Department of Defense

Strategic Sustainability Performance Plan

FY 2016

7 September 2016

The mission of the Department of Defense (DoD) is to provide the military forces needed to deter war and protect the security of our country. To successfully execute the DoD mission, our Military Departments must have the energy, land, air, and water resources necessary to train and operate, today and in the future, in a world where there is increasing competition for resources. Sustainability is a mission imperative for DoD. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, dovetails with DoD's commitment to sustainability through FY 2025 and beyond. Incorporating sustainability into planning, decision-making, and day-to-day operations assures resilience, enabling us to carry out our mission in the face of current and emerging challenges, including those from a changing climate.

This annual update of the DoD Strategic Sustainability Performance Plan (SSPP) establishes the path by which we will advance our mission by ensuring the longevity of critical resources, minimizing long-term costs, addressing environmental, safety, and occupational health considerations, and advancing technologies and practices that further the Department's sustainability goals. The SSPP also addresses climate change, which causes national security concerns in multiple ways, such as opening passages through the Arctic, contributing to global instability, increasing heat stress, and increasing sea level and storm surge near our coastal installations. We are actively integrating climate considerations across the full spectrum of our activities to ensure a ready and capable force. Our efforts will improve the resiliency of our fixed installations, and further embed sustainability considerations into the conduct of DoD business. At the core of our undertaking to improve sustainability and resilience is the ongoing engagement of our personnel, stakeholders, and the public.

The Department pursues sustainability opportunities that make the most compelling case in terms of mission productivity and long-term cost performance. The goals and sub-goals in the DoD SSPP set the tone for our operations, but the Department's decisions are ultimately driven by practical, mission-based considerations for success in the fiscally constrained environment that exists now and for the foreseeable future.

Year after year, the Department strives for continual improvement in sustainability. FY 2015 saw further improvements in the energy and water efficiency of facilities, and reductions in the volume of petroleum fuels used by non-tactical vehicles. At the same time, our use of renewable sources of energy continued to climb. In January 2016, we issued a DoD Directive titled *Climate Change Adaptation and Resilience*, which solidifies the commitment of the Department to fully integrate climate change considerations into our core policies, plans, and programs. Our near-term sustainability focus is to identify and implement measures that cost-effectively address EO 13693 while advancing the DoD mission.

Frank Kendall
Under Secretary of Defense for Acquisition, Technology and Logistics

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Executive Summary

Vision

The vision of sustainability for the Department of Defense (DoD) is to maintain the ability to operate into the future without decline—either in the mission or in the natural and built systems that support it. At the heart of sustainability is the need to preserve Earth's natural resource base for use in the future. DoD depends on these resources—energy, air, land, and water—to conduct its mission. The objective of the DoD Strategic Sustainability Performance Plan (SSPP) is for sustainability to become thoroughly woven into the everyday fabric of the DoD mission. Just as sustainability directly affects the ability of DoD to perform its mission in the future, so does the Department's ability to be resilient to the impacts of climate change. Sustainability and adaptation to climate change go hand in hand with DoD's efforts to ensure resilience and success.

Although the SSPP does not expressly address combat operations or the direct support of combat operations—such as contingency basing, ships, aircraft, and tactical vehicles—the linkages between sustainability and the DoD mission are strong and direct for combat as well as non-combat activities. Implementing sustainable practices at contingency bases and in contingency operations reduces the associated demand of logistics and resupply, enabling our military personnel to focus on the operation, rather than activities that support operations, such as fuel and water convoys.

Leadership

The DoD Chief Sustainability Officer is the Assistant Secretary of Defense for Energy, Installations and Environment. This senior official is responsible for ensuring the effective and successful implementation of the SSPP across the Department, and for leading the Senior Sustainability Council (SSC). The SSC consists of approximately 20 senior officials from the Military Departments and key DoD Directorates, who collectively span all functions of the Department, consistent with the cross-cutting, integrated nature of sustainability. Chartered in November 2010, the purpose of the SSC is to integrate sustainability into DoD policies, plans, budgets, and decisions, and make recommendations pertaining to sustainability, including on the adequacy of policies and resources in meeting the Department's sustainability goals. In addition to the SSC, each Military Department and the Defense Logistics Agency (DLA) have designated a sustainability officer to ensure accountability in implementing the SSPP across their organizations.

Performance Review and Planned Actions

Greenhouse Gas Reduction

DoD's target subject greenhouse gas (GHG) emissions from Scope 1 and 2 sources[1] in FY 2015 totaled 23.65 million metric tons of carbon dioxide equivalents [MMT CO_2(e)], nearly 12% lower than the FY 2008 base year. Emissions from Scope 3 sources were 6.28 MMT CO_2(e), nearly 18%

[1] The GHG emissions of an entity are divided into three types of emissions called Scopes. Scope 1 emissions are those from sources owned or controlled by DoD, such as fuel combusted in a furnace. Scope 2 emissions result from the generation of electricity, heat, steam or chilled water purchased by DoD. Scope 3 emissions are from sources not owned or directly controlled by DoD, but related to DoD activities. Examples include employee commuting and the energy losses that occur during the transmission and distribution of electricity consumed by DoD.

lower than the FY 2008 base year, when third-party operated renewable energy generation is included.[2]

The continued decline in Scope 1 and 2 emissions was driven by ongoing reductions in the two main contributing categories: purchased electricity (49% of Scope 1 and 2 emissions) and stationary combustion (20%). The main strategy used by the Department to improve energy efficiency and security—while decreasing Scopes 1 and 2 GHG emissions—is to continue pursuing cost-effective measures to improve the efficiency and renewable energy capacity of its fixed installations. As discussed in the Performance Contracting section below, performance-based contracting using third-party financing is one of the most cost-effective paths to achieve this.

Scope 3 emissions edged higher from the prior year due to a small increase in employee business air travel and a smaller amount of credits for hosted renewable energy. In the near future, the main contributor to further reductions in Scope 3 emissions will likely come from increasing credit for hosting renewable energy facilities.

Sustainable Buildings

The portion of DoD buildings meeting the criteria for conformance with the revised Guiding Principles for Sustainable Federal Buildings continued to rise, with 1.5% of applicable building area conforming in FY 2015, an increase of more than 77% since FY 2010. Although DoD policy requires new construction and major renovations to adhere to the Guiding Principles (Unified Facilities Criteria 1-200-02, *High Performance and Sustainable Building Requirements*), the sheer magnitude of DoD's facility inventory to which the Guiding Principles apply—over 50,000 facilities—coupled with constrained budgets and fewer new or renovated facilities means DoD will likely continue to make relatively small annual improvements towards our goal.

Optimizing energy efficiency, Fleet Readiness Center Southwest, CA

Photo: U.S. Navy

Renewable Energy

As a percentage of electricity consumed by DoD facilities in FY 2015, DoD produced or procured 12.4% from renewable sources (electric and non-electric), exceeding the target of 12%. To help ensure the energy security of fixed installations, the Department will continue to emphasize renewable energy projects sited on DoD or adjacent federal property. Each Military Department set a goal to develop one gigawatt of renewable energy on its installations, and the Services are pressing ahead with plans to continue increasing on-site renewable energy capacity.

Water Use Efficiency and Management

The potable water intensity of DoD facilities was more than 22% lower in FY 2015 than the FY 2007 base year, exceeding the 16% target. This was achieved through a suite of proven measures, including:

- implementing opportunities for improvements identified in facility evaluations;

[2] Third-party operated renewable energy refers to credit DoD receives for hosting the operation of renewable energy generation by third parties on DoD land, for which DoD does not retain the renewable energy certificates. Without this credit, target subject emissions totaled 30.82 MT CO_2(e).

- reclaiming, recycling, and reusing water;
- landscaping with vegetation having low water requirements;
- leak detection and repair; and
- installing high-efficiency plumbing fixtures.

The Department will continue to pursue these approaches on military installations and in other DoD facilities.

Photo: U.S. Air Force

Fleet Management

The Department continued to reduce the amount of petroleum-based fuel it used in its fleet of non-tactical vehicles in FY 2015, while ramping up its use of alternative fuels. Petroleum vehicle fuel consumption declined 33.6% compared to the FY 2005 baseline, while alternative fuel consumption rose 210%. Both results appreciably exceeded their targets of 20% and 159%, respectively. These metrics retire in FY 2015, replaced by the average GHG emissions from the fleet per mile travelled, with FY 2014 as the base year. Using this new measure, the efficiency and environmental impact of DoD non-tactical vehicles was approximately 3% higher in FY 2015 than the base year. Since the new metric is strongly influenced by the extent to which a fleet is electrified, DoD's success in meeting the 4% reduction target for FY 2017 will require an accelerated shift in the non-tactical fleet to vehicles fueled by electricity, as well as selecting the most fuel-efficient vehicles in class available for those petroleum-fueled vehicles that remain in the fleet inventory. Individual DoD Components—the Military Services and other Defense Agencies and Activities—are investigating policy and logistical approaches for providing employees with infrastructure to charge their vehicles in ways that are in accordance with Section 1413(c)(2) of the Fixing America's Surface Transportation Act, which requires that employees pay fees for using the infrastructure.

Sustainable Procurement

DoD manually reviewed its FY 2015 contract actions for sustainable procurement requirements; of the 1,814 reviewed, more than 96% were in compliance. This result is down slightly from the previous year due to a Service's clarification of the requirements for 'compliant' contracts. However, the nearly 100% compliance reflects the fact that sustainability has successfully become incorporated into the day-to-day procurement of the Military Services, DLA, and other DoD Components. The Department anticipates further improvement in sustainable procurement once it issues the DoD Instruction *Procurement of Sustainable Goods and Services* in 2016.

