2018 INSTALLATION ENERGY ASSURANCE CAMPAIGN PLAN

DOING THE RIGHT THINGS
FOR THE RIGHT REASONS

AIR FORCE MATERIEL COMMAND

INNOVATIVE AIRMEN CREATING WAR-WINNING CAPABILITIES FOR THE NATION.

OUR MISSION

DELIVER & SUPPORT AGILE WAR-WINNING CAPABILITIES.

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COMMANDER'S MESSAGE

Installation energy is a critical mission resource we depend on every day. Events of recent years demonstrate an upward trend in environmental, physical, and cyber threats to our nation's energy systems. In the past, we relied on emergency measures to sustain critical and important missions through a short-term prime power disruption. With the increasing risk of a widespread and prolonged disruption, we need to understand what the mission threats are and what we should do to keep installations functioning and secure.

I am pleased to publish the AFMC Energy Assurance Campaign Plan, which aligns with the 2017-2036 Air Force Energy Flight Plan. This update reframes our dialogue about energy and elevates it as a critical mission resource. The plan adopts three AF goals of Improved Resiliency, Optimized Demand, and Assured Supply and integrates them into four lines of effort: Optimized Systems and Processes, Cyber Secure Control Systems, Independent Secondary Sources of Energy, and Reliable and Managed Distribution.

As we continue shifting from an approach to energy rooted in the principles of conservation and opportunity to a more holistic and inclusive program driven to ensure mission success, we must stay true to the core principle of doing the right things for the right reasons. Energy assurance is an undeniably critical aspect of being mission effective as much as energy efficiency is important to being operationally efficient. I look for a seamless and collaborative partnership between communities – unified in purpose and focused on solving these challenges while positioning our installations for tomorrow.

The challenge going forward is formidable – not because we lack the technology or expertise, but because there will be variation between installations and missions, both in need and opportunity. I look to Center Commanders to lead in finding affordable and effective solutions to assure we always have the energy we need to meet mission requirements.

ELLEN M. PAWLIKOWSKI
General, USAF
AFMC Commander

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INTRODUCTION

Installation energy is used to power all facilities on an installation and includes energy forms such as electricity, natural gas, energized water (steam) and compressed air. The **AF Energy Flight Plan** characterizes installation energy as a strategic imperative highlighting vulnerabilities of the nation's energy system and a growing mission risk of continued dependence on external supplies. The nation's electrical infrastructure is aging and threatened by events such as extreme weather, acts of terrorism, and hostile cyber intrusions. The risk for a widespread and prolonged disruption is real and growing. The AF can no longer assume unimpeded access to external energy supplies.

Today, installations purchase prime energy, as a commodity, from a local utility and distribute it to base operations and missions. In the event of a supply disruption, a back-up or secondary capability exists through generators and/or battery banks, where needed. However, some of these back-up solutions were only designed to sustain mission through a short term disruption and were never meant to provide an enduring source of energy. Although Continuity of Operations (COOP) plans also specify bringing in additional sources or relocating the mission, this is often not mission effective or practical over an extended period of time. Given AFMC's unique mission sets, relocation is simply not an option. AFMC commanders need to understand the root problems of these energy vulnerabilities and what should be done to improve preparedness.

Assured energy, or the ability to have energy readily available for mission needs, is an often overlooked yet vital aspect of being mission effective. The AF challenges commanders at all levels to rethink the mission-critical role energy plays and to reduce operational risks. This focus culminates in the AF vision to **"Enhance Mission Assurance through Energy Assurance,"** which underpins the AF Energy Flight Plan and drives AFMC to a more reliable and resilient energy posture. The AF Plan identifies three Strategic Energy Goals: Improve Resiliency, Optimize Demand, and Assure Supply.

The AFMC energy theme of "Doing the Right Things for the Right Reasons" shifted the Command's energy program from an approach rooted solely in the principles of conservation and opportunity to one centered on doing the right things for the mission. AFMC builds on the AF theme as it develops its approach to energy assurance. In doing so, AFMC recognized energy assurance is vital to being mission effective and energy efficiency is a key to being operationally efficient. In addressing energy vulnerabilities, AFMC strengthens stakeholder confidence in delivery of combat ready capabilities as well as the performance of the capabilities themselves. In elevating energy as a managed concern and controllable resource, AFMC optimizes productivity, eliminates waste, and improves performance.

INTRODUCTION

While the AF Energy Flight Plan provides the foundation, the **AFMC Energy Assurance Campaign Plan (EACP)** defines what energy assurance means in the Command and provides a strategic roadmap to guide Centers and Installations in improving energy security. AFMC's strategic intent is to better manage the emerging risk to mission by improving the operational agility of installation energy systems to achieve a robust, resilient, and ready energy posture. The EACP purpose is to unify proponents and achieve alignment across functional areas.

