MARINE CORPS ENERGY

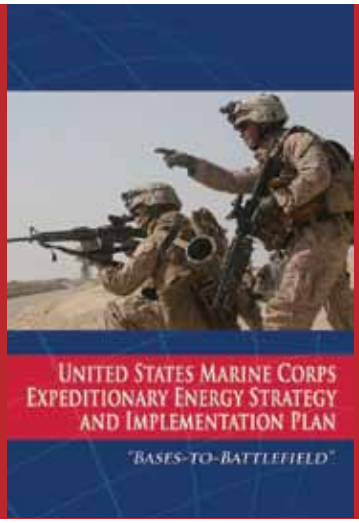
United States Marine Corps

INSTALLATIONS ENERGY STRATEGY

MARINE CORPS ENERGY

Energy is a valuable resource that is critical for Marine Corps readiness and success. To be effective, we cannot afford to use more than we need. To maintain our expeditionary edge, we will use energy wisely, from "**Bases to Battlefield.**"

MARINE CORPS EXPERIENCE ON THE BATTLEFIELD HAS PROVEN THAT THE PRUDENT USE OF ENERGY IMPROVES OUR COMBAT EFFECTIVENESS BY MAKING OUR FORCES LIGHTER AND FASTER. ENERGY IS EQUALLY IMPORTANT ON MARINE CORPS INSTALLATIONS. OUR BASES AND STATIONS MUST BECOME INCREASINGLY ENERGY EFFICIENT AND INDEPENDENT TO COST-EFFECTIVELY PERFORM THEIR CRITICAL MISSIONS AND SUPPORT MARINE CORPS READINESS. RECOGNIZING THE IMPORTANCE OF ENERGY TO THE FUTURE OF OUR CORPS, THE COMMANDANT SIGNED THE "BASES TO BATTLEFIELD" EXPEDITIONARY ENERGY STRATEGY, CALLING FOR ACTION TO LIVE, TRAIN, AND FIGHT AS AN EXPEDITIONARY FORCE. OUR SUCCESS IN COMBAT BEGINS WITH PREPARATION AT OUR BASES WHERE WE MUST RAISE ENERGY AWARENESS AND ENSURE THE EFFECTIVE USE OF ENERGY.



As the Commander of Marine Corps Installations Command (MCICOM) and the Assistant Deputy Commandant, Installations & Logistics (Facilities), I am committed to improving readiness and mission support through the efficient use of energy and enhanced energy security on all Marine Corps installations. Our installation leadership must embrace these actions and support the Commandant's call for an energy ethos by engendering a culture of conservation across our bases and stations. Judicious use of energy resources will be the underlying message for responsible energy use by everyone on our installations: Marines, Sailors, civilians, and our families. Energy must be a priority for all hands and considered as a component of our actions, regardless of time of day or day of week.

To unify and coordinate our approach toward energy, I am publishing this guiding document, the *United States Marine Corps Installations Energy Strategy.* It reinforces the Commandant's *Expeditionary Energy Strategy*, and provides clear Lines of Operation, Objectives, and Responsibilities that will enable installations, supported commands, and tenant organizations to take positive action. Through the execution of this strategy, Marine Corps installations will improve upon a strong record of stewardship of our nation's resources and fully support and maintain our mission readiness by implementing prudent management practices; supporting and achieving mandates; conserving energy; and reducing costs.

Energy resources are critical to Marine Corps readiness and mission success and contribute to our national security. To be effective at home and on the battlefield, we cannot afford to use more than we need. To maintain our expeditionary edge, we will plan and execute in the spirit of this strategy, and develop a culture that uses resources wisely, from "Bases to Battlefield."

J. A. KESSLER
Major General, U.S. Marine Corps
Commander, Marine Corps Installations Command
Assistant Deputy Commandant,
Installations & Logistics (Facilities)

BACKGROUND

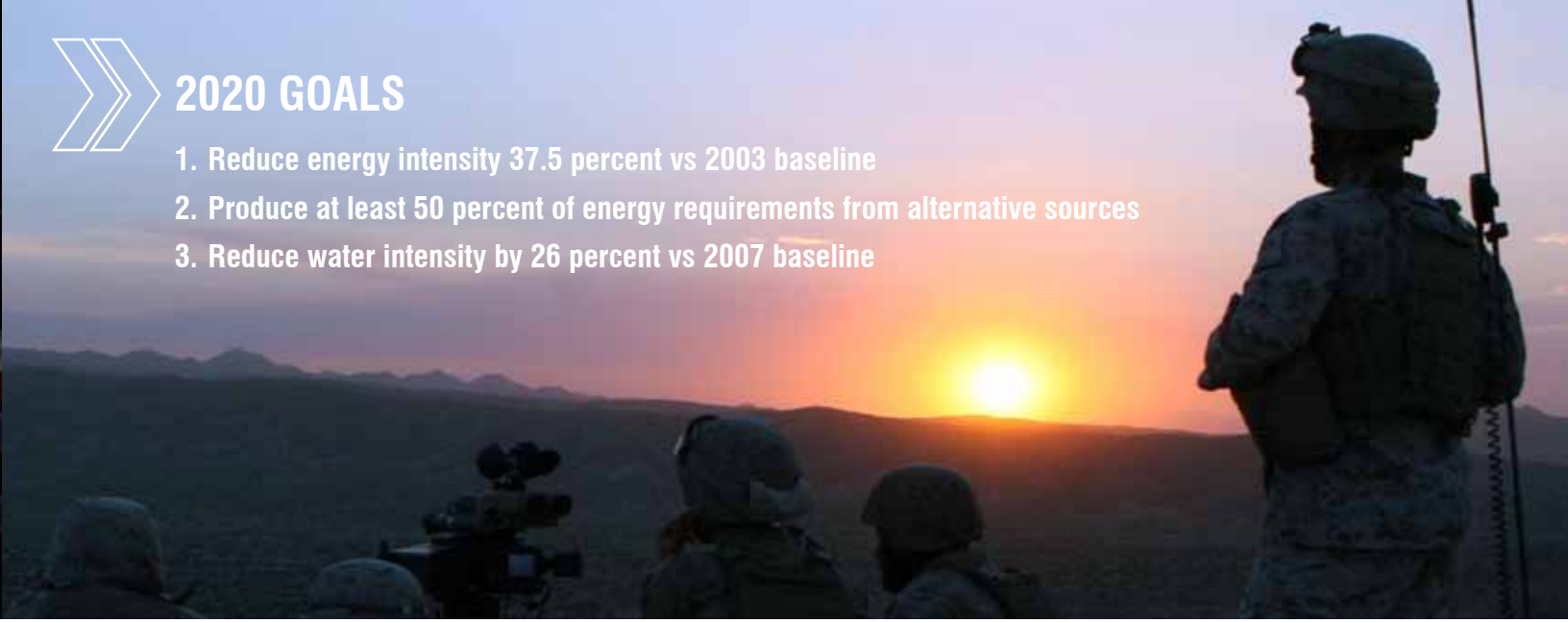
Energy resources are the lifeblood of Marine Corps installations and directly linked to the mission readiness and operational effectiveness of the Fleet Marine Force (FMF). Fluctuations in the cost of energy, and potential supply and security vulnerabilities associated with energy resources, threaten the ability of installations to sustain tenant and supported units. Congressional legislation and Presidential directives have mandated increased energy efficiency and renewable generation throughout Department of Defense (DoD) installations to diversify supply and bolster resiliency of energy-related infrastructure. The Secretary of the Navy has emphasized the utilization of renewable and alternative energy resources as a means of achieving energy security and independence for the Department of the Navy (DoN). Marine Corps installations have undertaken significant efforts to institute energy efficient technologies and practices, reduce energy consumption, and expand the use of renewable resources.

Achieving success will require developing a Corps-wide "energy ethos" based on the common understanding that the efficient use of vital energy resources has a positive impact on Marine Corps mission readiness. Continued implementation of prudent management practices and energy efficient technologies will maximize funding available for investment in future operational capabilities. Further integration of renewable energy and alternative fuel resources will continue to produce utility cost savings and support energy security by both improving the reliability and resiliency of utility distribution systems and ensuring power for critical infrastructure. Advanced metering infrastructure and building and utility control systems will provide decision makers with the capability to make informed operating decisions.

MISSION STATEMENT

In order to maintain mission readiness, achieve mandates, and reduce energy costs, Marine Corps installations will:

1. Ensure a secure and reliable energy supply to support the operating forces and their families through the prudent management of energy resources and infrastructure.
2. Achieve requirements mandated by Congress and the President to promote the efficient use of energy and water, increase the use of renewable energy sources, and reduce our nation's dependence on foreign oil.
3. Reduce the lifecycle operating costs of Marine Corps facilities and manage future commodity price volatility.