Pollution Prevention and Waste Reduction

Reducing waste and preventing pollution are high priorities for the Department, which has six sub-goals aimed at achieving these goals:

1. diverting non-hazardous solid waste from disposal
2. diverting construction and demolition (C&D) debris from disposal
3. reducing the use of printing paper
4. reducing the quantity of toxic chemicals released into the environment or transferred off-site
5. ensuring all individuals applying pesticides on installations are certified
6. updating and reviewing annually all installation Integrated Pest Management Plans.

Of the quantity of non-hazardous solid waste generated in FY 2015, DoD diverted 46% of it from disposal, falling short of the 50% goal. For construction and demolition debris, however, the

diversion rate was 82%, far above the 60% target. Regarding the use of paper, when Executive Order (EO) 13514 was issued in October 2009, the Department went beyond the requirements of the EO, setting a goal for 95% of all DoD employees to be covered by policies to reduce the use of printing paper as of the end of FY 2015. This goal was achieved in FY 2015, with 98% of all DoD employees covered.

Photo: U.S. Army

Damage by invasive species controlled with mechanical clearing and spot application of herbicide, Devens Reserve Forces Training Activity, MA

The total quantity of toxic chemicals released from DoD installations in the calendar year (CY) 2014 reporting period, as reported under the Toxics Release Inventory, was 17.7% less than the CY 2006 base year. The Department is in the process of developing a new sub-goal focused on the Military Services' Toxic and Hazardous Chemicals Reduction Plans, which replace the one based on the Toxics Release Inventory.

DoD's two sub-goals addressing the use of pesticides are geared toward ensuring that pesticides are applied safely and effectively, and only when necessary. One sub-goal tracks the percentage of pesticide applicators—DoD and contract personnel—who are appropriately certified. The Department achieved 99.6% in FY 2015, slightly shy of the 100% target due to the constant turnover in personnel. The other sub-goal is for all installations to have their Installation Integrated Pest Management Plans approved and updated. Performance on this metric was 94.2% in FY 2015.

Electronic Stewardship and Data Centers

The Department's Electronics Stewardship Implementation Plan stipulates that all relevant electronics procured by DoD be registered with the Electronic Product Environmental Assessment Tool (EPEAT), that all information technology contracts include language on DoD's power management and duplexing goals, and that 100% of computers and monitors have ENERGY STAR features enabled to the maximum degree possible based on mission needs. DLA Disposition Services handles the vast majority of DoD electronics at the end of their useful lives. In FY 2015, DLA processed 89% of the end-of-life electronics it received through certified recyclers. DLA will improve performance in the near future through procurements it finalized recently for certified recycling services.

To consolidate data centers and make the remaining ones more efficient, DoD has closed almost 580 data centers, 16,462 servers, and 577,903 square feet of floor area through FY 2015, with an additional 364 data center closures planned for FY 2016. The Department has installed energy meters at all core data centers and actively manages power usage effectiveness. DoD also tracks performance on a set of metrics measuring the operational efficiency of data centers, such as the number of operating systems, the number of staff needed to service operating systems, and extent of virtualization. The DoD Chief Information Officer is updating the DoD Computer and Storage Strategy, and reviewing other existing data center and cloud policies to determine if and how they require updating.

Performance Contracting

The Department continues to view third-party, performance-based contracting of energy efficiency improvements as one of its most cost-effective mechanisms for reducing energy consumption by its

facilities. In FY 2015, DoD awarded nearly $300 million in performance contracts, and it plans to award a total of approximately $900 million in FY 2017 and FY 2018 combined. Since the launch of the Presidential Performance Contracting Challenge in December 2011, DoD has awarded nearly $1.5 billion in performance-based contracts.

Climate Change Resilience

Climate change is a clear national security concern, affecting us today and forecast to affect us more in the future. To address this concern, the Department issued DoD Directive (DoDD) 4715.21, *Climate Change Adaptation and Resilience*, on 14 January 2016, which establishes policy, roles, and responsibilities for the integration of climate change resilience across the Defense enterprise. The Directive is a significant step forward to require the Defense-wide consideration of the effects of climate change and how to plan for them. As per DoDD 4715.21, DoD expanded the screening of DoD issuances (Directives, Instructions and Manuals) by an additional 87 in FY 2015, to identify those that should be updated to include the consideration of climate change impacts beyond our initial focus on those relating to land and water management. Three ongoing DoD Regional Climate Change Adaptation Planning Pilot efforts continued, representing each of the three Military Departments. At four installations, the Department completed the pilot testing of a tool DoD developed to help installations identify how much water they need to satisfy mission requirements. Based on feedback and lessons learned, the tool was updated and a second phase of pilot testing was initiated at 20 installations. DoD also made major strides in developing processes to address climate effects on a regional basis, collaborating with surrounding communities and local and state governments to identify ways to leverage one another's capabilities and become more resilient together.

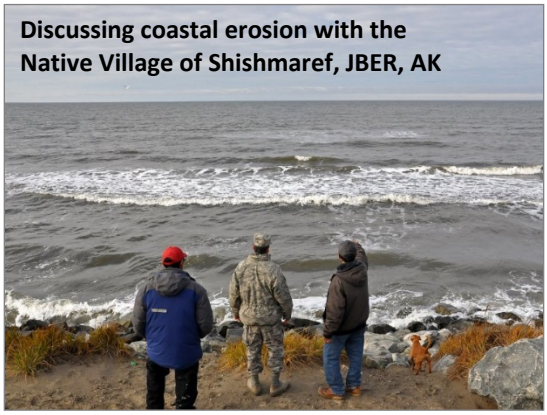


Photo: U.S. Air Force

The Department will continue to identify, review, and update appropriate DoD Issuances to ensure that the effects of a changing climate on the DoD mission will be considered. Of those issuances identified thus far for updating, DoD plans to have updated 20% of them by the end of FY 2017. To improve coordination on the effects of a changing climate with other Federal agencies, state and local partners, Tribal governments, and private stakeholders, DoD will update Departmental guidance based on lessons learned from its regional climate change planning pilots and Joint Land Use Studies. By the first quarter of FY 2017, the Department will also incorporate planning for the effects of a changing climate into two mission areas of the DoD National Preparedness Guide.

I. Sustainability in DoD

I.1 Sustainability and the DoD Mission

The Department of Defense vision of sustainability is to maintain the ability to operate into the future without decline—either in the mission or in the natural and man-made systems that support it. The Department embraces sustainability as a critical enabler in the performance of the mission, recognizing that it must plan and act in a sustainable manner now in order to build an enduring future. Just as sustainability directly affects the ability of DoD to perform its mission in the future, so does the Department's ability to be resilient to the impacts of climate change. Sustainability and adaptation to climate change go hand in hand with DoD's efforts at continual improvement to ensure resilience and success.

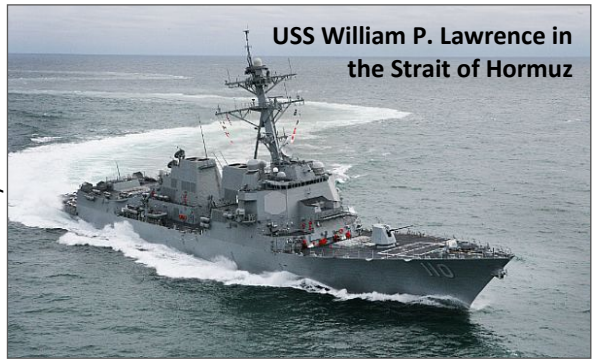

USS William P. Lawrence in the Strait of Hormuz

Photo: U.S. Navy

Sustainability is a financial imperative for the Department. Operating sustainably necessitates forethought into the consequences of all decisions, from the procurement of everyday goods to the design and construction of facilities. This reduces operating costs in many ways, such as reducing the consumption of energy and water, generating revenue from the reuse and recycling of materials that would otherwise be disposed, and using greener chemicals that avoid liability and remediation costs. The linkage between sustainability and costs is especially strong in the case of energy due to the price volatility of petroleum—a fungible, globally traded commodity. Regardless of the changing domestic energy context here in the United States, global oil markets are subject to significant price volatility, complicating budget and acquisition decisions.

Energy and Water

DoD relies on the commercial electricity grid to deliver electricity to hundreds of installations—a situation that places the continuity of critical missions at risk. Grids are vulnerable to intermittent or prolonged power disruption caused by weather events, attacks, or sheer overload. With the increasing reliance of U.S. combat forces on "reach back" support from installations in the United States, power failures at those installations could adversely affect the projection of military power and the capability for homeland defense. This means that an energy threat to bases in the United States can be a threat to operations abroad. Beyond electricity, the Department depends on a broad energy supply chain, including petroleum networks and electricity networks, which is increasingly at risk. Most petroleum products move by sea, and much of this trade passes through vulnerable chokepoints such as the Strait of Hormuz. Piracy, political instability, cyber attacks, and military action can threaten the free flow of energy resources through these vital channels.


Wastewater reclamation plant, MCB Camp Pendleton, CA

Photo: U.S. Marine Corps

Fresh water is a limited and mission-critical resource essential for military operations, drinking, hygiene, sanitation, food preparation, and medical care. During military

operations, water poses similar challenges as liquid fuel, requiring the protection of large, vulnerable convoys as it is transported to the troops. Also, the treatment and disposal of wastewater is a human health and environmental issue for Soldiers and the civilian populations being protected during military operations.

At fixed installations, water is also a mission imperative. Water scarcity has led a number of DoD installations in the United States to implement aggressive water conservation and reuse measures. So far, most of these installations have been located in arid portions of the West, but supplies of water are becoming an issue in other parts of the country as well. DoD also faces potential water risks in its supply chain, should there be insufficient water for suppliers to produce the goods and services sold to DoD.