The AF evolution in how we frame and approach energy touches every aspect of what we do, underpins every mission, and is broader than a project, initiative, or program. How we perceive and value energy must become ingrained as a part of our culture and embedded in everything we do. Our messaging must be clear and far reaching, inspiring the innovative spirit of our airmen and capitalizing on the AF energy toolbox and AFMC's vast problem-solving capabilities

RESPONSIBILITIES

Mission owners work in partnership with the mission support community to assure AFMC's mission to "Deliver and Support Agile War-Winning Capabilities." This seamless relationship is reflected AFMC's energy theme, implementation guidance, governance structure, and business processes.

AFIMSC DETACHMENT 6

- Provide MAJCOM-wide support in implementing the AF Energy Flight Plan.
- Lead energy groups and forums to develop, organize, coordinate and publish supplemental guidance to unify proponents and improve energy assurance.
- Represent, inform, and advocate on behalf of Higher Headquarters for programs, policies and resources required to develop and execute the AFMC installation energy program.

AFMC CENTERS

- Assure availability of a continuous, uninterrupted supply, of installation energy for mission assets supporting the National Military Command System and combatant, sub-unified and Air Force component commands.
- Champion a collaborative, mission centric energy program spanning all operational locations to advance energy performance and security through improved resiliency, optimized demand, and assured supply.

AIR FORCE CIVIL ENGINEER CENTER (AFCEC)

- Manage the AF installation energy toolbox and provide subject matter expertise to enable installations to capitalize on the best value technology and execution method.
- Provide comprehensive civil engineer expertise to AFMC Directorates, Centers, Complexes and Wings on energy assurance.
- Support and participate in AFMC mission installation energy groups and forums as the AF energy subject matter expert.

GOVERNANCE

Vision and unity are assured through the AFMC Energy Assurance Steering Group (EASG). The EASG—chaired by the Commander, Deputy Commander, or Executive Director—is a chartered senior leader forum that provides the strategic stage to guide and integrate Center energy assurance initiatives. The EASG is supported by an Energy Assurance Working Group (EAWG) with membership from each AFMC Center at the Col (GS-15 Equivalent) level and is best characterized as a collaborative body to unify, assure policy meets mission need and resolve challenges. Finally, the AFMC Energy Assurance Installation Forum (EAIF) provides the front line forum to execute EASG energy program objectives.

POSITIONING INSTALLATION ENERGY SYSTEMS

The AF Strategic Master Plan - May 2015 summarizes the critical role that resilient installations, infrastructure, and combat support capabilities play and highlights the importance of reducing dependence on single-point public energy sources and utility grids. Installations, when viewed through the lens of a war fighting capability, share commonality with other platforms. An installation is a system of systems platform providing resources like energy that are critical to meeting AFMC missions. This mission dependence on installation readiness drives AFMC to address these mission vulnerabilities and to improve installation energy systems. The AF Future Operating Concept - A View of the AF in 2035, highlights the central idea of leveraging operational agility as a way to adapt swiftly to any situation or adversarial action. Operational agility is the ability to rapidly generate - and shift among - multiple solutions for any given scenario. In the context of installation energy systems, operational agility refers to the ability to supply energy when and where it is needed. It is enabled by diversifying the sources of energy and gaining control over the distribution or flow of energy across the installation. In times of reduced capability, the system agility enables local Commanders to respond to mission and operational dynamics and to decide where best to use the available energy.

The AF fights from its installations. The AF Energy Flight Plan emphasizes a growing need for installations to maintain a robust, resilient, and ready energy posture to ensure the freedom to operate. As threat levels increase and vulnerabilities of our installation energy systems increase, capability gaps arise. If not mitigated, these gaps can deny mission accomplishment. To better manage these risks, future missions will have access to energy from multiple sources (available, redundant, and diversified). To do this, AFMC seeks to improve the operational agility of installation energy systems through four lines of effort:

1. Optimized Systems and Processes

2. Cyber Secure Control Systems

3. Independent Alternate Energy Solutions

4. Reliable and Managed Distribution

These are discussed in greater detail in the following section.

OPTIMIZED SYSTEMS AND PROCESSES

Optimizing energy demand, as part of the material solution development process and in achieving mission effectiveness, is vital to assuring the sustainability and reliability of platforms. Optimization of processes such as developing, testing, and leveraging technology and in sustaining platforms is an important attribute of being mission effective and essential to a robust, resilient, and ready energy posture. The less energy we consume, the less we have to be prepared to replace. AFMC will aggressively pursue an enduring effort to continuously improve energy efficiency and conservation, as part of being mission effective.