2020 GOALS

1. Reduce energy intensity 37.5 percent vs 2003 baseline
2. Produce at least 50 percent of energy requirements from alternative sources
3. Reduce water intensity by 26 percent vs 2007 baseline

CONCEPT OF OPERATIONS

The *Installations Energy Strategy* establishes five Lines of Operation that provide a comprehensive approach to achieving its mission. These Lines of Operation, derived from the Commandant's *Expeditionary Energy Strategy*, are Energy Ethos, Energy Information, Energy Efficiency, Renewable Energy and Alternative Fuels, and Energy Security. Each Line of Operation is organized by Objectives, which describe a desired end state; and by actionable Responsibilities, which delineate how each echelon of command can accomplish desired outcomes. The Marine Corps will balance these requirements in order to maintain mission and operational readiness, quality of life, and safety while facing a fiscally constrained future.

With the publication of the *Installations Energy Strategy*, the Marine Corps will lead by example in pursuing solutions to the challenges of cost avoidance, energy security, and environmental stewardship. Success will require a shared Ethos that underscores positive cultural and behavioral changes and improved processes; implementation of Energy Information management systems to provide Marine Corps leaders and energy managers with actionable data supporting energy programs; prudent management practices and investment in Energy Efficiency technologies; integration of Renewable Energy and Alternative Fuel systems to add diversity, reliability, and cost stability at installations; and Energy Security solutions that mitigate the effects of supply disruptions on mission essential functions.

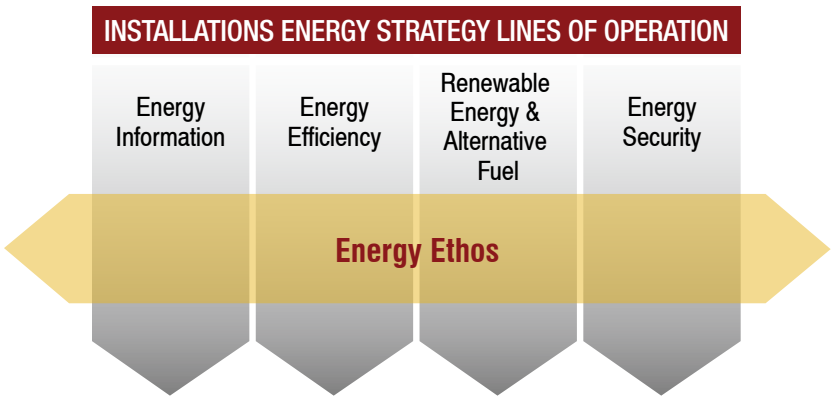
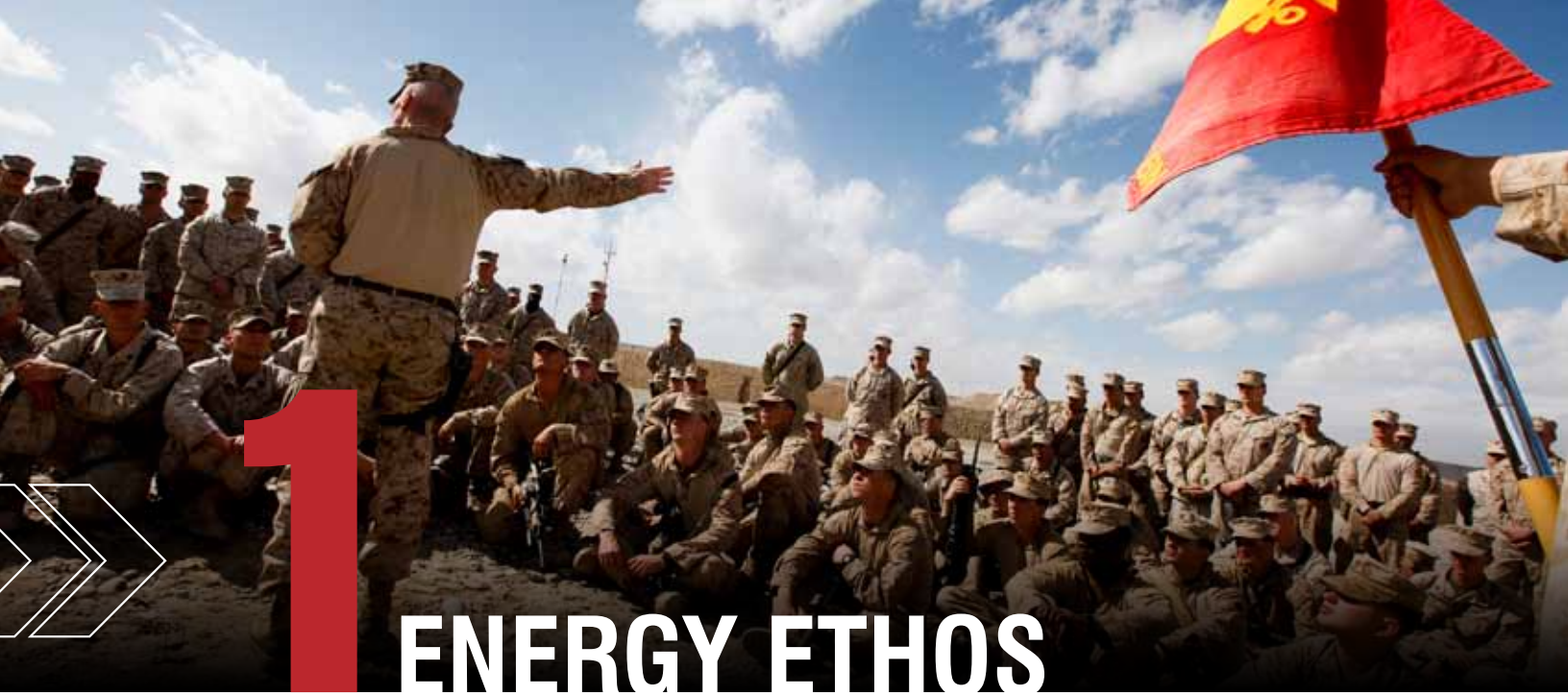


Figure A: The *Installations Energy Strategy* establishes five Lines of Operation that provide a comprehensive approach to achieving its mission, with ethos underscoring all other aspects.

LINES OF OPERATION



1 ENERGY ETHOS

Ethos is the shared vision that the efficient use of energy resources is a critical component of mission readiness. In the *Expeditionary Energy Strategy*, the Commandant directed the Marine Corps to be aware of and value our limited energy and water resources, whether operating aboard installations or on deployment. This "Bases to Battlefield" approach promotes the establishment of an energy ethos that equates efficient use of vital resources to enhanced mission readiness on installations and operational effectiveness in combat. Ethos serves as the foundation of any effective energy management program both in garrison and in theater.

Since installation commands own the physical infrastructure but are not the primary end-users of energy and water on the installation, it is crucial to educate and involve tenant and supported commands in fostering this ethos. Every Marine, civilian, and visitor bears responsibility for being a good steward of resources. An energy ethos that values responsible use of resources supports the efforts of Marine Corps installations to meet mandates, drive down costs, and mitigate risks associated with vulnerable supply chains.

OBJECTIVES:

1. Incorporate energy impacts in installation planning functions and operational decisions

Headquarters, regional commands, and installation commands must lead by example to credibly influence the utilization of energy resources by tenant units. This will require each level of command to examine its own internal operational procedures, planning criteria, and scheduling processes in order to integrate prudent energy management requirements that gain efficiencies in resource conservation and management. Each level of command will also ensure that their respective workforces are fully trained to perform assigned energy management functions.

2. Involve supported commands and tenant units

The largest populations on Marine Corps installations are the Marines assigned to installation tenant commands. Direct communication with these tenant units is the most meaningful way to educate and institute a culture of prudent energy resource usage. Installation commands are obligated to lead efforts to instill an energy ethos in the Marines operating, working, and living aboard Marine Corps installations and to assist the leadership of tenant units with engaging and educating their Marines.

3. Raise end-user awareness of and commitment to the value of efficient use of energy resources

Every person on an installation, whether Marine or civilian, plays an integral role in transforming the way the Marine Corps manages its vital resources. At the end-user level, awareness programs will emphasize the importance of energy conservation and management that will effect culture (methods of saving energy) and behavior (sustained energy saving practices).