Water supply and distribution, water use, wastewater treatment, and the management of stormwater runoff are interrelated and influence energy and sustainability. For example, the process of extracting, treating, and delivering water to end users is highly energy-intensive. Measures that use and distribute potable water more efficiently and with less leakage result in significant reductions in energy consumption and, therefore, emissions of carbon dioxide. By reducing stormwater runoff from facilities through low impact development (LID) approaches, fewer pollutants flow into local bodies of water. In the case of collection systems that combine wastewater and stormwater, LID also reduces the volume of stormwater requiring treatment by the wastewater treatment system, and reduces the risks of sewage-containing wastewater overflowing into water bodies during heavy precipitation events.

Minimizing Chemicals of Concern


Photo: U.S. Air Force

Green solution for washing parts replaces hazardous solvent, Altus AFB, OK

Chemicals and materials are essential to the performance of DoD weapon systems and platforms and to the success of military operations. However, the use of hazardous and toxic chemicals and materials poses a number of risks. Toxic chemicals present risks to human health if not managed carefully and the necessary personal protective measures and environmental controls increase the life cycle costs of the Department's systems. In addition, continuing national and international regulatory actions and market pressures are resulting in the non-availability of some chemicals and materials that are needed to meet the demanding performance requirements of modern weapon systems and platforms. The Department has developed a three-tiered process called "scan-watch-action" to identify chemicals and materials with emerging risks, assess the risks to people and the mission, and implement proactive risk management actions. During this process, the Department works closely with academia, regulatory agencies, and industry. The Department also has initiatives to integrate safer, more sustainable chemicals into the industrial base and operations. The Department continues to invest in research, development, and testing of substitute chemicals and materials that present lower risks to human health and the environment, increase performance, and reduce life cycle costs.

Maintaining Readiness in the Face of Climate Change

Climate change creates both needs and opportunities to examine how DoD operates today and in the future, both in the United States and abroad. Climate change is predicted to affect the

"The DoD must be able to adapt current and future operations to address the impacts of climate change in order to maintain an effective and efficient U.S. military."

— DoD Directive 4715.21, *Climate Change Adaptation and Resilience*, 14 January 2016

Department in many ways, including direct effects on installations and indirect effects on regional stability, particularly those regions of the world already prone to conflict. Climate change can directly impact military installations and operations by limiting the availability and quality of ranges and lands needed for training, reducing water supplies, increasing flood and fire hazards, and increasing severe weather risks to the electricity grid. Some of the Department's low-lying coastal installations are threatened by coastal erosion and inundation due to sea level rise, which can damage or destroy infrastructure, reduce availability of land for operational needs, and impact water supply due to seawater intrusion.

The more frequent and extreme heat projected to occur due to climate change may limit outdoor training, impair personnel efficiency, and strain electricity supply due to the increased demand on the electricity grid for cooling. Human health could also be impacted due to the connection between heat and air quality: heat accelerates the photochemical process that forms ground-level ozone from vehicle exhaust. Ozone formation and its attendant health problems may worsen with the warmer temperatures projected to result from climate change. Thawing permafrost and a reduction in the sea ice that protects the coast from erosion by storms may impact DoD installations and activities in the Arctic.

"Climate change will affect the Department of Defense's ability to defend the Nation and poses immediate risks to U.S. national security."

— DoD Climate Change Adaptation Roadmap, FY 2014

In many areas, warmer temperatures will reduce the amount of snow pack in the mountains, which provides a significant amount of water supply. Water quality and water supply reliability can be further threatened by changes in precipitation patterns, which can cause extended droughts and reduce surface and groundwater supplies in many areas. These trends are expected to continue, increasing the likelihood of water shortages for certain areas. Higher temperatures could increase the risk of wildfire by reducing moisture in soil and plant material and, in some areas, by lengthening the fire season. An increased risk of uncontrolled wildfires can have direct mission consequences. Climate change may also bring an increased frequency of heavy precipitation events in some areas, raising the threat of flooding.

Photo: U.S. Air Force

Black flag for high heat and humidity, Keesler AFB, MS

Changing temperature and precipitation patterns accompanying climate change may cause shifts in the composition or geographic range of some species. Among the species shifts anticipated are movement of wildlife to more favorable habitats, the increased numbers and geographic range of vector-borne diseases into the United States, and expansion of invasive grasses and shrubs. Invasive plants contribute fuel load for wildfires, which in turn increases the likelihood, range, and intensity of wildfires. Threats to federally-protected species may increase and additional native species may become endangered, adding to the obligation of species protection for some military installations.

Climate change impacts can directly interfere with an installation's ability to carry out its mission. For example, training may be limited through the occurrence of more red and black flag days

(high heat and humidity conditions), by the loss of land to either sea level rise or the need to set aside more land for endangered species, and by more frequent restrictions on live-fire training where heat and reduced rain increase the fire hazard.

By incorporating aggressive consideration of the current and potential impacts of a changing climate in mission planning across the Defense enterprise, the Department will become more sustainable. This sustainable enterprise requires resilience in the face of an unknown future operating environment and a robust risk management framework to address changes when they occur.

I.2 Integrating Sustainability throughout DoD

The sustainability principles promulgated in the SSPP are the policy of the Department, and should be incorporated into all DoD decisions pertaining to design, investments, and prioritization of activities. Sustainability is not an individual Departmental program. Due to its cross-cutting nature, sustainability is by necessity an organizing paradigm that applies to all DoD mission and program areas. Applying a systematic framework for improving sustainability involves a wide range of practices that span much of DoD's day-to-day activities and military operations. DoD personnel are applying this mindset to improve mission performance and reduce life cycle costs.

The DoD SSPP provides a coherent approach both for complying with multiple federal requirements for sustainability and for ensuring the mission is accomplished. The Department established the inter-connected objectives and goals for sustainability shown in Figure 1. These, together with the sub-goals, form the framework DoD uses in its SSPP to track progress on continually improving sustainability. Although more needs to be done, sustainability is already institutionalized in DoD through a large body of existing DoD policies and procedures. Figure 2 lists some recent examples of DoD policies relating to sustainability, including DoD Instructions (DoDIs), Unified Facilities Criteria (UFCs), and policy memoranda. The list illustrates the integrated nature of sustainability, with many policies addressing multiple areas of sustainability.

Facilities

The sustainable construction, renovation, and operation of DoD facilities is required by a suite of DoDDs, DoDIs, UFCs and policy memoranda. The most recent relevant, high-level issuances are:

- Policy Memorandum: *DoD Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA*) – January 2010
- UFC 3-210-10, *Low Impact Development* – November 2010
- UFC 2-100-01, *Installation Master Planning* – May 2012
- UFC 1-200-02, *High Performance & Sustainable Building Requirements* – March 2013
- Policy Memorandum: *Utilities Meter Policy* – April 2013
- Policy Memorandum: *Department of Defense Sustainable Buildings Policy* – November 2013
- Policy Memorandum: *Floodplain Management on Department of Defense Installations* – February 2014
- Policy Memorandum: *Water Rights and Water Resources Management on Department of Defense Installations and Ranges in the United States and Territories* – May 2014
- DoDI 3200.21, *Sustaining Access to the Live Training Domain* – September 2015
- DoDI 4170-11, *Installation Energy Management* – March 2016

Figure 1. Framework of Objectives, Goals, and Sub-Goals Used for the DoD SSPP

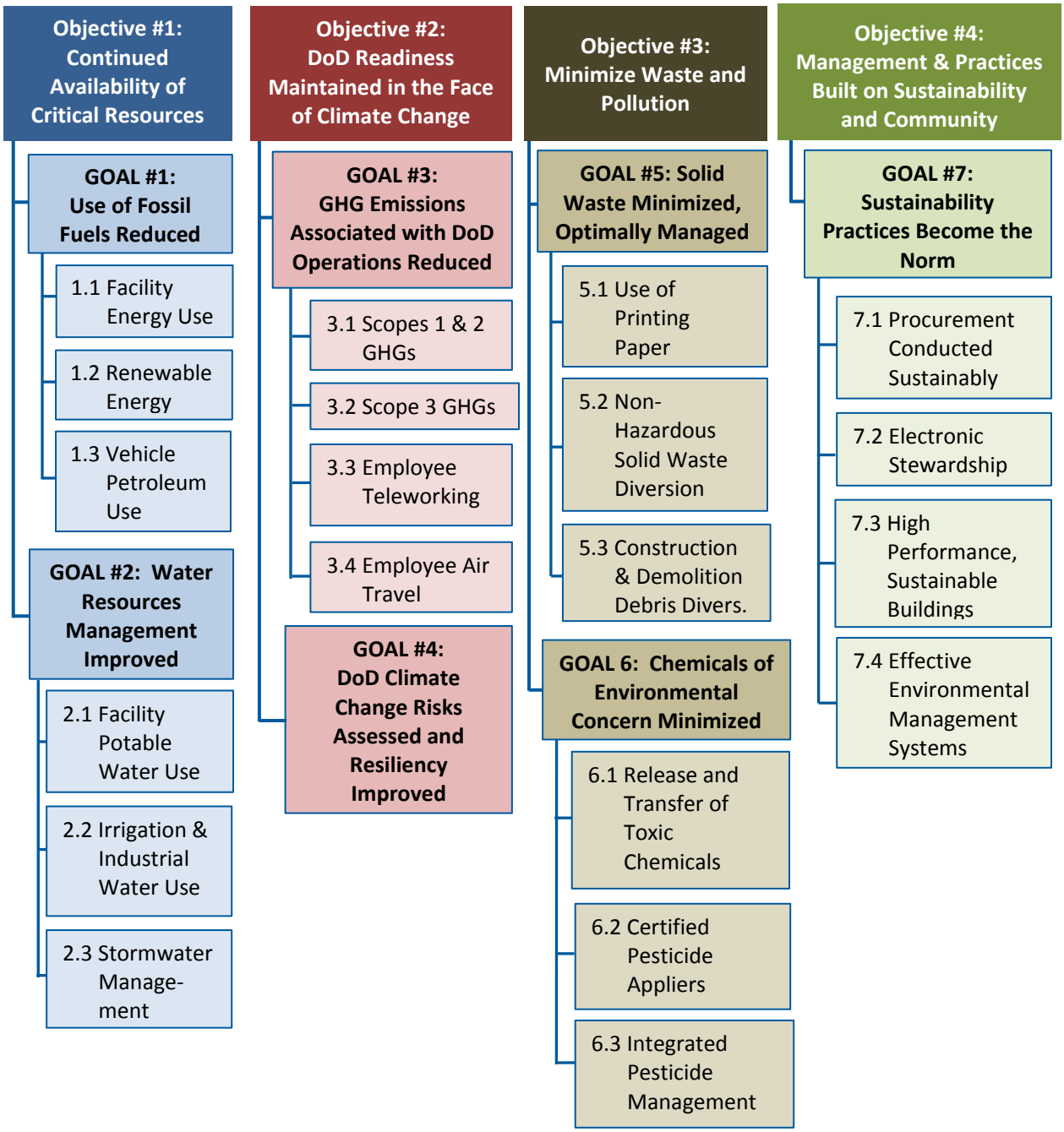
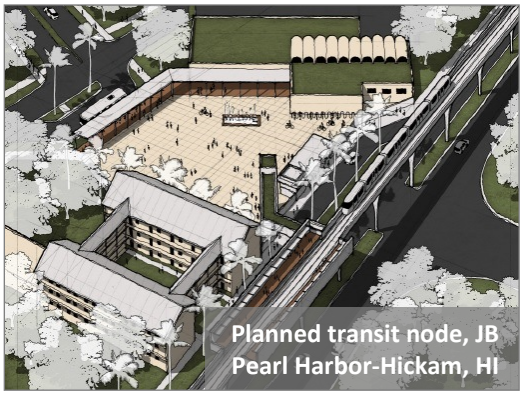