In general, operational efficiency occurs when the production of an output is maximized while minimizing the amount of waste or unnecessary effort. The pursuit of energy efficiency is not a standalone consideration and being operationally efficient does not always reduce the amount of energy consumed. Smart evolutions in productivity can increase consumption but gain benefit in other areas such as improving the safety, speed, or quality of production processes. AFMC will carefully consider energy demand in making reliability and sustainability trade-offs and in balancing energy needs with other important drivers such as cost, performance, schedule, and readiness. AFMC will improve energy efficiency and assurance through actions such as:

- **Elevate energy efficiency as a key consideration in filling capability gaps**
- **Integrate it into engineering processes**
- **Include it as a critical element in the design of industrial processes**
- **Upgrade the efficiency of real property and equipment through facility and infrastructure modernization and investment**
- **Optimize installation energy systems and infrastructure**

OPTIMIZED SYSTEMS AND PROCESSES

Incorporating energy efficiency into the design of buildings, work spaces, and related support systems is an enduring strength of the AF energy program. Although already strong, more work remains in continuing the current level of effort and in building upon these successes to identify and exploit opportunities in other areas across the enterprise. Investments in efficiency often cost more upfront but pay for themselves over time. This method of using total cost ownership or life-cycle costs has shown itself to lead to better long-term solutions than employing a traditional analyses based solely on the initial capital investment. Life-cycle costing will be used to form the cost basis in making future investment decisions in energy efficiency.

While gaining energy efficient real property, equipment and processes is primarily an attribute of design, energy conservation can be thought of as an operational improvement that results in using less energy than a process otherwise would. AFMC will pursue energy conservation through actions such as:

- **Foster and continuously strengthen an energy aware culture across the enterprise**
- **Include building controls in the acquisition or modernization of facilities**
- **Expand the use of Control Systems (CS) to better control energy supply and demand**
- **Employ process controls to automate production and related support processes**

AFMC consumes about one quarter of the installation energy used across the AF. It is generally divided into two types: facility and process energy. Facility energy is consumed in real property and provides for the comfort of building occupants. It is managed by mission support, as the host installation. Process energy is used to produce an output in mission activities such as industrial production, computational labs, and test programs. It is managed by the mission owner, as the installation tenant. Facility and process energy are, however, inextricably linked and must be addressed together, whenever possible.

CYBER SECURE CONTROL SYSTEMS

The Air Force Cyber Campaign Plan (AFCCP) - 2017 highlights the interconnectedness and growing vulnerabilities of Information Technology (IT) systems and the mission need for improving cyber security and resiliency of those systems and networks. Increasingly competent adversaries coupled with the ever expanding nature of the internet of things has made Control Systems (CS) vulnerable to attack. The threat is real and far-reaching, affecting and encompassing virtually any system and even any device that communicates through a network. These attacks can cause mission failure, extended operational impacts, and physical damage to critical infrastructure, as well as provide a foothold for additional attack vectors into other IT systems.