RESPONSIBILITIES:

HQMC LF/MCICOM will:

- Update the *Installations Energy Strategy* as required to ensure guidance is relevant to the execution of the Lines of Operation.
- Implement an internal strategic communication and training plan to engage, educate, and empower staff on resource issues. Identify opportunities to streamline processes and introduce energy and resource efficiency into planning steps.
- Develop toolkits that provide installation commands with materials for organizing and initiating, as per the *Expeditionary Energy Strategy*, a Unit Energy Manager (UEM) program.
- Coordinate Marine Corps participation in Federal and DoN-sponsored awareness and recognition initiatives.

REGIONAL COMMANDS will:

- Engage internal staffs to identify opportunities to provide support to installations in developing energy ethos efforts.
- Develop regional communications plans to share geographic-specific best practices and lessons learned, as well as developing amplifying guidance on energy resource consumption through metering information and data analysis.

INSTALLATION COMMANDS will:

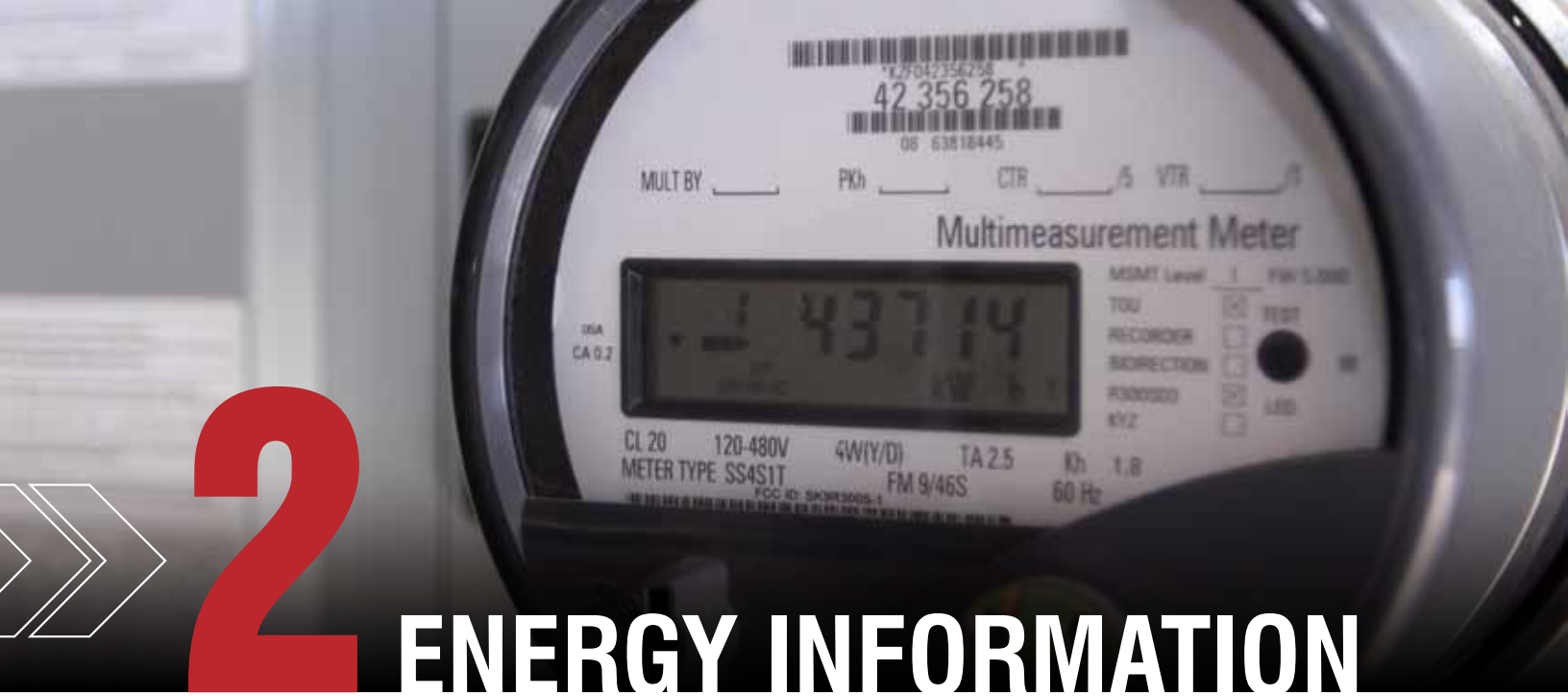
- Provide energy efficiency training to planning, design, and maintenance staff.
- Designate Installation Energy Managers (IEMs) as the main point of contact for facility energy management issues. IEMs will implement audit programs, identify and prioritize energy projects, promote energy awareness, and coordinate training for tenant UEMs.
- Establish UEM programs at the battalion and squadron level to provide a single point of contact within each organization. UEMs will serve as each command's advisor on energy and water management, and will actively promote energy awareness and reduction opportunities.
- Utilize public affairs campaigns to increase awareness and publicize program goals, tools, and progress at different organizational levels through web sites, conferences, e-mails, displays, reports, newsletters, handbooks, and guidance.
- Develop incentive and accountability programs that target individuals and organizations, and publicly recognize energy saving efforts and reward energy conserving behavior.

Resident Energy Conservation Program

The Resident Energy Conservation Program (RECP) is designed to encourage and provide incentives for energy conservation in Public-Private Venture (PPV) housing. The RECP will directly benefit Marine Corps family housing residents by allowing savings associated with reduced energy consumption to be reinvested directly back into their community in the form of improved playgrounds, community centers, and other amenities. The program uses meter data to set a reasonable range for average electricity consumption in housing units. Residents who consume electricity that is more than 10 percent above average for a group of similar homes will be billed. Residents who conserve more than 10 percent below the average will receive a credit. Residents within a ten percent buffer above or below the average usage will neither pay nor receive a credit. Average usage is set on an ongoing basis to account for variations due to weather.

RECP was first piloted in Marine Corps Air Station Beaufort, Marine Corps Recruiting Depot Parris Island, and Marine Corps Base Hawaii in August 2010. It included phases for both mock billing and live billing. Over the pilot program's 21 months of live billing, electricity use dropped 12 percent, equal to approximately 10 million kilowatt hours of electricity at a value of $2 million.

In 2013, all installation private housing will start live billing. The initiative is expected to curb residential energy use by 12 to 15 percent, with annual savings of $4 million. Savings will be reinvested into quality of life initiatives for Marines and families.



2 ENERGY INFORMATION

The Marine Corps will interconnect technologies and processes with energy information systems to provide actionable information for Marine Corps leaders and energy and facility managers that reveal new opportunities to reduce consumption, integrate renewable energy and alternatives fuels, and enhance security. Data management systems will provide feedback about resource usage beyond energy and facilities managers to end-users, helping to drive cultural and behavioral change. The Marine Corps will also implement a data-driven enterprise energy management system to centrally monitor installation energy usage.

OBJECTIVES:

1. Establish common requirements for the functions and capabilities of all installation-level energy information systems

The Marine Corps will establish common requirements for the functions and capabilities across all energy information systems at the installation level. The Marine Corps will integrate Building Control Systems (BCS) and Utility Control Systems (UCS), which includes Advanced Metering Infrastructure (AMI) and Supervisory Control and Data Acquisition (SCADA) systems, into a data management system to enhance visibility and control of energy usage and associated costs. Data management systems will collect and analyze energy usage data that will be distributed to key stakeholders over a secure network in order to optimize energy system performance and leverage smart grid capabilities.

2. Establish an enterprise energy management system

The Marine Corps will pull installation-level data from data management systems into an enterprise energy management system. This system will include analytical tools and graphical user interfaces to enable resource management decisions across all installations. In implementing this enterprise system, the Marine Corps will resolve the challenges of the DoD Information Assurance Certification and Accreditation Process (DIACAP), Information Technology (IT) support, and cybersecurity, including the protection of data integrity and confidentiality.

3. Equip non-tactical vehicle (NTV) fleets with upgraded fuel management systems

The Marine Corps will upgrade fuel management systems to track fuel use in the NTV fleet through improved telematics and infrastructure technologies. These systems will capture more accurate data, identify inefficient vehicle operations in real-time, and implement stronger controls on fuel dispensing and purchasing.

RESPONSIBILITIES:

HQMC LF/MCICOM will:

- Conduct an evaluation of existing energy information systems in order to publish system and device requirements that address gaps in legacy systems.
- Develop an Enterprise Energy Information Management (EEIM) plan to standardize requirements for the collection, consolidation, and analysis of energy data across installations.
- Work with higher and adjacent organizations as needed to resolve information assurance and cybersecurity issues of an enterprise energy management system.

REGIONAL COMMANDS will:

- Coordinate with subordinate installations regarding respective regional and installation requirements necessary for fielding energy information systems.

