partners, both commercial and government, to certify aircraft to use alternative fuel blends
Increase facility use of alternative and renewable energy	Increase facility consumption of renewable or alternative energy to 25% of total electricity use by 2025
	Construct on-base renewable energy production to achieve 1% of Air Force facility consumption by 2013 and develop 1,000 megawatts of on-site capacity by 2016
	Ensure all new buildings are designed to achieve zero-net-energy by 2030, beginning in 2020
Increase use of alternative fuels in ground vehicles and equipment	Acquire 100% of new light-duty vehicles as alternative or flex-fuel vehicles where commercially available and economically feasible by 2015
	Increase alternative fuel use in ground vehicles by 10%, compounded annually, through 2015 (2008 baseline)
	Use alternative fuels 100% of the time when alternative fuels are available and cost effective
	Identify opportunities and requirements to incorporate use of alternative fuels in vehicles and equipment in deployed environments
Diversify and develop new energy sources suitable for expeditionary use	Promote RDT&E of alternative energy sources that can be generated locally or regionally near deployed assets
	Integrate improved and secure energy supplies into planning for and management of expeditionary bases
	Identify the potential for alternative energy sources in deployed environments by 2013

Priority 4 – Foster an Energy Aware Culture

Air Force military and civilian personnel serve as the conduit for achieving the priorities, goals, and objectives of the Air Force Energy Strategic Plan. Organizational culture underlies organizational cohesion and operational change, and thus is fundamental to fostering energy management norms of behavior within the Air Force.

The first step in *Fostering an Energy Aware Culture* is to increase Airmen's understanding of energy and its impact to the mission. The Air Force views energy as a major component of its operations that sustain mission readiness and responsiveness on a global scale. As energy awareness increases, new ideas and methodologies for operating more efficiently will emerge and push the Air Force towards energy security and sustainability. It is essential that the Air Force integrate the economic costs and security implications of energy use into structuring, equipping, and posturing the force and planning for operations.

The Air Force is comprised of Active, Reserve, Guard, and Civilian personnel, with different knowledge basis and job requirements. Individuals in these large and diverse groups make everyday decisions to reduce demand for energy, assure supply, and increase resilience. This includes decisions made by pilots, facility energy managers, and wing commanders, to name a few. By fostering energy awareness and making energy a consideration in every action, whether in a permanent or deployed environment, Airmen will:

- Value energy as a mission critical resource, leading to maximizing energy efficiency, while minimizing the cost and logistical challenges associated with energy wherever possible
- Integrate energy into the planning, structuring, equipping, and posturing for the Air Force as it moves forward to address future challenges

The Air Force must develop and sustain capabilities to improve its energy security, a process that begins with Airmen. This requires the Air Force to continue focusing on how it approaches energy by increasing energy awareness and understanding. As part of this effort, the Air Force will:

- Identify key segments of the Airmen population based on their impact to the Air Force's overall energy goals
- Cultivate an energy-aware force using communications targeted to the unique interests of segments of Airmen by leveraging all available tools, including social media, to increase energy awareness while personalizing each Airmen's role in energy efficiency and energy security
- Foster support of Air Force energy program and strategies by informing and educating target audiences about the Air Force's energy needs and its impact on national security
- Encourage collaboration to expand and strengthen partnerships with our sister Services, other government agencies, and the private sector

KEY INITIATIVE: APPROACH TO EDUCATION AND TRAINING

Education and training represent one of the foremost ways to foster an energy aware culture among Airmen. Led by the Air Education and Training Command, the Air Force is conducting a comprehensive review of all Air Force curricula, from basic training to senior leadership courses, to ensure that energy awareness, conservation, and security concepts are incorporated. This effort, which will be completed in 2014 and represents one of the largest reviews of its kind in Air Force history, will ensure Airmen are given the tools and information necessary to make energy a consideration in everything they do. As a kick-off to this initiative, the Air Force released an on-line energy awareness module that provides an overview of the Air Force's approach to energy, a tool for commanders to emphasize energy in their respective mission, and energy smart tactics, techniques, and procedures Airmen can use at work and at home.