Figure 2. Examples of DoD Sustainability Policies Issued Since FY 2010, Illustrating the Integrated Nature of Sustainability
Next to each policy is a set of numbers corresponding to the sustainability topics shown in the blue box at right.

In addition to policy and guidance, the Department has made changes in the way it finances improvements to existing buildings. One is a significant shift to the use of third-party contracting based on performance, where efficiency improvements and renewable energy projects are paid through cost savings, with no upfront cost to the government. Also, DoD modified its approach to the Energy Conservation Investment Program (ECIP), making it part of a portfolio approach in which the Services pursue the most financially attractive energy projects, whether through ECIP or third-party financing. As a result, the Department can fund projects having a major impact on energy efficiency and/or security even though they might not otherwise be justified under internal funding strategies. Another change in ECIP to encourage long-term planning is that Services are now required to build a five-year program of projects proposed for ECIP funding. Finally, DoD introduced inter-Service competition for ECIP funding. Although the Department will guarantee each Service a minimum level of funding, it has awarded funds based on competitive merit since FY 2014.

Photo: Urban Collaborative



The design of facilities and the evaluation and prioritization of activities should consider environmental and societal factors in addition to mission, financial, and regulatory considerations. For example, the Department may invest in new renewable energy sources to provide energy security for critical assets and missions. The creation of walkable communities and cluster developments on bases reduces automobile usage, saves military families money, and improves health. Sustainability is also closely tied to the well-being of personnel— DoD's most important asset. The ability to recruit, retain, train, educate, and equip the All-Volunteer Force, and to sustain its readiness and morale, is fundamental to the DoD mission. Adopting greener chemicals and materials limits potential exposure of personnel to harmful substances, and can avoid the need to use hot, uncomfortable hazardous material suits, expediting operations and maintenance activities. In areas where air quality is a concern, an Installation Commander might prioritize investment and design decisions that lower vehicle emissions and reduce the heat island effect on the installation, for example by planting shade trees. Therefore, investment decisions should consider all the costs and benefits of incorporating sustainability. A cost-benefit analysis, including both monetary and non-monetary costs and benefits, should be performed on proposed projects so decision-makers can best evaluate their anticipated effectiveness.

The Department recognizes the importance—and the challenge—of ensuring that sustainability is incorporated into decision-making across the organization. Individual Commands and installations, not a central DoD office, make many of the decisions on budgeting and executing DoD projects. In practice, decisions made at the facility level do not always take into consideration the larger objectives of the Department as a whole, including its sustainability objectives. The challenge of incorporating sustainability into investment decisions is further exacerbated by the fact that the benefits of many sustainability considerations are difficult to quantify, whether at the installation or Command level, using traditional metrics such as return on investment. The Department will find more ways to help Installation Commanders and other decision-makers form an objective basis for making decisions about projects in a way that advances DoD's sustainability objectives. Beyond the project level, the Department has a bigger picture view of promoting sustainability by investing in new and emerging technologies. These investments represent a risk at the individual project level, but when viewed across the entire Department they can significantly increase the return on investment.

Acquisition

Large military systems and platforms can have a life cycle of 30 years or more. Resources to maintain these systems and platforms are costly and, in some cases, dwindling. In addition, choices in resources such as energy sources and chemicals and materials can have a significant impact on human health and the environment and associated life cycle costs. Without a full understanding of life cycle effects, significant impacts and costs may be unintentionally inserted during development and design phases of acquisition and later incurred by the logistics, installations, and operational communities. Early sustainable design choices can make a significant difference in these costs. DoD personnel have developed and are testing a methodology called a Sustainability Analysis that combines Life Cycle Assessment with Life Cycle Costing. A Sustainability Analysis is a method used to compare two or more design alternatives (for example regarding energy sources and materials) with the same performance requirements on the basis of resource consumption, emissions, associated life cycle impacts, and the resulting costs. The Analysis can help uncover previously hidden human health and environmental impacts and their associated life cycle costs. Such an analysis can help inform design decisions when making choices among alternatives, and long-term supportability requirements once a design has been chosen. Sustainability Analyses can help to achieve the Department's goal to lower total ownership costs and acquire more sustainable systems—those that use less energy, water, and toxic chemicals, and produce fewer emissions. In 2015, the Department completed three pilot projects to test the methodology in partnership with companies in the defense industry. Lessons learned from the pilot projects are being incorporated into a final version of a guidance manual that describes the steps for completing a Sustainability Analysis.

An essential component of sustainable weapons acquisition is sustainable manufacturing. Sustainable manufacturing is the creation of manufactured products with processes that are economically sound, non-polluting, energy efficient, conserving of natural resources, and safe for warfighters, users, employees, and communities. As a keystone concept that integrates multiple sustainability elements, sustainable manufacturing can make weapons acquisition more affordable by avoiding the costs of environmental, health, and safety liabilities. Every dollar spent on such liabilities is one less that is available for warfighter capabilities. Sustainable manufacturing has a place in both the acquisition of systems and in their logistical sustainment.

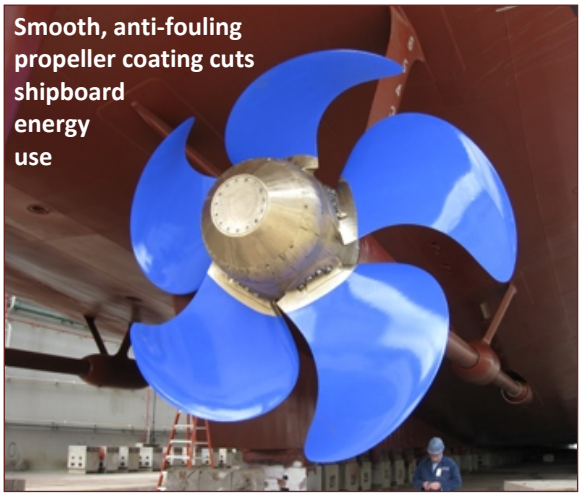


Photo: U.S. Navy

Operations

While a contributor to the Department's sustainability effort, military operations are necessarily exempt from the targets of this SSPP and EO 13693. Although the SSPP does not expressly address combat operations or the direct support of combat operations—such as contingency basing, ships, aircraft, and tactical vehicles—the linkages between sustainability and the DoD mission are strong and direct across the board, including for combat operations. The Department is working to improve the sustainability of contingency bases as a means of enhancing force effectiveness and mission outcomes and reducing unnecessary risks to the mission. This

involves applying the principles of sustainability to decisions affecting policy, doctrine, organizations, training, materiel, leadership, personnel, and facilities. The expected results are reduced costs and increased efficiency and resiliency in planning; the efficiency, effectiveness, and interoperability of equipment; and the management and oversight of contingency basing. Improved contingency base sustainability will also enhance mission support by reducing resource consumption and the vulnerability of fuel and water supplies, preserving the health of warfighters, and improving environmental and safety performance. Lastly, to the extent DoD can share sustainable practices with partner nations, international resilience to challenges such as climate change is being built. This resilience can contribute to the Department's goal of conflict prevention as outlined in the *2014 Quadrennial Defense Review*.

I.3 Leadership

The Department designated the Assistant Secretary of Defense for Energy, Installations and Environment as DoD's Chief Sustainability Officer. The Chief Sustainability Officer is responsible for ensuring the effective and successful implementation of the SSPP across the Department, and for leading the Senior Sustainability Council. Table 1 shows the current SSC membership.