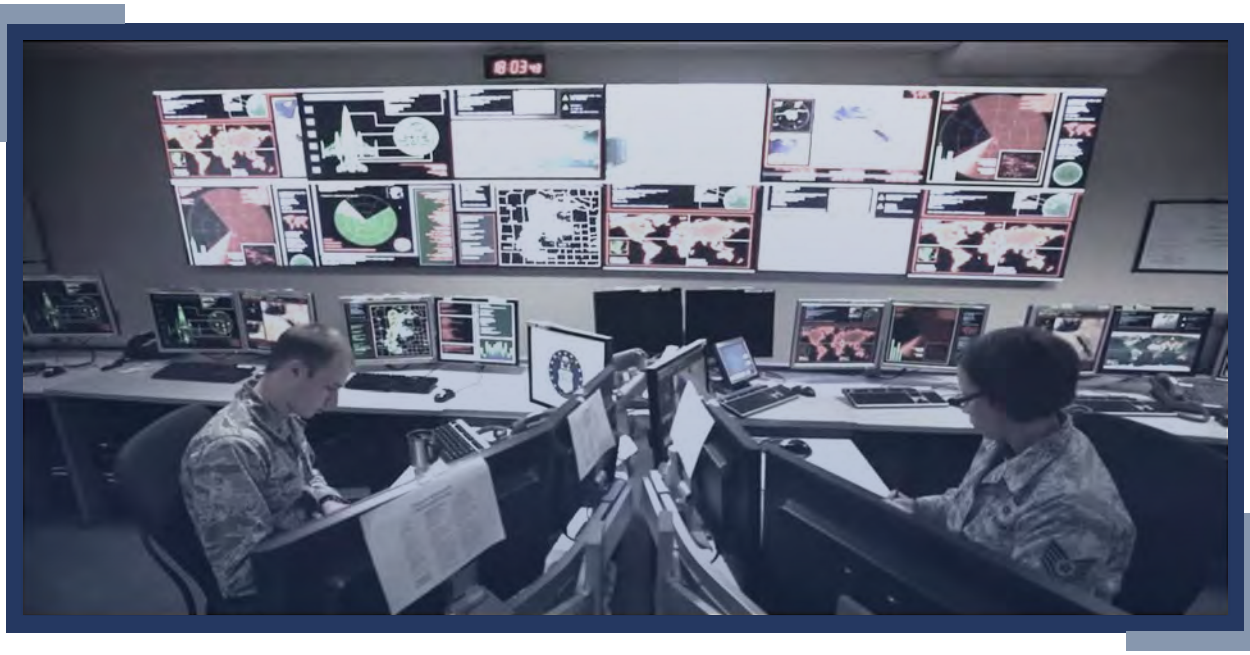
AFMC uses a wide variety of CS in applications to monitor and control the operation of equipment, infrastructure, or associated devices. CS is Operational Technology (OT), which is IT adapted to directly monitor and/or control physical devices, processes, and events. In OT systems, availability is the primary concern versus traditional IT, which place a higher value on confidentially. Installation energy CS consists of integrated computers and control components that act upon underlying mechanical equipment to achieve a physical objective. Supply side systems such as Supervisory Control and Data Acquisition (SCADA) use computers, sensors, and switches to remotely manage the flow of energy across the installation. Demand side systems such as Energy Management Control Systems (EMCS) and subsystems such as Programmable Logic Controllers (PLCs) and Direct Digital Control (DDC) manage consumption in control of systems such as building air conditioning and lighting. Centralized CS such as the AF Advanced Meter Reading System (AMRS) collect, transmit, and store energy consumption data. These and other forms of CS are used widely across the enterprise to optimize resources in supporting virtually all aspects of the AF core mission areas.

Legacy AFMC CS were never designed to operate in a contested environment. Instead they were intended as isolated systems running on a dedicated network with proprietary communication protocols and specialized hardware and software. They were not designed to mitigate cyber intrusion risks. Moreover, AFMC legacy systems vary in scope, application, and maturity and were acquired in a decentralized manner, primarily to the lowest bidder and in a non-standard fashion. The result is a wide variety of disparate systems many of which have reached or are nearing the end of their useful life. Modern CS, however, adopts the characteristics and access controls of traditional IT systems and allow greater operational capability, efficiency, and automation.

CYBER SECURE CONTROL SYSTEMS

As AFMC moves forward with modernizing and securing CS, the AFCCP framework will provide the holistic strategic guidance and cross functional integration needed to better manage cyber intrusion risk and the complex functional interdependencies of the AF OT environment. AFCCP focus areas span the acquisition, operations, and infrastructure domains. AFMC will improve the risk posed by installation energy CS through actions such as:

- **Modernizing CS to improve operational agility while keeping installations cyber secure**
- **Fixing existing CS to support energy assurance and improve mission assurance**
- **Hosting installation energy CS on hardened, cyber-secure networks**



INDEPENDENT ALTERNATE ENERGY SOURCES

AF policy drives AFMC to reduce mission dependence on vulnerable single-point energy sources and utility grids. Generation and/or storage of prime energy independent of the nation's system provides the alternative sources of energy needed to sustain missions through supply disruptions for which legacy generators applications and other asset-specific emergency systems were never intended to support. In general, energy supplies can be diversified by having multiple sources of prime energy available for mission. These can include primary and alternative feeds, distributed generation systems, diversity of fuel, and/or energy storage. Redundancy in distribution can be gained by having multiple routes for supplying energy. This operational agility is enabled through sensors, switches, and controls inherent with robust distribution control systems.

AFMC energy production capabilities vary widely in age, condition, and capability ranging from simple asset specific emergency generators to complex prime power systems, such as peaking plants capable of islanding an entire installation from the nation's electric grid. Depending on the design, either a stand-by or prime power generator can be capable of supporting a prime power need or even a networked application. Less capable generators, however, are limited in capability, resource intensive to maintain and can degrade over time becoming more and more prone to failure.