Priority 4 Goals and Objectives	
GOALS	**OBJECTIVES**
Provide energy leadership throughout the Air Force to promote an energy-conscious culture	Incorporate energy analysis and planning requirements into all relevant posture and strategy documents
	Conduct quarterly meetings of energy governance structures at Department, MAJCOM, and installation levels
	Develop and implement a capstone energy awards program by 2013
Promote the importance of energy to Air Force missions throughout the Total Force	Develop and implement an annual energy outreach effort in conjunction with federal energy awareness campaigns
	Provide energy awareness materials on an annual basis for all Airmen
	Incorporate energy into appropriate existing training and education programs progressively through 2014
	Incorporate operational energy into security cooperation and partnership development by 2013
Strengthen energy in acquisition processes	Apply the energy key performance parameter based on DoD guidance
	Include fully burdened cost of energy as a factor in major weapons systems acquisitions
	Use the fully burdened cost of energy and energy key performance parameter to help shape acquisition decision making

MOVING FORWARD WITH AN INTEGRATED APPROACH TO ENERGY

Effective and efficient energy management is a dynamic process

From aviation operations to installation infrastructure within the homeland and abroad, energy enables the dynamic and unique defense capabilities that allow the Air Force to *fly, fight, and win...in air, space and cyberspace*. Effective and efficient energy management is necessary and critical for assuring energy availability today and energy sustainability into the future. The Air Force is taking a coordinated, proactive, and comprehensive stance towards energy management through the integration of all four of its energy priorities. This approach will lead to increased energy security and reduced energy costs, and prevent potentially conflicting and expensive activities. The Air Force is pursuing two broad efforts where energy is just one consideration—the Net Zero Initiative and the air base of the future—that typify this multifaceted, integrated approach to energy management.

Near-Term Approach: Net Zero Initiative

As part of our effort to continue to integrate energy into day-to-day operations, the Air Force is pursuing a net zero posture for installation energy and water to help achieve the federal goal of zero net energy by 2030 for all new facility construction and alterations. We will build on existing goals and strengthen our commitment to the operational mission by focusing on management of energy and environmental resources. The Air Force defines a net zero energy posture as one where an installation consumes no more energy than is generated on the installation. Similarly, a net zero water posture is defined as reducing our demand for potable water to the greatest extent practicable by capturing and reusing, repurposing, or recharging an amount of water equal to or greater than the amount of water the installation consumes.

To achieve these postures, the Air Force will need to continue to reduce its demand for energy and water through conservation and culture change, and increase on-site energy production through renewable sources of energy. These actions will improve the installation's energy resiliency because it will significantly reduce the energy required from the commercial grid. The Air Force is in the process of building a strategic, economically sensitive, and integrated approach to meet these goals. The goals will not represent an unfunded mandate, but instead put focus on finding cost savings/cost avoidance opportunities while supporting and building upon the sustainability goals and objectives already established.

Long-Term Approach: Air Base of the Future

The culmination of any Air Force effort in a crosscutting area—from readiness to safety to energy—is to ensure that the Service is positioned for the future. Part of this includes guiding changes and investments to current installations, but also informing designs for those installations that may be built in the future in deployed and permanent environments. The air base of the future would rely on power generated from renewable energy sources connected to a centralized storage facility and directly to facilities. Excess power generated during the day or night from renewable sources would be stored and used during high demand periods, and the installation would rely on distributed sources of energy to reduce single point vulnerabilities and rely on energy from the main grid as backup—not the other way around. Our objective is to develop an integrated master plan by 2015 that optimizes function, security, and efficiency, placing a high priority on energy resiliency and uninterrupted energy and water supplies.