Table 1. Senior Sustainability Council Membership

Assistant Secretary of Defense for Energy, Installations and Environment – Chair
Under Secretary of Defense (Comptroller)
Under Secretary of Defense for Policy
Under Secretary of Defense for Personnel and Readiness
Under Secretary of Defense for Intelligence
Assistant Secretary of the Army (Installations, Energy and Environment)
Assistant Secretary of the Navy (Energy, Installations and Environment)
Assistant Secretary of the Air Force (Installations, Environment and Energy)
Deputy Department of Defense Chief Information Officer
Assistant Secretary of Defense for Research and Engineering
Assistant Secretary of Defense for Logistics and Materiel Readiness
Deputy Director, Cost Assessment and Program Evaluation
Director, Defense Procurement and Acquisition Policy
Director of Logistics, Joint Staff
Director, Defense Logistics Agency Installation Support
Director, Industrial Policy

As stipulated in its charter, the four key tasks of the SSC are to:

1. integrate sustainability into policies, plans, budgets, and decisions;
2. make recommendations on processes and procedures to implement the requirements of EO 13693 and other federal sustainability requirements;
3. continuously improve the Department's approach to the SSPP; and
4. review the adequacy of policies, resources, and performance in meeting goals, and make recommendations on changes required.

The SSC is responsible for ensuring integration of the SSPP into the Department's enterprise management structure. It works to ensure that sustainability is reflected in relevant policies, program plans, guidance, and budget development within the Department. Each Military Department (MILDEP) has a sustainability officer to ensure accountability for the SSPP's implementation, and each annually develops a sustainability implementation plan. Additionally, execution of the SSPP is aided by the leadership of the Chief Sustainability Officer, SSC, Sustainability Implementation Work Group, and other relevant committees and work groups. The Sustainability Implementation Work Group reports to the SSC and is charged with drafting input to the SSPP and facilitating compliance and continual improvement in meeting the SSPP goals. The Department is using its existing structure of committees and work groups to address specific issues and engage subject matter experts where appropriate. The committees and work groups cover a wide range of sustainability topics, including: GHGs, energy, transportation and fuels, solid waste and recycling, sustainable procurement, electronic stewardship, and sustainable manufacturing.

The SSC established a Climate Change Adaptation Working Group in December 2012, to facilitate implementation of the climate change requirements found in EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. The Working Group takes direction from and provides advice to the SSC regarding the state of climate science, vulnerability and impact assessments, and adaptation practices, and it led the development of the Department's *2014 Climate Change Adaptation Roadmap*. The Working Group membership represents Military Services, Defense Agencies, and Offices across the Department, including Policy, Personnel and Readiness, the Joint Staff, and the Combatant Commands. Together with the SSC, the Working Group will continue to analyze climate change-related policy, guidance, and practice; ensure that the Department has access to the climate-related information necessary to make informed decisions; and engage with internal and external stakeholders to identify and implement actions to maintain mission resilience in the face of a changing climate.

The Office of the Secretary of Defense (OSD) employs a number of mechanisms to ensure that sustainability factors are adequately addressed. Departmental planning and programming guidance lays out requirements that DoD Components must use to build their budgets, and environmental and sustainability requirements are part of this guidance. Another key feature of DoD's planning and budgeting process is the Future Year Defense Plan. This provides a six-year resource plan for achieving Department objectives, with major updates occurring every two years and the planning horizon rolling forward during each update cycle.

The SSC conducts annual Performance Management Reviews, and DoD Components are required to submit annual progress reports to OSD. The progress reports and Performance Management Reviews afford the Department the opportunity to alter strategies to better meet sustainability goals. Also, the SSPP has a built-in performance monitoring system in the form of a quantitative metric for each of the sub-goals.

I.4 Outreach and Communication

The Department is continually working to increase awareness of the SSPP among personnel, using normal internal channels of communication such as websites, newsletters, and announcements throughout the Department and within each individual DoD Component. DoD uses annual updates of the SSPP as opportunities to remind civilian, military, and contractor staff of the Department's expectations regarding sustainability. Each year, the Office of the Assistant Secretary of Defense for Energy, Installations and Environment presents the SSPP to senior officials within each DoD Component at the Deputy Assistant Secretary level and higher. Presentations stress the integration

of sustainability activities within overall DoD strategic planning and budgeting.

The Department has long had the DENIX platform on the internet (DoD Environment, Safety and Occupational Health Network and Information Exchange) for communicating sustainability performance to both DoD employees and the public. DENIX offers a wealth of information on sustainability, including DoD and federal policy and guidance, useful technical information, and examples of DoD's sustainability activities. Topics covered include: alternative fuel vehicles, environmental, safety, and occupational health in acquisition, the Toxics Release Inventory, Environmental Management Systems, Solid Waste and Recycling, and Sustainability. In addition, the Whole Building Design Guide website, www.wbdg.org, hosts a significant number of DoD documents pertaining to green buildings, including facility and construction criteria.

Discussing sustainability goals, Fort Hood, TX

Photo: U.S. Army Corps of Engineers

Making DoD more sustainable requires the broad participation of personnel across the Department. While OSD can accomplish a certain amount of outreach and raise awareness, most employee engagement occurs at the Component level. In general, across DoD, Components engage and reach out to their personnel on sustainability issues through internal newsletters, websites, and social media. The Services participate in award programs pertaining to sustainability, such as the Secretary of Defense Environmental Awards, and comparable federal agency programs such as the annual Federal Energy and Water Management Awards of the Department of Energy Federal Energy Management Program, and their own award programs. The MILDEPs also have their own award programs to recognize excellence in promoting sustainability. The Army has annual Secretary of the Army Energy and Environmental/Sustainability awards programs to recognize outstanding sustainability and energy performance at the installation, team, and individual levels. The Secretary of the Navy annually recognizes outstanding performance by Navy and Marine Corps installations, ships, and squadrons with Energy and Water Management Awards. In the Air Force, sustainability is one of the categories in the annual Air Force General Thomas D. White Environmental Awards program, and the General Edwin W. Rawlings Award for Environmental Sustainability specifically recognizes the sustainability initiatives of military and civilian personnel.

The Navy uses a robust set of communication tools and channels to ensure its workforce has awareness of the DoD SSPP and DoD sustainability goals and related sustainability targets. The Navy's Chief of Naval Operations Instruction (OPNAV) 5090.1D (*Environmental Readiness Program Manual*) identifies the relevant regulatory and policy requirements and defines how commands should organize their programs and activities to achieve compliance and sustainability. The Instruction is revised semi-annually to reflect changes in regulations and policy, incorporating feedback from technical experts from the field. Outreach is specifically addressed in Chapter 5 (Outreach and Communications), including submissions to *Currents* magazine (which reaches both internal and external audiences). Training is provided for personnel with environmental requirements as key aspects of their positions, as well as those with collateral environmental responsibilities. The Navy makes extensive use of social media platforms, including Facebook and Twitter pages for Task Force Energy and *Currents* magazine; the Stewards of the Sea Facebook page; the Currents Flickr page; and the Navy Energy and Environment YouTube channel. These online tools have allowed the Navy to expand its reach to diverse internal and external audiences and

effectively communicate recent news and developments on sustainability. Finally, the Navy's "Energy Warrior" app, which is available free for tablets and smart phone devices, showcases members of the Navy workforce and commands who are actively engaged in sustainable practices.

The U.S. Marine Corps (USMC) promotes sustainability across all missions and at every organizational level. Each employee has the responsibility to work collaboratively to meet the goals set forth by the Federal mandates and DoD policies to achieve strategic sustainability. During FY 2015, USMC prioritized delivering the message and theme "You have the power" to all Marines, highlighting the importance of the individual's power to make decisions that are environmentally sound and conscious of resource conservation; decisions that cumulatively make achieving sustainability goals possible. The Marine Corps' has launched its Energy Ethos Campaign to promote the shared vision that the efficient use of energy and water resources is a critical component of mission readiness. To help support the Energy Ethos Campaign, each command is establishing a Unit Energy Manager to change the mindset of those who live and work aboard the base to be more conscious of how water and energy resources are used. The program calls for all individuals to take small steps that will collectively add up to large savings for the Marine Corps, such as turning off computers at night and taking shorter showers.

The Air Force uses a variety of communication tools to ensure Airmen are aware of and support DoD's sustainability goals. *Air Force Civil Engineer Magazine*, a quarterly publication available in both print and electronic format, focuses on "engineers in action". It relates the experiences and accomplishments of Air Force civil engineers, a varied field with specialty areas that include energy, environment, and installation management. Sustainability information is also communicated across the Air Force and to external audiences via social media platforms including Facebook and Twitter, and electronic systems such as eDASH. eDASH is an internet-based, SharePoint, environmental information repository and clearing house managed by the Air Force Civil Engineer Center (AFCEC). It is the only Air Force-approved location for housing environmental portfolio-related web pages, information, documents, resources, and tools. eDASH is a low-cost, fully integrated, and scalable solution approved for use by all Air Force employees and contractors issued a DoD Common Access Card.

The Army's Senior Energy and Sustainability Council, co-chaired by the Under Secretary of the Army and Vice Chief of Staff of the Army, continues to oversee and integrate sustainability and energy efforts across the Army enterprise. The Council is supported by a General Officer Steering Committee and a Council of Colonels—which meet quarterly and monthly, respectively—to track and report Army progress implementing the DoD SSPP and other sustainability-related actions. The Army also routinely addresses sustainability in its Services and Infrastructure Core Enterprise Board, a three- and four-star level board chaired by the Assistant Secretary of the Army for Installations, Energy and Environment [ASA(IE&E)]. Commands annually brief ASA(IE&E) on energy and water SSPP goals, and in FY 2014 the briefs were expanded to include performance on non-tactical vehicle fleet petroleum, waste diversion, and sustainable procurement. Internally, energy and sustainability were themes in three editions of the Army's *STAND TO!*, a daily electronic news item distributed throughout the Army and posted on the Army website. On its public website, the Army continued sustainability and energy outreach via pages on energy, sustainability, and environment (http://www.army.mil/news/energy and http://www.army.mil/news/environment), as well as the ASA(IE&E)'s website. Sustainable practices are also routinely highlighted in articles in the Army's bi-monthly Public Works Digest publication. Headquarters (HQ) Army and Army installations also utilize social media to expand their sustainability outreach.