Many legacy solutions will likely continue to play a vital and enduring energy assurance role, but only in a mission appropriate application for which they were specifically designed for and where an underlying business case justifies doing so. As the duration in the loss of commercial prime energy increases, mission needs will evolve. Non-networked, asset-specific solutions like stand-by generators limit flexibility and can impede AFMC's ability to respond to mission and operational dynamics.

Traditionally, AFMC renewable energy production initiatives were pursued where the opportunity existed, e.g. available real estate, appropriate technology and private investment. They were limited in scope, intended to meet DOD goals, and resulted in solutions that simply feed power to nation's energy system with no provision for the installation to use the energy in times of need. There was very little if any consideration to mission need. With the AFMC energy program centered on doing what is right to assure mission, Centers will revisit these legacy agreements and ensure future capabilities satisfy a mission capability gap.

INDEPENDENT ALTERNATE ENERGY SOURCES

Continued industry advancements in clean, renewable, and alternative energy generation and storage technologies provides an opportunity to fill energy assurance gaps with a more sustainable solution set. Technologies that re-use the by-products of traditional production methods such as combined heat and power systems can be exploited to affordably fulfill mission need for steam and electricity. Recovery of waste heat from industrial processes can be used to reduce or eliminate another energy source. Traditional alternative energy sources such as biofuels, solar, wind, hydro, geothermal, and nuclear can be applied to improve installation energy assurance and independence. We will embrace sensible and proven clean energy technology to meet energy assurance needs where the life-cycle cost effective.

RELIABLE AND MANAGED DISTRIBUTION

In an energy system, reliability is the degree to which a mission owner can depend on the system to deliver the energy required for mission. Resilience is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from energy disruptions. Both reliability and resilience are key attributes of an operationally agile energy system. Reliability though isn't just about diversified supply and redundant distribution. In 2016, the Department of Defense (DOD) reported FY15 power outages lasting greater than eight hours were primarily attributed to: Equipment Failure (45%), Acts of Nature (43%), and Planned Maintenance (7%).

Managing the risk of a disruption caused by a failure within the installation energy system is just as important as any other aspect of the risk management profile. These systems are comprised of thousands of individual pieces, parts, and components working together to produce and/or supply energy. System infrastructure such as feeders or circuits, switches, transformers, and substations and alternative energy sources are critical links. Visibility of the age and condition of these components and how the system deteriorates over time is critical to managing the risk of a mission impact attributed to equipment failure.

The AF Asset Management Program (AMP) provides a process to better capture these risks and direct investments toward those systems and/or components that pose the greatest risk to mission. AFSC employs similar principles in preventative or condition based maintenance programs and in managing equipment attrition. Applying these proven strategies to AFMC energy systems will help assure appropriate investments are made at the right time. AFCEC in partnership with DOD is developing the Utility Sustainment Management System (SMS) to enable this component level visibility, which is planned to be integrated into the AF AMP tools in time fiscal year 2022/23 timeframe. AFMC will capitalize on the DOD SMS for AF owned and operated utility systems and work with privatized system owners to assure appropriate investment planning is being accomplished to manage the risk of equipment failure.

RELIABLE AND MANAGED DISTRIBUTION

An important aspect of managing an energy system is visibility of the condition of the system as it ages. AFMC is working with AFCEC to develop a Utility System Outage Reporting and Tracking (USORT) tool, which will help in predicting system deterioration and enable engineers to proactively manage the risk of disruptions attributed to equipment failures. The USORT tool will track causes of outages and assist engineers with development of strategies to improve the overall resilience of systems. Beginning with electrical systems, AFMC installations shall use the USORT tool as the primary means to capture and assess the performance of installation energy systems.

To advance resiliency, the AF Energy Flight Plan requires improved redundancy in AFMC energy systems beginning with critical missions. In the context of reliability, redundancy signifies that an energy system will continue to function in spite of a failure of some system components. This resistance to failures is secured by providing alternative paths of operation by arranging selected elements of the energy system in parallel. AFMC energy systems already support a level of redundancy in supply using support systems like standby and/or prime power generators. However, new and emerging threats require new approaches and these legacy solutions may no longer be appropriate for the mission being supported.

RESILIENT POWER APPROACH

AFMC will follow a systematic approach to better understand the local threat; the vulnerabilities of the energy system(s) and the opportunities to improve; and to define what should be done to assure a robust, resilient, and ready energy posture. AFMC energy systems must be responsive to mission change and the dynamics inherent with operating under a reduced capability. They must sustain critical base functions while alleviating the cost and schedule impacts a disruption can cause to the acquisition process, e.g. industrial production, research and development, and test programs.