INSTALLATION COMMANDS will:

- Utilize AMI and associated data management systems to:
  - Support utility cost tracking and billing functions.
  - Inform Unit Energy Managers (UEMs) and end-users about energy consumption at tenant and supported commands.
  - Identify operational efficiency improvements by benchmarking building energy use and measuring energy project performance.
  - Reduce energy costs through demand reduction and peak shaving strategies.
- Ensure cybersecurity and accreditation of utility and building control systems.
- Integrate energy information into centrally managed data systems that support near real-time command and control of energy management and building control systems.
- Integrate improved fuel management systems using telematics to better track NTV fuel usage.

Marine Corps Air Station (MCAS) Beaufort Energy Management Control System with Advanced Automated Meter Reading

MCAS Beaufort has implemented an installation-wide Energy Management Control System (EMCS) using advanced Automated Meter Reading (AMR). This system provides accurate information on energy consumption at individual buildings, departments, and the installation as a whole. By allowing collection and analysis of data, the EMCS enables the installation to effectively manage and maintain energy systems at their optimal performance levels. Additionally, this system collects renewable energy generation and performance data, which can be compared across facilities.

This data also enables targeted energy efficiency approaches and subsequent performance monitoring. With the installation's major buildings already metered for electricity, the system has resulted in tailored energy initiatives. For instance, with 25 percent of base energy usage in Bachelor Enlisted Quarters alone, efforts are now targeting single Marines and sailors. Information and control systems such as the one at MCAS Beaufort, combined with generation and dispatch controls for full smart grid capability, will enhance energy service to our tenant Marines.

3 ENERGY EFFICIENCY

The Marine Corps will implement efficient technologies and best management practices to achieve cost savings, improve infrastructure, and mitigate risks associated with reliance on external energy resources. Efficiency does not mean simply turning off the switch and doing without. Rather, it implies using resources more efficiently to provide the same or even an improved level of benefits at lower cost. Implementation of efficient technologies and best management practices delivers a wide range of benefits including cost savings, infrastructure improvements, improved energy reliability and security, and increased productivity. Marine Corps installations will continue to make significant efficiency investments into both physical infrastructure and vehicle fleets and will leverage lessons learned to provide a high level of service to supported and tenant commands.

OBJECTIVES:

1. Improve efficiencies of energy-related infrastructure

Physical infrastructure aboard Marine Corps installations is comprised primarily of buildings and supporting utility system components. Building projects, for new construction, major renovations, and adaptive reuse of historic structures, will use an integrated design approach that ensures substantially less energy use without compromising occupant comfort or building functionality. An integrated approach considers the interactions of all building components including the building site (location, orientation, and landscaping); envelope (walls, windows, doors and roof); heating, ventilation and air-conditioning (HVAC) system; and lighting, controls, and equipment. The Marine Corps will incorporate sustainable building design through adopting the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Green Building Rating System for new construction and major renovations. In addition, installations will assess potential opportunities related to installation utility systems, including cogeneration systems, fuel switching, waste heat usage, and thermal storage. Cost-effectiveness will be the primary factor for project selection and approval.

2. Utilize alternative financing mechanisms to implement energy efficiency measures

With limited appropriated funding available, the Marine Corps will leverage partnerships with the private sector through alternative financing, such as Energy Savings Performance Contracts (ESPC), and Utility Energy Service Contracts (UESC). These mechanisms are crucial in identifying, evaluating, and financing energy efficient infrastructure improvements. ESPCs and UESCs eliminate the need for high initial capital costs by leveraging the cost savings potential of these energy savings projects.

3. Reduce petroleum consumption in non-tactical vehicle (NTV) operations

The Marine Corps will support the Secretary of the Navy (SecNav) goal of reducing petroleum use in NTVs by 50 percent by 2015. Transportation planning and operations will minimize petroleum consumption by incorporating motor pools and vehicle downsizing into fleet management practices. Alternative fuel vehicles (AFVs) serve as the cornerstone of transportation activities aimed at petroleum consumption reduction. Matching vehicle technologies with existing and planned fueling infrastructure ensures

effective and cost-efficient AFV use. Compressed Natural Gas (CNG) vehicles and infrastructure is an example of an effective commercial solution and will be considered where available. Hydrogen fuel cell or battery electric vehicles are technologies to evaluate as they become commercially viable and cost-effective. Where alternative fuel availability (government or commercial) is not available and practical, more efficient conventional vehicles or hybrid electric vehicles are alternative options to reduce petroleum consumption.

RESPONSIBILITIES:

HQMC LF/MCICOM will:

- Manage the Energy Investment Program (EIP) to provide installation commands the opportunity to implement energy efficiency related restoration and modernization projects.
- Develop policy and guidance that establishes roles and responsibilities related to the execution of ESPCs and UESCs.
- Review and approve annual utilization studies to identify and eliminate inefficiencies in NTV fleets. These utilization studies will ensure an effective balance of standard, high efficiency, and AFV technologies in installation NTV fleets to reduce petroleum consumption.

REGIONAL COMMANDS will:

- Provide installations with guidance and support for performing audits and carrying out needed projects. Regional commands will collect and disseminate lessons learned from audits to help improve processes, develop templates, or bundle projects where applicable. Where beneficial, regional commands will assist Installation Energy Managers (IEMs) with identifying, evaluating, and carrying out projects through channels such as the EIP.
- Coordinate with regional NAVFAC and the Resident Officer in Charge of Construction (ROICC) to prioritize LEED credits that obtain financial and energy efficiency return on investment (ROI).
- Collaborate with HQMC and NAVFAC to identify regional and local ESPC and UESC providers based on technology expertise and demonstrated performance
- Maintain and share awareness of state and local public developments (such as policies and cost-based incentives) as well as the private market landscape, as they affect their subordinate installations' ability to attract and negotiate third party finance options.
- Conduct annual utilization studies to identify and eliminate inefficiencies in NTV fleets. Regional commands will also request infrastructure improvements that promote and support AFVs in their respective subordinate installations' NTV fleets.

INSTALLATION COMMANDS will:

- Perform energy audits to evaluate current energy usage and determine the best locations to incorporate energy savings measures such as ESPCs and UESCs.
- Perform lifecycle cost analyses to justify decisions related to capital investments involving energy-related infrastructure.
- Ensure that all building new construction and major renovations meet LEED Silver criteria, achieving a minimum of 40 percent of LEED credits from the Energy and Atmosphere (EA) and Water Efficiency (WE) sections.
- Implement demand reduction and peak shaving strategies to reduce overall installation energy costs.
- Optimize the use of NTVs and ensure compliance with efficiency-related policies.
- Adopt efficient and alternative fuel vehicle technologies and commercially available vehicle telematics that assist NTV users and managers in reducing unnecessary petroleum use wherever cost-effective.

Marine Corps Base (MCB) Quantico Warfare Support Center Earns LEED Silver

The Warfare Support Center, home to the Wounded Warrior Regimental Headquarters, became the first building at MCB Quantico to earn the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Silver certification.

Energy efficiency enhancing features of the building include its thermal envelope, low lighting power density, lighting controls, and an energy efficient HVAC system. The building uses less air conditioning than a typical building of its kind by employing cool roof technology that reflects light and emits heat away from the roof.

The building is also notable for its indoor air quality management plan, sustainable building materials, water efficiency (which is 50 percent more than a typical office building), and its storm water management system.

The Warfare Support Center is the first, but will not be the only, building of its caliber at MCB Quantico. Other projects that have received, or will soon receive, LEED certification include multiple barracks buildings at The Basic School, the Officer Candidate School Headquarters, the Officer Candidate School Mess Hall, and a hangar at the Marine Corps Air Facility.

4 RENEWABLE ENERGY AND ALTERNATIVE FUEL

Renewable energy and alternative fuels will be utilized to produce cost savings, support energy security by diversifying supply and improving the reliability and resiliency of utility distribution systems, and power critical infrastructure. The Marine Corps will support Federal, DoD, and DoN goals by evaluating potential renewable energy sources such as biofuels, biomass, geothermal, solar, wind, and ocean, to provide reliable power supplies and fuel diversification, which enhance energy security for individual facilities, supplement power for peak-use periods, lower risk of fuel spills in environmentally sensitive locations, and increase price stability in an uncertain energy economy. Achieving these goals will require significant capital investment, necessitating a deliberate portfolio-based approach that identifies the best locations for renewable generation, and public and private financing options. In addition, the Marine Corps will support the use of energy storage and alternative fuels in non-tactical vehicles (NTVs) as these technologies mature and become more financially viable.