It is vital that DLA customers, personnel and all affected stakeholders be aware of the agency's sustainability objectives, concepts, and policies. DLA's Sustainability and Climate Change Adaptation Program is finalizing the formation of a chartered DLA Senior Sustainability Council. The Council will be a decision-making governing body that facilitates strategic management engagement, supports accountability for meeting sustainability targets, and stages a forum for discussing sustainability and climate change adaptation issues across DLA.

The Defense Contract Management Agency (DCMA) is predominantly a tenant activity located in DoD and federally-managed space. Host outreach programs on sustainability policy are shared with the DCMA workforce. Also, one of the initiatives in the FY 2015 DCMA Strategic Plan is to develop and deploy an Energy and Environmental Communications Plan that will improve sustainability and the potential for future cost avoidance by adopting green (facility, energy, and environmental) practices. DCMA provides quarterly messages to the workforce emphasizing sustainability, including energy efficiency and conservation.

The Defense Intelligence Agency (DIA) has an active program to communicate sustainability. The primary means is through DIA's internal website, featuring daily articles, photos, announcements, and other items of interest on topics ranging from energy saving tips to buying green products. DIA maintains a Sustainability SharePoint site on its classified computer system, which serves as the unofficial repository for many sustainability products and services, including the DoD SSPP. DIA communicates the goals and requirements of DoD's SSPP with a Microsoft PowerPoint presentation titled "Sustainability and Environmental Management System (EMS) Awareness" to provide self-paced training to all DIA employees on the DoD SSPP and EMS requirements; the presentation is located on the DIA Sustainability Microsoft SharePoint site. In FY 2015, DIA began utilizing flat-screen television monitors located in several common areas in DIA HQ to educate employees on the DIA energy program and other sustainability topics. The messages have been well received and generated sustainability discussions in the DIA HQ.

The National Reconnaissance Office (NRO) maintains an active sustainability outreach program through two major vehicles: Sustainability Working Groups and the NRO Environmental Safety Office website. The agency-level Working Group consists of representatives from all NRO sites as well as all Directorates and Offices, and meets quarterly to disseminate important sustainability information and provide forums for sharing best practices and success stories. The individual sites also have sustainability working groups. The NRO Environmental Safety Office website on NRO's secure network provides continuously updated information on sustainability best practices, opportunities for training and education, as well as regulatory updates.

In the National Security Agency/Central Security Service (NSA), engaging and communicating with employees on sustainability is handled by the agency's Sustainability Team. The Team maintains both an internal and external webpage where it posts information on NSA sustainability actions, and staffs kiosks at various NSA events to communicate the agency's sustainability efforts. In cases where broad-based employee participation is required, such as when the agency moved to single stream recycling, the agency also uses signs, posters, and e-mails for outreach. Quarterly, the Sustainability Team holds Green Team meetings with representatives from across the agency, providing the opportunity to offer suggestions on sustainability projects and policy. The agency routinely offers training to NSA employees on a wide variety of topics such as energy management, sustainable procurement, and the Energy and Environmental Design (LEED) rating system of the U.S. Green Building Council Leadership.

The Missile Defense Agency (MDA) promotes the participation of its employees in sustainability by requiring all new employees to complete an environmental awareness training course that explains the importance of MDA's environmental compliance and sustainability program. All employees are required to complete refresher training every year. MDA's Environmental Directorate maintains a website accessible to all employees, containing current information to ensure that all employees in each organizational element are aware and have a working knowledge of the goals and requirements of the SSPP. The agency also publishes articles on current MDA sustainability issues, events, and success stories at least quarterly. MDA's Environmental Integration Product Team meets quarterly to discuss the agency's sustainability progress and target new initiatives to undertake. The team has six sub-working groups that will continue to develop and execute focused action plans for pursuing opportunities for improvement. The sub-working groups are: Green Procurement, Teleworking, Sustainable Operations (energy, water, and solid waste), Vehicle Fleet Management, Electronics Stewardship, and Environmental Management System (EMS).

In the Washington Headquarters Services (WHS), DoD sustainability goals are communicated by the Environmental, Sustainability and Energy Branch through the WHS Sustainability and Energy Management Task Force, and by briefings on various sustainability topics, reviewing design submittals for construction and minor renovation projects, and meeting with the groups managing these projects on sustainability matters. Some of the smaller Components, such as DCMA and Defense Commissary Agency (DeCA), are predominantly tenants in DoD and other federally managed space. These Components generally achieve outreach by sharing the sustainability policy and programs of their hosts with their employees. DCMA also provides quarterly messages to the workforce emphasizing energy conservation and efficiency as well as sustainability.

DoD welcomes input on its SSPP. Please submit comments and questions through DENIX at https://www.denix.osd.mil/cmrmd/ by clicking on the "Contact Chemical Material Risks Management Program" link on the left.

II. Strategic Overviews for the Military Services and DLA

II.1 Army

The Army's overarching mission-focused sustainability efforts include policies, initiatives, projects, technologies, and collaboration. During FY 2015, the Army issued an overarching *Energy Security and Sustainability Strategy*. The Strategy is built upon the principle of resiliency. Its vision is a ready and resilient Army, strengthened by secure access to our energy, water, and land resources, which preserves future options in a rapidly changing world. This vision has three components: a ready force, resilient capabilities, and secure resources. The Strategy consists of five strategic goals:

1. Inform Decisions
2. Optimize Use
3. Assure Access
4. Improve Resiliency
5. Drive Innovation

These goals aim to: improve resource efficiency, expand alternative and renewable energy, incorporate science and technology, and accomplish networked energy security and installation resiliency.

II.2 Navy

From the Navy's perspective, sustainability encompasses policies, technology, best practices, smart planning, and an appropriate level of fiscal investment to ensure effective mission performance now and for the foreseeable future, while respecting the natural environment and recognizing resource constraints. If Navy ships, aircraft, and tactical equipment can travel farther on a gallon of fuel, the Navy can reduce vulnerabilities associated with refueling, remain on station longer, and/or increase the intensity of operations when needed. Reducing energy consumption and integrating affordable renewable energy sources at shore facilities makes the Navy more resilient and allows resources to be focused on training and operational requirements, which is especially vital in times of fiscal constraint. Responsibly managing Navy impacts to the land, water, and in the air meets the spirit and intent of applicable environmental regulations while maintaining trust with the public and other key stakeholders. Interfacing with industry and outside federal agencies ensures that urban development and other uses near Navy installations and training areas do not degrade the ability to train and operate naval forces. Finally, evaluating and addressing the potential effects of climate change on shore infrastructure allows for continued support of Navy operational assets.

II.3 Air Force

The mission of the United States Air Force is "to fly, fight, and win … in air, space, and cyberspace." This mission is energy and resource intensive, and requires considerable access to, and dependence upon, built and natural infrastructure. To the Air Force sustainability is not a stand-alone program, nor is it simply an environmental initiative; rather it is a holistic philosophy and integrated management approach that connects activities today to those of the future through sound business, environmental, energy and material management practices. Sustainability helps create and maintain conditions that allow the Air Force to achieve its mission and improve its performance while reducing compliance burdens and operating costs. In times of constrained budgetary resources, sustainability initiatives help the Air Force maintain efficiently operated, ready, and resilient installations, while making funding available for other mission areas.

II.4 Marine Corps

The U.S. Marine Corps embraces sustainability as a means of improving mission accomplishment. The essence of sustainability is using mission-critical resources—energy, fuel, water, equipment, and facilities—with greater efficiency, while enhancing warfighting capabilities and mission. Operating more efficiently is a universal concept that can be achieved by better integrating sustainable practices across every facet of the USMC mission and capabilities, from bases to battlefield, acquisition to fielding, concept to application.

II.5 Defense Logistics Agency

The mission of the Defense Logistics Agency is to provide effective and efficient global solutions to warfighters and other valued customers. Integrating sustainability into DLA's activities is vital for delivering effective solutions and world-class, global support to the warfighter. DLA fully embraces the DoD vision of sustainability and considers itself an integral part in DoD's effort to maintain the ability to operate into the future without decline, either in the mission or the natural and built systems that support it. DLA's sustainability strategy includes workforce engagement, leveraging technology to consistently improve resource

consumption efficiency, working with our customers and industry partners to increase availability of and demand for "green" products and bio-based fuels, increasing DLA's non-tactical fleet efficiency through smart management and planning, and treating sustainability as a critical enabler in the performance of DLA's mission. Over the past year, DLA formalized its Sustainability and Climate Change Adaptation Program to support efficient and effective implementation of EO 13693 and EO 13653. Successful implementation of the Sustainability and Climate Change Adaptation Program will ensure DLA's continued excellence in environmental stewardship and promote sustainability as an integrated agency-wide concept.

III. Goal and Sub-Goal Summaries

III.1 Progress Update

Figure 3 displays the status of DoD's progress on its sub-goals in scorecard form. A green score is assigned when the result is equal to the target or greater. A result scores red when it is below the amount needed for yellow. The scoring system for assigning yellow is shown in Table 2. Sub-goals that match those in the Sustainability/ Energy Scorecard of the Office of Management and Budget use the same color ranking system. Table 3 shows sub-goal results for FY 2010 through FY 2015. Appendix A provides the metrics for each sub-goal, along with the results and targets from FY 2011 through FY 2020. Beginning with the FY 2017 SSPP, the DoD SSPP sub-goals will be extended to FY 2025 and updated to correlate with EO 13693.