Managing the risk for mission disruption does not mean all missions and operations should, or will, be positioned to sustain through a widespread and prolonged disruption beyond the legacy solutions already in place. AFMC will focus on assuring critical and important missions, as defined by mission owners and customers, can continue to be met along with essential support services required to sustain those missions. These needs will be integrated with other installation 24/7 operations such as air traffic control centers, data centers, communications centers, emergency operations centers, medical centers, and command and control centers. AFMC will also address the risk of impacts on the cost, readiness, and schedule of warfighter deliverables and installation tenant missions. In taking a broader approach, AFMC seeks to affordably position installations to remain responsive to the mission requirements of the Combatant Commands (COCOM) while enabling the command and control flexibility needed when operating at a reduced capacity.

RESILIENT POWER APPROACH

Improving the operational agility of energy systems does not require a one-for-one replacement of supply, as the level of assurance required for each mission or operation will vary. This variation highlights the need to affordably scale solutions to right-size the level of individualized protection of mission assets (facilities, capabilities, and systems) while positioning AFMC for future missions.

AFMC installations shall implement the AFMC/CC approved Energy Assurance Approach, identified below, to achieve the AFMC energy goals and objectives.

1. Conduct Planning:

Mission support develops and maintains an Installation Energy Plan (IEP) or IEP Summary as a holistic roadmap toward pursuing the AFMC energy assurance core attributes.

2. Establish Partnerships:

Mission support develops sensible partnerships with external utility service providers, respective State energy officials, mission owners, and key stakeholders and provides the collaborative forum to organize.

3. Define Important Missions:

Mission owners to identify to mission support missions that directly support the National Military Command System and combatant, sub-unified and Air Force component commands. (The Critical Asset Risk Management (CARM) program requires AFMC Centers to identify and manage critical missions meeting DOD criteria. The Air Force Cyber Campaign Plan - June 2017 requires AFLCMC to decompose 43 mission capabilities, which is already underway. Centers and Installations will use these sources in forming critical and/or important missions)

RESILIENT POWER APPROACH

4. Determine Mission Needs:
Mission support to collaborate with each mission owner to assess and define the required reliability for critical and important missions.

5. Develop Installation Requirements:
Mission support to identify energy supply, distribution vulnerabilities, integrate mission owner requirements, and develop conceptual solution sets.

6. Update Installation Energy Strategy:
Mission support to integrate needs into the IEP Summary and develop and prioritize projects to close gaps and expand capability.

7. Develop Execution Plan:
Mission support to develop requirement prioritization methodology, planning, programming and budgeting guidance, and an acquisition strategy aligned to the goals and objectives of this plan.

Following this approach, AFMC will develop installation requirements by integrating mission and operational needs together and incrementally execute a prioritized roadmap that leads to appropriate improvements in the installation energy system

AFMC will seek business opportunities for public and private investments (utilities privatization, third-party financing, etc.) to affordably deliver these capabilities. Centers and associated installations must remain unified in purpose, scope, and approach and committed to capitalizing on the expertise, resources, and capabilities of the Air Force energy program. Revisiting and addressing the risks to missions presented by our legacy systems is not easy work, but it is necessary.

PEFORMANCE MEASURES

The following initial measures will be used to monitor the health of the AFMC energy program.

- Reduction in the scope, frequency, and duration of electrical outages
- Reduction in energy system failures attributed to infrastructure, real property, and equipment
- Progress toward a 25% reduction in energy consumption (FY15 baseline) by 2025
- Progress toward a 25% increase in the use of clean energy (FY15 baseline) by 2025

GOALS AND OBJECTIVES

The AF Energy Flight Plan goals of Improved Resiliency, Optimized Demand, and Assured Supply and their associated objectives are inter-related. AFMC will develop and execute requirements to meet these goals through four lines of effort: Optimized Systems and Processes, Cyber Secure Control Systems, Independent Alternate Energy Sources, and Reliable and Managed Distribution.

AFMC will evolve installation energy systems to become a requirements-driven capability. The AFMC near-term (6-10 Year) goal is to improve the reliability of infrastructure, processes, and systems to ensure critical missions always have the energy they need when and where they need it. The AFMC long-term (10-20 Year) goal is to modernize energy systems to supply and distribute prime power that is available, diversified, and redundant. The following Goals and Objectives incorporate and complement the energy assurance goals and objectives identified in the AF energy Flight Plan and align with the following guidance:

AF Strategic Master Plan (SMP) FH2.7:

Provide resilient installations, infrastructure, and combat support that enable the Air Force to project power rapidly, effectively, and efficiently

AF SMP AG2.1:

Ensure systems are designed, engineered, tested, acquired, and sustained smartly, efficiently, and cost effectively

AFMC Strategic Plan Goal 2:

Increase agility to improve AFMC support to the AF Enterprise.