OBJECTIVES:

1. Leverage power purchase and leasing agreements to implement large-scale renewable energy projects over 1 MW

The Marine Corps will pursue cost-effective, on-site renewable power development with the assistance of private sector financing and development expertise. While renewable energy technologies are commercially viable, large-scale development is typically more economically feasible with certain incentives that are unavailable to government agencies. Private partnerships will improve lifecycle cost-effectiveness of large-scale renewable projects by incorporating benefits such as investment tax credits (ITC), production tax credits (PTC), property tax exemptions, renewable energy certificates (RECs), and accelerated depreciation.

2. Continue to add capacity through small-scale renewable generation

The Marine Corps will continue to identify and develop small-scale revewable projects that will add capacity to better serve the load profile of installation infrastructure. Smaller, cost-effective projects will collectively reduce demand for energy, particularly during daily or seasonal peak load times. In addition, the Marine Corps will explore, as a complement to these smaller projects, future energy storage capabilities that could potentially increase the attractiveness of small-scale renewable energy technologies.

3. Increase the utilization of alternative fuels for non-tactical vehicles (NTVs)

Regional commands and installations will prioritize vehicle acquisition and alternative fuel infrastructure projects by maximizing the use of technology that reduces the most petroleum per dollar spent for each transportation requirement. While alternatives to conventional vehicles and fuels are commercially available, they are not always accessible in all areas, in sufficient quantities, or at a reasonable cost to outfit the entire Marine Corps NTV fleet. Local fleet managers must match vehicle technologies with supporting fuel infrastructure to ensure that alternative fuel vehicles will meet transportation requirements and the

Marine Corps' aggressive energy goals. Compressed Natural Gas (CNG), Flex-Fuel (E85), and hybrid vehicles are examples of effective alternative capabilities that are an integral part of the Marine Corps' strategy to utilize commercial vehicle solutions. However, where alternative fuel availability (government or commercial) is not ensured, more efficient conventional vehicles or hybrid electric vehicles should not be discounted as options for reducing petroleum consumption.

RESPONSIBILITIES:

HQMC LF/MCICOM will:

- Implement an enterprise-wide renewable energy plan that matches installations with available renewable resources and technologies. The plan will include a ranking of locations based on potential renewable energy production levels and economic benefit to the Marine Corps. Prioritization will take into consideration mission impacts, local utility rate structures, regulatory constraints, alternative financing mechanisms, and incentives such as renewable portfolio standards (RPS) and RECs as applicable.
- Evaluate regional command requests for funding to pursue their respective prioritized lists of small-scale installation renewable energy projects.
- Develop a strategy to ensure sufficient infrastructure is in place to support a transition to a fleet of alternative or electric vehicles.

REGIONAL COMMANDS will:

- Identify and evaluate specific regional opportunities to implement renewable power generation.
- Provide support to installations in developing large-scale renewable projects based on regional energy profile, return on investment (ROI) and energy security requirements.
- Develop and prioritize project lists within their respective region to improve alternative and electric vehicle infrastructure and reduce the dependence of NTV fleet inventories on petroleum based vehicles.

INSTALLATION COMMANDS will:

- Evaluate potential renewable energy sources, to provide reliable power supplies and fuel diversification.
- Evaluate cost effective military construction and major building renovation projects involving roof replacements that incorporate roof-top solar thermal, photovoltaic, and/or energy-reducing coating technologies.
- Offer cost-effective alternative fuel vehicles (AFVs) and coordinate with facility managers, and local and regional fleet managers, to ensure that any vehicle acquisitions have sufficient infrastructure to support the intended design and fuel source.
- Collaborate on renewable generation projects that could benefit from an increased presence of battery electric vehicles (BEVs). BEVs can be used to increase load for renewable power generation and can provide a ready source of battery storage for microgrid stability.

Marine Corps Recruit Depot (MCRD) San Diego Installs Photovoltaic (PV) Array

MCRD San Diego installed two innovative PV systems in FY 2012. Both projects showcased a level of creative thinking and aggressive design strategy beyond prevailing norms, with technologies easily transferable to other sites.

The first, a 990 kW system, was designed to offset 75 percent of the connected load of three new buildings. Additional surface area was required, so PV panels were installed on two adjacent building roofs; two covered carports were constructed and covered with PV panels; and a shading structure was built to cover 1,200 linear feet of bleachers. The PV-covered bleacher structure is a centerpiece of the weekly viewing of the recruit graduation ceremony, raising green energy awareness throughout the Corps.

The second system is a 1.7 MW ground mounted solar farm. To overcome the challenge of existing underground utilities at the location, a ballasted mounting system was designed. Additionally, the system is removable in the sections covering existing water and gas lines. Unique to this system is the use of Helios 420 W panels with 96-cell technology. Transformers and switch gear were engineered with capacity to support future expansion.

5 ENERGY SECURITY

The Marine Corps will ensure the availability of energy supplies to maintain mission readiness on its installations. Currently, the Marine Corps relies on commercial electrical grids and fuel and natural gas distribution systems to provide power for the majority of its installation energy requirements. This reality presents a significant risk to Marine Corps installations and their ability to maintain critical functions in the event of a catastrophic disaster, whether natural or man-made. The Marine Corps will move beyond the assumption that "energy will always be there," adopting a more proactive approach to improving its energy security posture by reducing dependence on external suppliers of vital energy resources through conservation, efficiency, and on-site generation, as well as improving the resiliency of energy infrastructure against physical and cyber vulnerabilities by utilizing smart grid capabilities.

OBJECTIVES:

1. Assess and prioritize mission energy requirements

Critical mission requirements include those functions which require a continuous supply of energy during an emergency. These may include housing, life safety and health (e.g., hospitals), public safety (e.g., police and fire departments), communications, environmental systems, and critical mission support. Fossil fuel-powered back-up generators addressed in most Continuity of Operations (COOP) plans are short duration solutions that are manpower-intensive and vulnerable to supply chain disruptions often associated with disasters. As this tactical solution provides only minimal coverage for installation mission essential functions, the Marine Corps will pursue longer-term solutions that address criticality, prioritization, and investment strategies to mitigate risk.

2. Identify points of utility and delivery systems vulnerability

Vulnerability assessments will focus on the effects of disruptions to the availability of a specific energy supply or service. The Marine Corps will evaluate long-range utilities goals, objectives, and policies by local governments and authorities to determine their impact on mission readiness. These assessments will be incorporated into the Installation Master Planning processes to assist in mitigating risks to mission critical infrastructure and mission essential functions. Specifically, they will help alleviate the impacts of disrupted supplies and optimize response plans.

3. Mitigate unacceptable energy security risks

Gap analysis will be conducted to identify corrective actions that remove unacceptable risks from potential failure of energy systems and identify the planning, programming, and budgeting actions necessary to implement the corrections. Potential solutions to be considered include microgrid capabilities with smart grid foundational elements, enabling energy security through the control and distribution of power for critical infrastructure. Distributed energy resources for on-site generation such as micro-turbines, fuel cells, and combined heat and power will be used when determined to be lifecycle cost effective or to provide flexibility and security to mitigate unacceptable operations risk.

RESPONSIBILITIES

HQMC LF/MCICOM will:

- Coordinate with higher and adjacent commands to define energy security and develop policy and guidance that informs long-term goals and requirements.
- Coordinate with higher and adjacent commands to develop an energy security template that assists regional and installation commands with the assessment of energy security-related impacts, to include identification of mission critical asset sustainability requirements.
- Execute a resourcing strategy to address energy security vulnerabilities and risk mitigation.

REGIONAL COMMANDS will:

- Determine regional energy security policy and guidance.
- Coordinate with their subordinate installations to represent local and regional energy security concerns for current infrastructure and future demand impacts.
- Coordinate with Major Subordinate Command (MSC) headquarters to gain support and assistance with identifying prioritization of mission support.
- Provide technical staff support and guidance to installation commands regarding energy security issues relevant to the geographic region, including coordination with local and regional utilities and local and state regulators and legislators.

INSTALLATION COMMANDS will:

- Coordinate with tenant units to conduct annual energy security vulnerability analyses and develop action plans to remove unacceptable energy security risks.
- Ensure that COOP plans address energy emergency preparedness and protection and restoration of mission critical and essential functions.

Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms Microgrid Development

Military bases are often in isolated or disaster-prone locations that require reliable power in all circumstances. As a result, MCAGCC, home to the largest USMC training area, was an ideal candidate for its successful microgrid implementation program.