Table 2. Basis for Yellow Scores in the Sub-Goal Scorecard for FY 2015 Results

Sub-Goal		Yellow if < Target but:
#	Topic	
1.1	Energy	≥27%
1.2	Renewables [§2911(e)]	≥ last year's target
1.3	Vehicle Fuel	≥ last year's target
2.1	Potable Water	≥ last year's target
2.2	Industrial, Landscaping, and Agricultural (ILA) Water	*(baseline begin changed to FY 2016)*
2.3	Stormwater	≥90%
3.1	GHGs - Scopes 1 & 2	≥ half of FY 2020 goal
3.2	GHGs - Scope 3	≥ half of FY 2020 goal
3.3	Teleworking	≥ last year's target
3.4	Business Air Travel	≥ last year's target
5.1	Printing Paper	≥ last year's target
5.2	Solid Waste - Non-Hazardous	≥48%
5.3	Solid Waste - C&D Debris	≥58%
6.1	Toxic Chemicals	≥12%
6.2	Pesticides - Certification	≥99%
6.3	Pesticides - Plans	≥95%
7.1	Sustainable Procurement	≥95%
7.2	Electronic Stewardship	no metric is <90% of the target
7.3	Sustainable Buildings	≥ 13%

Cross-Cutting Initiatives

This section highlights Department activities that do not fit neatly under a single sub-goal. One example is the Army's Net Zero Installations initiative, which focuses on maximizing efficiency, maximizing reuse, and reducing demand. The Army transitioned Net Zero from a pilot initiative covering 17 installations to an Army-wide approach to sustainability via a directive signed by the Secretary of the Army on 28 Jan 2014. In FY 2015, ASA(IE&E) issued its *Strategy 2025*. The ten-year Strategy details the vision and top-level objectives for three key business drivers—installations, energy, and environment—to help the Army meet future challenges and succeed in future operating environments. The Strategy provides guidance and direction for the Army's land-holding Commands and installations, as well as operational energy efforts. Army Senior Leaders review the progress on each of the Strategy's objectives on a quarterly basis.

Figure 3. DoD SSPP Scorecard for FY 2015 Results

Objective #1: The Continued Availability of Resources Critical to the DoD Mission is Ensured	
GOAL #1: The Use of Fossil Fuels Reduced	
	**1.1** - Reduction in Facility Energy Intensity
	**1.2** - Use of Renewable Energy [Title 10, United State Code §2911(e)(2)]
no FY15 target	**1.3** - Reduction in Fleet Petroleum Use (non-tactical)
GOAL #2: Water Resources Management Improved	
	**2.1** - Reduction in Facility Potable Water Intensity
N/A	**2.2** - Reduction in Facility Industrial and Irrigation Water
	**2.3** - Stormwater Runoff Managed to Maintain Pre-Development Hydrology
Objective #2: DoD Readiness Maintained in the Face of Climate Change	
GOAL #3: Greenhouse Gas Emissions Associated with DoD Operations Reduced	
	**3.1** - Reduction in Scope 1&2 GHG Emissions
	**3.2** - Reduction in Scope 3 GHG Emissions
	**3.3** - Increase in Teleworking by Eligible Employees
	**3.4** - Reduced Scope 3 GHG Emissions from Employee Air Travel
GOAL #4: DoD Climate Change Risks Assessed and Resiliency Improved	
Objective #3: The Ongoing Performance of DoD Assets Ensured by Minimizing Waste and Pollution	
GOAL #5: Solid Waste Minimized and Optimally Managed	
	**5.1** - Increase in DoD Employees Covered by Policies to Reduce the Use of Printing Paper
	**5.2** - Increase in Non-Hazardous Solid Waste Diverted from the Waste Stream
	**5.3** - Increase in Construction and Demolition Debris Diverted from the Waste Stream
GOAL #6: The Use and Release of Chemicals of Environmental Concern Minimized	
	**6.1** - Reduction in On-Site Releases and Off-Site Transfers of Toxic Chemicals
	**6.2** - DoD Personnel and Contractors Who Apply Pesticides Are Properly Certified
	**6.3** - Integrated Pest Management Plans Prepared, Reviewed, and Updated Annually
Objective #4: Continuous Improvement in the DoD Mission Achieved through Management and Practices Built on Sustainability and Community	
GOAL #7: Sustainability Practices Become the Norm	
	**7.1** – 95% of Procurement Conducted Sustainably
	**7.2** - Electronic Stewardship and the Efficient Use of Data Centers
	**7.3** - Sustainable Buildings (Conforming to the Guiding Principles)
n/a	**7.4** - Environmental Management Systems Effectively Implemented and Maintained

Another example is the 20-year Air Force Civil Engineering Flight Plan issued by the Air Force in 2016 in order to implement the Air Force Strategic Master Plan. The plan incorporates sustainability as a key component of ensuring resilient Air Force installations that are "right-sized" to meet the mission with sustainably-built and natural infrastructures. The Air Force also uses Sustainability Development Indicators to ensure that sustainability is considered and addressed in the comprehensive planning process, by using the indicators to establish the installation sustainability profile for the Installation Development Plan. The quantitative values represented by the indicators can be used as measurement and predictive tools to inform the planning process, in conjunction with other quantitative and qualitative information. The indicators span a wide range of topics: air quality, energy and water use, water quality, encroachment, land use, non-hazardous waste reduction, renewable energy, space optimization, and natural and cultural resources. These categories are mandatory elements of the Installation Development Plan and address areas of interest that are both "inside the fence" and "outside the fence".

Other examples of progress that span multiple areas are the annual Federal Energy and Water Management awards, conferred by the Department of Energy Federal Energy Management Program. In FY 2015, the Military Services received 56% of the awards (18 out of 32) presented across the entire federal government. A selected set of these are showcased in Section IV.

Finally, all of the MILDEPs operate under policies and plans that reflect the integrated nature of sustainability. Examples are the:

- The Department of the Navy (DON)[3] cross-cutting environmental policy, *Environmental Readiness Program Manual*;
- U.S. Air Force *Energy Strategic Plan*, which also places a strong emphasis on water; and
- Army *Energy Security and Sustainability Strategy*.

[3] In this document, the Navy is used to refer to the U.S. Navy (USN), while DON refers to the Department of the Navy (which includes the U.S. Marine Corps as well as the U.S. Navy).

Table 3. Summary of FY 2015 Results for DoD SSPP Sub-Goals

#	Sub-Goal	2010	2011	2012	2013	2014	2015	2015 target
Objective #1: The Continued Availability of Resources Critical to the DoD Mission is Ensured								
GOAL #1: The Use of Fossil Fuels Reduced								
1.1	**Energy Intensity of Facilities Reduced 30% from FY 2003 Levels by FY 2015 and 37.5% by FY 2020**	11.4%	13.3%	17.7%	17.2%	17.6%	**19.9%**	30%
1.2	**By FY 2020, Produce or Procure Energy from Renewable Sources in an Amount that Represents at Least 18% of Electricity Consumed by Facilities**	9.6%	8.5%	9.6%	11.8%	12.3%	**12.4%**	12%
1.3	**Fleet GHG Emissions per Mile Traveled Reduced 30% from FY 2014 Levels by FY 2025**						**-2.9%**	none until FY17 (4%)
GOAL #2: Water Resources Management Improved								
2.1	**Potable Water Consumption Intensity by Facilities Reduced 26% from FY 2007 Levels by FY 2020**	12.6%	10.8%	18.6%	19.8%	21.5%	**22.3%**	16%
2.2	**Potable Industrial and Irrigation Water Consumption Reduced 18% from FY 2016 Levels by FY 2025**	*N/A until FY 2016*						none
2.3	**All Development and Redevelopment Projects of ≥5,000 Sq. Ft. Maintain Pre-Development Hydrology to the Maximum Extent Technically Feasible**	not avail.	not avail.	98%	98.9%	79.4%	**79.7%**	100%
Objective #2: DoD Readiness Maintained in the Face of Climate Change								
GOAL #3: Greenhouse Gas Emissions Associated with DoD Operations Reduced								
3.1	**Greenhouse Gas Emissions from Scope 1 and 2 Sources Reduced 42% from FY08 Levels by FY25**	3.6%	4.4%	9.2%	10.3%	11.3%	**11.9%**	16%
3.2	**Greenhouse Gas Emissions from Scope 3 Sources Reduced 25% from FY 2008 Levels by FY 2025** (with hosted renewable energy credit)	4.8%	(0.1%)	9.1%	18.5%	19.5%	**17.8%**	4%
3.3	**30% of Eligible Employees Teleworking at Least Once Per Bi-Weekly Pay Period, on a Regular, Recurring Basis, by FY 2025**	not avail.	not avail.	8%	13.4%	14.5%	**14.0%**	15%
3.4	**Greenhouse Gas Emissions from Employee Air Travel Reduced 7% from FY 2011 Levels by FY 2020**	not applic	not applic	9.0%	27.5%	29.0%	**21.1%**	2%
GOAL #4: DoD Climate Change Vulnerability Assessed and Resiliency Improved								