GOALS AND OBJECTIVES

AF Goal 1: Improved Resiliency, AF Objective 1.6: By FY36, all mission critical functions will have assured access to a reliable supply of energy at all times.

The AF standard is to provide sufficient installation energy to enable critical missions to sustain through an energy supply disruption for at least 7 days or until mission relocation. AFMC Centers shall identify critical missions and related support services that cannot be relocated. AFMC installations will identify capability gaps and integrate them into an installation master plan.

- **AFMC Sub-objective 1.6.1. (AF Objective 1.1, Modified): Identify single point of failures in the installation energy supply and distribution system and manage the risk to mission by eliminating, reducing or accepting the vulnerability by 2025.**

  Managing single points of failure minimizes risk a disruption in energy supply poses to mission. Installations will pursue an appropriate alternative energy supply where the risk to mission warrants it and/or life cycle cost effective.

- **AFMC Sub-objective 1.6.2. (Added): Expand, modernize, and harden Supervisory Control and Data Acquisition (SCADA) systems that support critical missions by 2025 and all missions by 2036**

  Control systems control the supply, distribution; and use of energy; monitor system performance; and provide analytics. SCADA capabilities are the backbone to an operationally agile energy system providing the ability to direct energy where and when it is needed. Installations will modernize SCADA systems to support a ready, robust, and resilient energy posture.

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GOALS AND OBJECTIVES

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AFMC Sub-objective 1.6.3 (Added): Provide visibility into the reliability of the infrastructure supporting critical missions by 2025 and all missions by 2036

Installation energy systems are a mission capability with each link in the energy supply, delivery and use chain equally important in assuring mission. Asset management provides a standardized framework to continually assess and sustain the health of energy systems. Installations will implement the DoD utility Sustainment Management System (SMS) to capture the health of energy infrastructure and to direct investments toward those systems and/or components that pose the greatest risk to mission.

AFMC Sub-objective 1.6.4 (Added): Improve the operational agility of installation energy systems to provide an enduring source of energy to critical and important missions by 2025 and all missions by 2036

Generation and storage of prime energy through alternative energy sources enables mission continuance in the event of a prolonged disruption in the nation's infrastructure and for which less capable asset specific generators are incapable of supporting. In the event of a substantive disruption, an operationally agile energy system can insulate and island the installation as needed to sustain mission. Installations will modernize energy supply and distribution systems to improve agility, flexibility, and adaptability.

GOALS AND OBJECTIVES

AF Goal 2: Optimized Demand, AF Objective 2.2: Meet AF Energy Intensity Reduction Goal by achieving a 25% reduction in reportable consumption (compared to an FY15 baseline) by 2025

Installations will strive for and contribute, to the AF FY25 goal of achieving a 25% decrease (compared to an adjusted FY15 baseline) in the amount of reportable installation energy consumed across the enterprise through a continual pursuit of being operationally efficient.

- **AFMC Sub-objective 2.2.1 (Added): Establish an Energy Management System under ISO Standard 50001 for AFSC industrial activities by FY2025**

  Installation industrial activities will adopt the ISO 50001 Energy Management System standard. ISO 50001 defines requirements for establishing, implementing, and maintaining an energy management system. It organizes, structures, and unifies the approach while providing an enduring management system.

- **AFMC Sub-objective 2.2.2 (Added): Make energy efficiency a reliability and sustainability consideration in 75% of material purchases and acquisitions by 2025 and 100% by 2036**

  The opportunity to reduce consumption arises in the day-to-day replacement cycle for aging infrastructure, real property, and equipment. Energy efficiency is least costly if designed into the asset, process, system, or capability upfront or acquired as a requirement specified in the purchase. AFMC Centers will institutionalize an enterprise-wide requirement for the design and/or acquisition of affordable and life cycle cost effective energy efficient equipment, real property, systems, and assets.

- **AFMC Sub-objective 2.2.3 (Added): Expand, modernize, and harden Energy Management Control Systems (EMCSs) for critical and important missions by 2025 and 100% of covered buildings by 2028**

  An EMCS is a demand management tool that enables control of energy demand. AFMC installations use EMCS technology, such as Programmable Logic Controllers (PLCs) and Direct Digital Control (DDC) systems, sporadically, yet these systems are typically budget neutral because of savings achieved through eliminating waste and improving operational efficiency. Installations will modernize EMCS to support a ready, robust and resilient energy posture.