The MCAGCC Microgrid is a self-contained “smart grid” capable of islanding roughly a third of the installation’s total load, while simultaneously meeting cybersecurity criteria. MCAGCC currently has 4.8 MW of photovoltaics (PV) including a 1.2 MW solar array. Additionally, the base has a gas-fired cogeneration plant in excess of 7 MW online with another 9.2 MW under construction. A complementary battery energy storage system, under construction, will assist in leveling out some of the PV loads.

MCAGCC’s software and controllers allow managers to efficiently dispatch all generation, provide real time metering and output functions for 240+ buildings, and perform controlled load shedding.

With this controls architecture in place, MCAGCC energy managers can optimize on-site resources while in grid connect mode, but also extend its operations capacity and maintain high performance in an off-grid situation. This microgrid enables MCAGCC to perform groundbreaking energy support to its tenant units.

APPENDIX A: Useful Information for Energy Leaders

The following appendix is intended to supplement the *USMC Installations Energy Strategy* and provide a single point of reference for relevant energy and water terminology. Please follow the provided links for further information regarding specific items.

MANDATES, GOALS AND REGULATORY INFORMATION

EPACT 2005 – ENERGY POLICY ACT OF 2005

- Mandates the installation of electric meters on all facilities where economically feasible by 2012.
- Mandates a 2% annual reduction in energy use intensity from FY 2006-FY 2015, totaling a 20% reduction (FY 2003 baseline).
- Sets annual goals for electricity consumed from renewable sources: 3% in FY 2007-FY 2009, 5% in FY 2010-FY 2012, 7.5% from FY2013-thereafter.
- Directs new federal buildings to be designed 30% below ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) standards if economically feasible.
- Requires 75% of light duty vehicles acquired in metropolitan statistical areas to be alternative fuel vehicles.

http://www1.eere.energy.gov/femp/regulations/epact2005.html

EISA 2007 – ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

- Mandates a 3% annual reduction in energy intensity from FY 2006-FY 2015, totaling a 30% reduction (FY 2003 baseline).
- Mandates the installation of meters for all facilities for electrical, steam and natural gas where economically feasible by FY 2012.
- Mandates the auditing of 100% of covered facilities every four years (25% of covered facilities per annum, rotating).
- Mandates reduction of fossil fuel usage in new facilities: 55% by FY 2010, 65% by FY 2015, 80% by FY 2020, 90% by FY 2025, 100% by FY 2030.
- Requires 20% total reduction of NTV petroleum use from FY 2005 to FY 2015.
- Requires 10% total increase in NTV alternative fuel use from FY 2005 to FY 2015.
- Prohibits agencies from acquiring vehicles that are not low-GHG-emitting vehicles.
- Requires every federal fueling center without renewable fuel availability to install a renewable fuel pump.

http://www1.eere.energy.gov/femp/regulations/eisa.html

EO 13423 – EXECUTIVE ORDER STRENGTHENING FEDERAL ENVIRONMENTAL, ENERGY, AND TRANSPORTATION MANAGEMENT

- Mandates a 3% annual reduction in energy use intensity from FY 2006-FY 2015, totaling a 30% reduction (FY 2003 baseline).
- Requires federal agencies to ensure that at least half of all renewable energy mandated under EPAct 2005 come from new renewable sources (developed after January 1, 1999), and to the maximum extent possible, renewable energy generation projects should be implemented on agency property for agency use.
- Mandates that federal agencies reduce water intensity (gallons per square foot) by 2% each year through FY 2015 for a total of 16% (FY 2007 baseline).
- Requires 10% annual increase in NTV alternative fuel use (from previous year), starting from the FY 2005 baseline through FY 2015.

http://www1.eere.energy.gov/femp/regulations/eo13514.html

EO 13514 – EXECUTIVE ORDER FEDERAL LEADERSHIP IN ENVIRONMENTAL, ENERGY, AND ECONOMIC PERFORMANCE

- Mandates reduction in potable water consumption intensity 2% annually through FY 2020, or 26% by the end of FY 2020, relative to a FY 2007 baseline.
- Mandates reduction in agency industrial, landscaping, and agricultural water consumption 2% annually, or 20% by the end of FY 2020, relative to a FY 2010 baseline.
- Requires a report of Greenhouse Gas (GHG) inventory for FY 2010 by 5 Jan 2011 and annually thereafter.
- Requires a plan to meet required petroleum reduction levels and alternative fuel consumption increases.
- Requires the development and annual update of Sustainability Plans that must include how agencies will achieve sustainability goals and GHG reduction targets (including fleet GHG reduction targets) and how agencies will prioritize agency actions based on life cycle return on investment.
- Requires 2% annual reduction of NTV petroleum use from FY 2005 to FY 2020.

http://www1.eere.energy.gov/femp/regulations/eo13514.html

DON – SECRETARY OF THE NAVY GOALS

- Energy Efficient Acquisition - Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings.
- Sail the "Great Green Fleet" - DON will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016
- Reduce Non-Tactical Petroleum Use - By 2015, DON will reduce petroleum use in the commercial vehicle fleet by 50%.
- Increase Alternative Energy Ashore - By 2020, DON will produce at least 50% of shore based energy requirements from alternative sources; 50% of DON installations will be net-zero.
- Increase Alternative Energy Use DON-Wide - By 2020, 50% of total DON energy consumption will come from alternative sources.

http://greenfleet.dodlive.mil/files/2010/04/Naval_Energy_Strategic_Roadmap_100710.pdf

USMC EXPEDITIONARY ENERGY STRATEGY GOALS

- Reduce Energy Intensity - USMC will reduce energy intensity at installations by 30% by 2020.
- Reduce Water Consumption - Through 2020, USMC will reduce water consumption by 2% annually using water awareness campaigns and water saving

devices and replacing inefficient utility systems.
- Increase Alternative Energy - By 2020, USMC will increase the amount of alternative energy consumed at installations to 50% of total energy consumption through the combination of aggressive demand reduction and on-installation renewable energy production.
- Reduce Non-Tactical Petroleum Use - By 2015, we will reduce the amount of petroleum used in the commercial vehicle fleet by 50% through the phased adoption of hybrid, electric, alternative, and flex-fuel vehicles.

http://www.marines.mil/community/Documents/USMC%20Expeditionary%20Energy%20Strategy%20%20Implementation%20Planning%20Guidance.pdf

NEPA – NATIONAL ENVIRONMENTAL POLICY ACT

Requires an environmental analysis (can be an environmental impact statement (EIS) or assessment) before the initiation of any project. An EIS describes the positive and negative environmental effects of a proposed project, and usually lists one or more alternative actions that may be chosen instead. The purpose of the NEPA EIS is to promote informed decision-making by federal agencies by making detailed information concerning significant environmental impacts available to both agency leaders and the public.

http://ceq.hss.doe.gov/

RPS – RENEWABLE PORTFOLIO STANDARDS

A regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal. An RPS requires electric utilities and other retail electric providers to supply a specified minimum amount of customer load with electricity from eligible renewable energy sources. In the United States, RPS requirements vary on a state-to-state basis.

http://www.epa.gov/chp/state-policy/renewable_fs.html

NAVY 1GW TASK FORCE GOALS

In alignment with the Secretary of the Navy's goal to produce 50% of shore-based energy requirements from alternative sources and achieve net-zero status at 50% of DON installations, the target of the 1GW Task Force is to aid in the facilitation/production of an additional 1 GW of renewable energy generation capacity at DON installations by 2020.

ENERGY SECURITY

While various definitions for energy security exist, energy security pertains to access to essential quantities of energy at affordable prices. Furthermore, the required energy should be available without disruption, and alternative energy sources should be readily available—also at affordable prices.

Several DoD and OSD mandates require energy security to be taken into consideration in day-to-day operations:

1. DoDD 3020.26 – Revises continuity policies and assigns responsibilities for developing and maintaining Defense Continuity Programs to enhance the DoD readiness posture. It is DoD policy that:
   a. All Defense continuity-related activities, programs, and requirements of the DoD Components, including those related to continuity of operations (COOP), continuity of government (COG), and enduring constitutional Government (ECG), shall ensure the continuation of current approved DoD and DoD component mission essential functions (MEFs) under all circumstances across the spectrum of threats.
   b. All DoD continuity planning and programming shall:

      (1) Be based on the assumption that no warning of attack or event will be received.

      (2) Ensure the performance of mission essential functions MEFs during any emergency for a period of up to 30 days or until normal operations can be resumed. The capability to perform MEFs at alternate sites must be fully operational as soon as possible, but no later than 12 hours after COOP activation.
2. DoDI 4170.11 – informs DoD Components to take necessary steps to ensure the security of energy and water resources. It instructs the Components to perform periodic evaluations of vulnerabilities that would occur as a result of energy disruptions. It also discusses the Defense Critical Infrastructure Program (under DoD Directive 3020.40).