Continuous Improvement: Lead, Watch, and Follow

The Air Force must continue to identify near-, mid-, and long-term solutions to improve its energy security, from new technologies to improved policies. This does not require the Air Force to lead in every area, but rather take advantage of its core competencies and strengths. The Air Force should continue to develop new technologies through research, development, and demonstration in areas that are critical enablers of core missions and associated platforms. In other areas, the Air Force should follow or watch technologies originating from external organizations to advance operational robustness, resiliency, and readiness.

The Air Force's strategic approach to energy and water management outlined in this plan is an evolving framework designed to be a reference point for all Air Force personnel. Energy management is a dynamic process that will necessitate the continuous incorporation of new information and developments on the energy front, and thus the Air Force views this plan as an adaptive framework for accomplishing Air Force energy goals and improving its energy security.

APPENDIX 1: REFERENCES

DoD Directive 4140.25, *DoD Management Policy for Energy Commodities and Related Services*, April 12, 2004

DoD Directive 5126.46, *Defense Energy Information System*, December 2, 1987

DoD Directive 5134.15, *Assistant Secretary of Defense for Operational Energy Plans and Programs*, May 17, 2011

DoD Instruction 4170.10, *Energy Management Policy*, August 8, 1991

DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, December 8, 2008

Executive Order 13423, S*trengthening Federal Environmental, Energy, and Transportation Management*, January 24, 2007

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, October 5, 2009

Energy Policy Act of 2005 (EPAct 2005), Public Law 109-58, August 8, 2005

Energy Independence and Security Act (EISA) of 2007, Public Law 110-140, December 19, 2007

National Defense Authorization Act for Fiscal Year 2010, Public Law 111-84, October 28, 2009

National Defense Authorization Act for Fiscal Year 2011, Public Law 111-383, January 7, 2011

National Defense Authorization Act for Fiscal Year 2012, Public Law 112-81, December 31, 2011

The National Military Strategy of the United States (Washington, DC: Chairman of the Joint Chiefs of Staff, 2011)

The National Security Strategy of the United States (Washington, DC: The White House, 2010)

U.S. Department of Defense, Energy for the Warfighter: Operational Energy Strategy, May 2011

U.S. Department of Defense, Quadrennial Defense Review, February 2010

APPENDIX 2: DEFINITIONS

Alternative fuel—Means methanol, denatured ethanol, and other alcohols; mixtures containing 85 percent or more (or such other percentage, but not less than 70 percent, as determined by the Secretary of Energy, by rule, to provide for requirements relating to cold start, safety, or vehicle functions) by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels; natural gas, including liquid fuels domestically produced from natural gas; liquefied petroleum gas; hydrogen; coal-derived liquid fuels; fuels (other than alcohol) derived from biological materials; electricity (including electricity from solar energy); and any other fuel the Secretary determines, by rule, is substantially not petroleum and would yield substantial energy security benefits and substantial environmental benefits.

Energy—Any usable power, including, but not limited to, electricity and power produced from coal, petroleum products, steam, natural gas, propane, military operational fuels and propellants, alternative fuels, and alternative and renewable energy sources, such as solar, wind, geothermal, and nuclear.

Energy intensity—Energy consumption per square foot of building space.

Energy management—The process of developing, executing, and overseeing plans, programs, and initiatives to achieve energy goals and objectives across all functional areas.

Energy security—Assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs.

Operational energy—Energy required for training, moving, and sustaining military forces and weapons platforms for military operations. The term includes energy used by tactical power systems, generators, and weapons platforms.

Process energy—Energy directly consumed in manufacturing, maintenance, to include equipment overhaul, rehabilitation or refurbishment, destruction, warehousing, and similar processes.

Renewable energy—Energy produced by solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project.

Water consumption intensity—Water consumption measured in gallons per gross square foot of building space.

Zero-net energy building—A building that is designed, constructed, and operated to require a greatly reduced quantity of energy to operate, meet the balance of energy needs from sources of energy that do not produce greenhouse gases, and therefore result in no net emissions of greenhouse gases and be economically viable.

U.S. AIR FORCE