GOALS AND OBJECTIVES

AFMC Sub-objective 2.2.4 (Added): Pursue third-party financed projects to reduce installation energy demand and improve the operational agility of installation energy systems

AFMC installations in partnership with the Air Force Civil Engineer Center (AFCEC) have a track record of forming the most expansive Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs) ever awarded in the AF. These contracts use budget savings from efficiencies gained to pay back third-party capital investments. Simply put, they enable the AF to recapitalize aging systems, property, and equipment at no upfront cost. Installations will identify opportunities to improve energy performance and advance operational agility through third-party financed investments to the maximum extend practical.

GOALS AND OBJECTIVES

AF Goal 3: Assured Supply, AF Objective 3.2: Meet the AF Clean Energy Goal of achieving a 25% increase in the use of alternative or renewable energy (compared to FY15 baseline) by 2025

Installations will contribute to the AF FY25 goal of achieving a 25% increase (compared to an adjusted FY15 baseline) in the use of alternative or renewable energy as an aspect of filling an energy security capability gap to assure mission effectiveness.

- **AFMC Sub-objective 3.2.1 (Added): Support 2 emerging energy technology demonstrations each year FY2018-23**

  A capability gap is a mission or mission support requirement where we lack either the technology, confidence in the application thereof, or an awareness of it to close the gap. Capability gaps can create an out-year demand signal for investments in AFRL science and technology. Gaps can also be solved through the DOD Environmental Security Technology Certification Program (ESTCP) and SAF/IEE managed Broad Agency Authority (BAA) program. Emerging energy technology can improve the cost and performance of a resilient energy system. Installations will capitalize on opportunities to develop partnerships, collaborate with industry, sponsors and academia and leverage other funding sources in improving performance and advancing operation agility of installation energy systems.

- **AFMC Sub-objective 3.2.2 (Added): Pursue Energy Resilience and Conservation Investment Program (ERCIP) funding to reduce installation energy demand and improve the operational agility of installation energy systems**

  The DOD ERCIP is a $150M subset of military construction (MILCON) set aside by Congress to help agencies achieve Federal energy mandates. OSD target allocations are based on the amount of installation energy consumed within the Service or Agency. Although AFMC represents about one fourth of the AF installation energy burden, we consistently under-perform in securing ERCIP funding. Installations will identify opportunities and improve ERCIP candidate projects to better align with eligibility criteria, especially in implementing ESTCP-funded demonstration projects.

DEFINITIONS

Alternative Energy – Energy generated from technologies and approaches that advance renewable heat sources, including biomass, solar thermal, geothermal, waste heat, and renewable combined heat and power processes; combined heat and power; small modular nuclear reactor technologies; fuel cell energy systems; and energy generation, where active capture and storage of carbon dioxide emissions associated with that energy generation is verified.

Clean Energy – Renewable electric energy and alternative energy.

Critical Infrastructure – Cyber and physical systems and assets so vital to the Air Force that the incapacity or destruction of such systems and assets would have a debilitating impact on the Air Force's ability to execute its missions.

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 Assurance – Activities across three main categories—preparation and planning, mitigation and response, and education and outreach—focused on the goal of energy resiliency.

Energy Resilience – The ability to prepare for and recover from energy disruptions that impact mission assurance on military installations.

Energy Security – Having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet mission essential requirements. – 10 U.S.C. 2924

Installation Energy – The energy used to power all facilities located on military installations and enduring locations, as well as fuel for the non-tactical fleet vehicles used at those locations and the energy consumed in manufacturing, maintenance, and other processes.

Mission Assurance – A process to protect or ensure the continued function and resilience of capabilities and assets – including personnel, equipment, facilities, networks, information and information systems, infrastructure, and supply chains – critical to the performance of DoD Mission Essential Functions (MEF) in any operating environment or condition.

DEFINITIONS

Prime Energy - The source of supply of electrical energy that is normally available and used continuously day and night, usually supplied by an electric utility company, but sometimes supplied by base-led user-owner generation.

Process Energy – Energy consumed in support of a manufacturing, industrial, or commercial process other than conditioning spaces and maintaining comfort and amenities for the occupants of a building. This includes, but is not limited to, energy consumed by industrial facilities (such as maintenance depots), data centers, simulators, and laboratory equipment.

Reliable Operation – Operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.

Renewable Energy – Energy generated from renewable sources, including the following: solar including electricity, wind, biomass, landfill gas, ocean including tidal, wave, current, and thermal, geothermal including electricity and heat pumps, municipal solid waste, new hydroelectric generation capacity achieved from increased efficiency or additions of new (1 Jan 1999 or later) capacity at an existing hydroelectric project, thermal energy generated by any of the preceding sources.

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