RENEWABLE AND ALTERNATIVE ENERGY

AFV - ALTERNATIVE FUEL VEHICLE

AFVs include any dedicated, flexible-fuel, or dual-fuel vehicle designed to operate on at least one alternative fuel. AFVs can run electricity, compressed natural gas (CNG), liquefied petroleum gas (LPG), ethanol, or hydrogen. Vehicle types include, but are not limited to: plug-in hybrid electrical vehicles (PHEVs), hybrid electrical vehicles (HEVs), battery electrical vehicles (BEVs), fuel cell vehicles, dual-, flex-, or bi-fuel vehicles.

MICROGRID

A localized grouping of electricity generation, energy storage, and loads that normally operates connected to the traditional centralized grid. A fully functioning microgrid, however, can completely disconnect from the traditional grid and function autonomously. Power generation and loads in a microgrid are usually interconnected at low voltage.

RENEWABLE ENERGY

Energy derived from natural, non-fossil sources, including solar, wind, biomass, landfill gas, municipal solid waste, ocean (including tidal, wave, current, and thermal), geothermal, and hydroelectric energy resources.

http://www1.eere.energy.gov/femp/technologies/renewable_technologies.html

ENERGY FINANCE

ECIP – ENERGY CONSERVATION INVESTMENT PROGRAM

A subset of the MILCON program, managed by DoD and specifically designated for energy projects that reduce Defense energy costs. It includes construction of new, high-efficiency

energy systems or the improvement and modernization of existing systems.

EIP – ENERGY INVESTMENT PROGRAM

Managed by MCICOM and provides O&M funds to construct, repair, and replace utilities systems and facilities. The EIP program is run by Headquarters Marine Corps to provide funding for energy reduction projects.

EROI – ENERGY RETURN ON INVESTMENT TOOL

MCICOM GF-1 MS Excel Energy Project Prioritization Model, with full eROI implementation expected to roll out for USMC regions and installations in FY 2013.

ESPC – ENERGY SAVINGS PERFORMANCE CONTRACT

ESPCs enable federal agencies to implement energy projects with no upfront capital costs. An ESPC is a contract between a consumer and an energy service company (ESCO) for the purpose of achieving energy cost savings. The ESCO conducts a comprehensive energy audit for the federal facility and identifies improvements to save energy, and guarantees the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the agency.

http://www1.eere.energy.gov/femp/financing/espcs.html

EUL – ENHANCED USE LEASE

A method for funding construction or renovations on federal property by allowing a private developer to lease underutilized property, in exchange for cash or in-kind consideration. This authority enables the Navy to maximize the utility and value of installation real property and provide additional tools for managing the installation's real estate assets to achieve business efficiencies.

https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_hq_pp/navfac_bdd_pp/navyeul

FSRM – FACILITIES SUSTAINMENT, RESTORATION, AND MODERNIZATION

FSRM is an Operation and Maintenance, Marine Corps (OMMC) appropriation that is centrally managed by HQMC. FSRM funds are generated within DoD based on a facilities model that predicts annual requirements to ensure that facilities are sustained at appropriate levels over their respective life cycles. After being allocated to the installations, a portion of the funding is retained at HQMC for funding of larger FSRM projects. The installations are authorized to use their FSRM funding for locally approved projects. HQMC calls for the submission of larger FSRM projects, also known as M2/R2 projects, two years in advance of the funding becoming available. Installation commanders will normally go out with a "call for work" to their tenants and subordinate units, and once received by the installation, those projects are separated into larger (M2/R2) and smaller (M1/R1) projects.

ITC – INVESTMENT TAX CREDIT

A U.S. federal corporate tax credit that provides a tax break to applicable commercial, industrial, utility, and agricultural sectors. Eligible technologies for the ITC are solar water heat, solar space heat, solar thermal electric, solar thermal process heat, photovoltaics, wind, biomass, geothermal electric, fuel cells, geothermal heat pumps, cogeneration, solar hybrid lighting, microturbines, and geothermal direct-use. The tax credit varies depending on the technology.

http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F

LIFECYCLE COST

The upfront cost of a project/ improvement plus the total predicted maintenance and energy costs for the entire expected lifetime of the project/improvement.

MILCON – MILITARY CONSTRUCTION

MILCON involves the construction of facilities that cost in excess of $750K. MILCON includes any construction, development, conversion, or extension of any kind carried out with respect to a military installation, for all types of buildings, roads, airfield pavements, and utility systems. MILCON appropriations are separate from all other appropriations approved by Congress in that once funding is approved by Congress, construction must begin within three years and be completed within five years. A MILCON project includes all construction work necessary to produce a complete and usable facility or complete and usable improvement to an existing facility. Additionally, instances may occur when maintenance and repair work will be accomplished as MILCON, either because it is part of a large project or a decision has been made to use MILCON instead of O&M funds.

NPV - NET PRESENT VALUE

A method used to evaluate the potential profitability of an investment or project. The difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of an investment or project. NPV analysis is sensitive to the reliability of future cash inflows that an investment or project will yield.

PAYBACK

The number of years it takes for the energy savings from an improvement to equal the upfront cost.

Simple Payback –
Total Cost ÷ Anticipated Savings/Year = Payback Period (years)

Modified Payback –
incorporates an estimate of increasing energy prices, discount rates, and other factors to determine a more realistic value of the savings

PPA – POWER PURCHASE AGREEMENT

On-site renewable power purchase agreements (PPAs) allow federal agencies to fund on-site renewable energy projects with no up-front capital costs incurred.

With a PPA, a developer installs a renewable energy system on agency property under an agreement that the agency will purchase the power generated by the system. The agency pays for the system through these power payments over the life of the contract. After installation, the developer owns, operates,

and maintains the system for the life of the contract.

http://www1.eere.energy.gov/femp/financing/power_purchase_agreements.html

PPP – PUBLIC PRIVATE PARTNERSHIP (P3)

Public-private partnerships (P3s) are contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of energy and water projects, and can cover both new and existing facility builds.

PRODUCTION TAX CREDIT

An income tax credit is allowed for the production of electricity from utility-scale wind turbines, geothermal, solar, hydropower, biomass, and marine and hydrokinetic renewable energy plants. This incentive, the renewable energy Production Tax Credit (PTC), was created under the Energy Policy Act of 1992 and aids renewable energy in being priced competitively with traditional fossil-fuel power.

http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F

SIR – SAVINGS-TO-INVESTMENT RATIO

The total energy savings over the lifetime of an improvement (Present Value) divided by the upfront cost of the investment. This calculation may or may not include predicted increases in energy prices or inflation rates.

UESC – UTILITY ENERGY SERVICE CONTRACT

Offer federal agencies an effective means to implement energy efficiency, renewable energy, and water efficiency projects. In a UESC, a utility arranges funding to cover the capital costs of the project, which are repaid over the contract term from cost savings generated by the energy efficiency measures. With this arrangement, agencies can implement energy improvements with no initial capital investment. After the contract ends, all additional cost savings accrue to the agency.

http://www1.eere.energy.gov/femp/financing/uescs.html

METERING AND DATA MANAGEMENT/REPORTING

AMI – ADVANCED METER INFRASTRUCTURE

An architecture for automated, two-way communication between a smart utility meter with the consumer and utility company. The goal of an AMI is to provide consumers and utility companies with real-time data about power consumption and allow customers to make informed choices about energy usage based on the price at the time of use. This is beneficial to Building Energy Managers, Unit Energy Managers, and Installation Energy Managers on USMC bases and stations.

DSM – DEMAND SIDE MANAGEMENT

Also known as load shedding, DSM entails monitoring electric usage continuously (usually by automated instrumentation) and shutting down certain pre-arranged electric loads or devices if a certain upper threshold of electric usage is approached. This can aid in preventing peak demand charges and aid utilities in managing unusually high demand.

DUERS – DEFENSE UTILITY ENERGY REPORTING SYSTEM

An automated management information system with which the Department of Defense monitors its supplies and consumption of energy.

EEIM – ENERGY ENTERPRISE ENERGY INFORMATION MANAGEMENT

The EEIM vision is to establish a DoD-wide capability to inform decision-making through the systematic collection, integration and analysis of facility energy use, production, and project data. Implementation of integrated facility and energy management business processes, through which relevant data can be collected from authoritative source, and common business language are important elements of this vision.

EMCS – ENERGY MANAGEMENT CONTROL SYSTEM

An energy conservation feature that uses computers, instrumentation, control equipment, and software to manage a building's use of energy for heating, ventilation, air conditioning, and lighting. These systems can also manage fire control, safety, and security.

ENERGY AUDITS

An inspection, survey, and analysis of energy flows for energy conservation in a building to reduce energy consumption without negatively affecting the facility. Beyond simply identifying the sources of energy use, an energy audit seeks to prioritize the energy uses according to the greatest to least cost effective opportunities for energy savings. There are three levels of energy audits: (1) walk-through analysis/preliminary audit; (2) energy survey and analysis; (3) detailed analysis of capital intensive modifications.

EUI – ENERGY USE INTENSITY

A unit of measurement that describes a building/area's energy usage (KWH/KSF). EUI represents the energy consumed by a building/area relative to its size. EUI is calculated by taking the total energy consumed in one year and dividing it by the total square footage of the area. Several federal mandates stipulate annual reductions in EUI.

FAST – FEDERAL AUTOMOTIVE STATISTICAL TOOL

Web-based system developed to measure the compliance of federal agencies with a number of federal mandates, tracking vehicle inventory, vehicle cost, miles driven, acquisition and disposal expenses, and fuel consumption.

GIS – GEOSPATIAL INFORMATION SYSTEM

A collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS capabilities can be used to manage metered data.

IA – INFORMATION ASSURANCE

The practice of assuring information and managing risks related to the use, processing, storage, and transmission of information or data, and the systems and

processes used for those purposes. Building metered data must be cleared through IA before being used and analyzed on installations.

MDM – METER DATA MANAGEMENT
An MDM system performs long term data storage and management for the vast quantities of data delivered by smart metering systems.

M&V – MEASUREMENT AND VERIFICATION
The process for quantifying savings delivered by an energy efficiency/conservation project.

SMART GRID
An electrical grid that uses information and communications technology to gather and act on information, such as information about the behaviors of suppliers and consumers, in an automated fashion to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity.

SUSTAINABILITY

ASHRAE – AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS
A building technology society that focuses on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. ASHRAE publishes a well recognized series of standards and guidelines relating to HVAC systems and issues. These standards are referenced in several federal mandates.

CEM – CERTIFIED ENERGY MANAGER
A professional certification issued by the Association of Energy Engineers. Professionals become eligible for this certification after demonstrating expertise in several areas ranging from standards, air quality, energy audits, lighting, procurement and financing.

ENERGY STAR®
ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping save money and protect the environment through energy efficient products and practices. Federal agencies are required by law to purchase FEMP-designated or ENERGY STAR®–qualified products. Products that meet FEMP-designated efficiency requirements are in the upper 25% of their class in energy efficiency.

http://www1.eere.energy.gov/femp/technologies/eep_fempdesignatedproducts.html

http://www.energystar.gov/

ENERGY STAR® INTEGRATED UPGRADE APPROACH
Contained in the ENERGY STAR® Building Upgrade Manual to identify cost effective energy efficiency measures. An integrated design approach considers the energy-related impacts and interactions of all building components.

GHG – GREENHOUSE GAS
Any of the atmospheric gases that contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the earth's surface. They include carbon dioxide (CO2), methane (CH4), nitrous oxide (NO2), and water vapor. The elevated levels of CO2 and CH4 that have been observed in recent decades are often attributed, at least in part, to human activities such as the burning of fossil fuels and the deforestation of tropical forests.

http://www1.eere.energy.gov/femp/program/greenhousegases.html

LEED – LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
An internationally recognized, voluntary, market-driven program that provides third-party verification of green buildings. It provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.

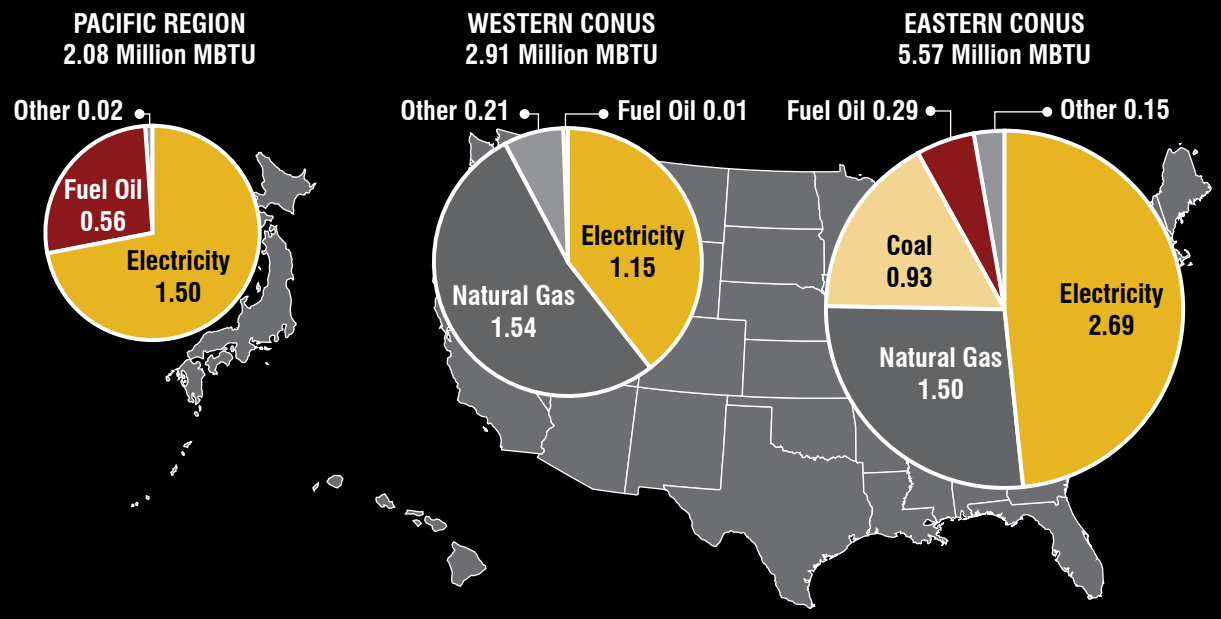
https://new.usgbc.org/leed

USGBC – US GREEN BUILDING COUNCIL
A non-profit organization dedicated to sustainable building design and construction. Developers of the LEED building rating system.

https://new.usgbc.org/

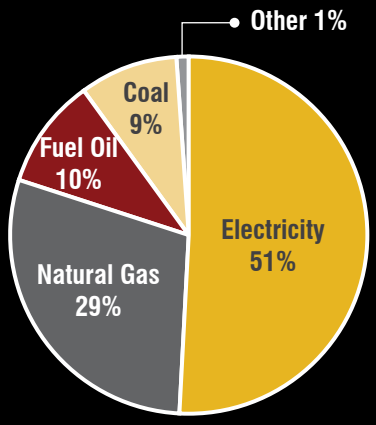
RECP – RESIDENTIAL ENERGY CONSERVATION PROGRAM
An incentives program targeting high-energy users living in private housing on Marine Corps installations. Low energy users receive refunds, while high energy users receive bills. All privatized residences are metered to establish baselines for proper energy consumption. The program sends statements to all residents, depicting energy use and methods to reduce consumption. RECP sends bills to consumers that use more than 10% of the established average and grants credits to those that use 10% less. The initiative is expected to curb residential energy use by 12–15%, and result in an annual savings of $4 million for the Marine Corps.

FIGURE 1: CONSUMPTION BY REGION SHOWN IN MILLIONS OF MBTU



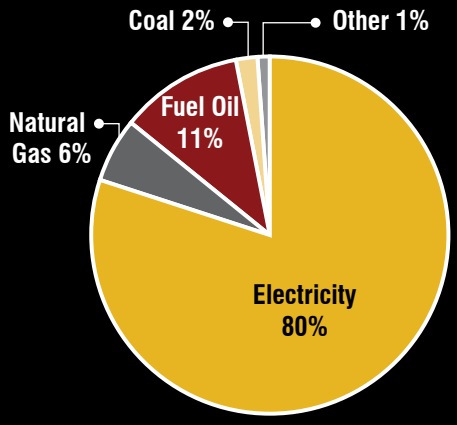
Total Consumption: 10.57 Million MBTU, Area of pie charts are proportional to the volume differences between the regions.

FIGURE 2: CONSUMPTION BY UTILITY TYPE



Shown as a % of total energy consumption

FIGURE 3: COST BY UTILITY TYPE



Shown as a % of total energy cost

Subtotals may not perfectly sum up to totals due to rounding error since values are expressed only to the second signiticant digit.


CAUTION


"UNLEASH US FROM THE TETHER OF FUEL"
-LtGen MATTIS
MARINE CORPS
ENERGY
USE IT WISELY
BASES TO BATTLEFIELD