#	Sub-Goal	2010	2011	2012	2013	2014	2015	2015 Target
Objective #3: The Ongoing Performance of DoD Assets Ensured by Minimizing Waste and Pollution								
GOAL #5: Solid Waste Minimized and Optimally Managed								
5.1	**By FY 2015, at Least 95% of DoD Employees Covered by Policies to Reduce the Use of Printing Paper**	43%	43%	57%	58%	63.6%	**98%**	95%
5.2	**50% of Non-Hazardous Solid Waste Diverted from the Waste Stream by FY 2015 and Thereafter Through FY 2020**	39%	40%	49%	46%	46%	**46%**	50%
5.3	**60% of Construction and Demolition Debris Diverted from the Waste Stream by FY 2015, and Thereafter Through FY 2020**	73%	77%	74%	73%	82%	**82%**	60%
GOAL #6: The Use and Release of Chemicals of Environmental Concern Minimized								
6.1	**On-Site Releases and Off-Site Transfers of Toxic Chemicals Reduced 15% from CY06 Levels by FY20**	2.8%	2.5%	(6.6%)	23.4%	15.5%	**17.6%**	5%
6.2	**100% of DoD Personnel and Contractors Who Apply Pesticides Are Properly Certified**	99.4%	99.2%	99.0%	99.6%	99.6%	**99.6%**	100%
6.3	**All DoD Installations Have Integrated Pest Management Plans Prepared, Reviewed, Updated Annually by Pest Management Professionals**	84.6%	90.2%	96.7%	90.9%	95.6%	**94.2%**	100%
Objective #4: Continuous Improvement in the DoD Mission Achieved through Management and Practices Built on Sustainability and Community								
GOAL #7: Sustainability Practices Become the Norm								
7.1	**95% of Procurement Conducted Sustainably**	not avail.	82.6%	95.0%	98.0%	97.5%	**96.1%**	95%
7.2	**Electronic Stewardship and Data Centers**	***See table for sub-goal 7.2 in Appendix A***						
7.3	**15% of Existing Buildings Conform to the Guiding Principles on High Performance and Sustainable Buildings By FY 2020**	0.89%	0.89%	0.97%	1.09%	1.11%	**1.50%**	FY25 target is 15%
7.4	**All Environmental Management Systems Effectively Implemented and Maintained by FY 2020**	red	red	red	red	yellow	*(quantitative metric for this sub-goal being discontinued)*	

Objective #1: The Continued Availability of Resources Critical to the DoD Mission is Ensured

GOAL #1: The Use of Fossil Fuels Reduced

Sub-Goal 1.1 – Facility Energy Intensity

Energy consumption by DoD facilities was 19.9% lower in FY 2015 than in the FY 2003 base year. Although this fell short of the 30% target, it does represent continued progress, as shown in Figure 4. The Department's ongoing emphasis on performance contracting is expected to continue the downward trend. Energy intensity declined 2.3% from FY 2014, while the building area corresponding to that usage dropped 1.6% due to ongoing efforts to reduce the Department's real property inventory.

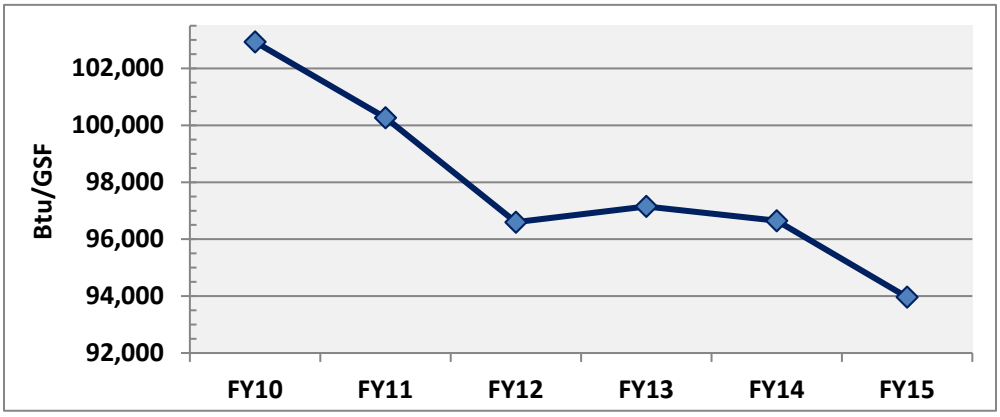


Figure 4. DoD Facility Energy Intensity from FY 2010 to FY 2015

Air Force facility energy intensity in FY 2015 was 106.2 thousand British thermal units (kBtu) per gross square foot (GSF), 24.3% below the FY 2003 baseline and 2% lower than the intensity in FY 2014. Key contributors to this accomplishment came from the consistent application of the following across Air Force installations:

1. realization of savings from prior investments in energy-saving projects;
2. energy awareness programs;
3. continued investments in energy savings performance contracts (ESPCs) and utility energy services contracts (UESCs); and
4. retro- and re-commissioning of facility heating, ventilating, and cooling (HVAC) systems.

Funding for energy saving projects is determined each year by the Civil Engineer Council as part of the overall process of developing the Integrated Project List. This process focuses on asset management principles to help ensure that funding through facility Sustainment, Restoration, and Modernization (SRM) is used for projects that offer the greatest mission benefit. Funding decisions for energy saving projects are based on the total funding available and the relative value to the Air Force in terms of the net life-cycle financial savings of the proposed projects.

Advanced energy meter, NAS Kingsville, TX

Photo: U.S. Navy

The Navy reduced the energy intensity of its facilities by 21.5% in FY 2015, relative to the FY 2003 baseline. It invested heavily in FY 2015 to continue driving down energy intensity, investing $520 million in performance-based contracts through the Navy's Capital Investment. The Navy channeled another $110 million in appropriated funds into energy efficiency improvements such as facility optimization, lighting efficiency, facility industrial controls, and upgrades to HVAC systems. In October, 2015, the Navy decommissioned its last three coal-fired boilers, built in 1954 and located at the central heating plant of Navy Support Facility Indian Head. The plant was replaced by nodal steam generation plants fueled with natural gas.

Since 2013, the Marine Corps has invested over $200 million to improve the energy efficiency of heating, cooling, and lighting systems; installed advanced metering infrastructure; and expanded the utilization of renewable energy resources on USMC installations. As a result of these efforts, the Marine Corps reduced facility energy intensity by 20.2% in FY 2015 compared to the FY 2003 baseline. The Marine Corps continues to focus on energy efficiency as the core strategy for reaching energy independence, with Installation Commands required to submit a "U.S. Marine Corps Energy and Water Management Annual Report," signed by both the Energy Manager and Installation Commander. These reports evaluate the energy management program overall, discuss current status and achievements, and lay out future plans and funding requirements. On 9 March 2015, a Marine Administrative Message was signed for the Energy Ethos Campaign and the Unit Energy Manager Program. These promote the Marine Corps' shared vision that the efficient use of energy resources is a critical component of mission readiness. The programs plan to create a culture of energy and water efficiency throughout bases and stations. The Energy Ethos Campaign:

- provides tenant commands with greater visibility of installation energy resources;
- emphasizes end-user-controlled reductions; and
- sustains the Marine Corps commitment to the efficient use of energy resources.

The Unit Energy Manager, appointed by each tenant command, is vital in supporting and promoting the Energy Ethos.

The Army reduced its facility energy intensity by 18% in FY 2015 from the base year. It is challenging for the Army to continue to achieve significant reductions in facility energy intensity because of two competing factors: the numerator in the calculation increased in FY 2015 due to an increase in the use of training simulation facilities and other energy-intensive buildings and functions related to the Afghanistan equipment reset, while the denominator of the intensity calculation continued to fall, with a significant reduction in building area of 34.5 million square feet in FY 2015. However, the Army's energy intensity is lower than the DoD average: 79.7 kBtu/GSF, compared to 100 kBtu/GSF.

Photo: U.S. Army

The Army continues to prioritize energy efficiency, investing a total of $367 million in FY 2015. Performance-based contracting in FY 2015 consisted of $156 million in task orders under ESPCs, and $49 million in UESCs. The Army received $50.5 million in ECIP funds and invested another $129 million in SRM funds in energy and water efficiency projects in FY 2015. Together, these investments are projected to yield annual savings of more than 1,300 billion British thermal units (Btu) in energy and $23 million in costs. The Army also continued to pursue combined heat and power opportunities, setting a goal in FY 2015 to

install 50 megawatts (MW) annually. The Army has installed advanced electric meters in nearly 17,000 facilities thus far, primarily through its Army's Central Meter Program.

DLA facility energy intensity was very low in FY 2015, less than 47 kBtu/GSF, but its ongoing aggressive efforts to reduce excess building inventory make significant further reductions a challenge. WHS reduced the energy intensity of its buildings by 22% in FY 2015, compared to the FY 2003 baseline. To further reduce its energy intensity, the agency is executing a major recommissioning program through FY 2017. Measures implemented in FY 2015 include water-side economizers at the Pentagon's refrigeration plant and the installation of approximately 85% of the meters to be installed under the Pentagon Reservation metering initiative. DIA reduced its energy intensity by 29% in FY 2015 from the baseline, primarily by optimizing the HQ chiller plants, as well as lighting improvements and efficient plumbing fixtures installed under an ESPC. NRO developed a tool to evaluate energy efficiency opportunities, populated with a wide variety of potential projects that it will assess.

Sub-Goal 1.2 – Renewable Energy

As a percentage of electricity consumed by DoD facilities in FY 2015, DoD produced or procured 12.4% from renewable sources (electric and non-electric), exceeding the target of 12% set by the Department under Title 10, United States Code §2911(e).

The Navy identified, developed, and executed significant large-scale renewable projects across its installations in FY 2015. Approximately 231 MW of new renewable generation was under contract or signed lease by the end of FY 2015, and the Navy had issued requests for proposals for another 570 – 670 MW of renewable energy via utility contracts, power purchase agreements, and outgrants. Another 109 MW are under procurement, expected to start coming online during FY 2016 and FY 2017. When combined with renewable energy projects operational in FY 2015, the Navy has approximately 1.0 gigawatts (GW) of renewable energy in the pipeline that is not associated with the NAWS China Lake geothermal plant or the Norfolk Naval Shipyard waste-to-energy plant. This strategy to pursue new, large-scale renewables will ensure the Navy has cost-effective renewable energy projects to support increased energy security. In August 2015, the Navy signed an agreement between the Western Area Power Administration, on behalf of the DON, and Sempra U.S. Gas and Power to supply 210 MW from a new solar photovoltaic (PV) facility. The power produced will satisfy a third of the energy for 14 DON installations in California (eight Navy, six USMC). The agreement is projected to save the DON at least $90 million over the 25-year term of the agreement. Integrating more renewable energy sources helps to diversify the Navy's energy portfolio, stabilize long-term energy costs through set-price contracts, and provide in-kind consideration in the form of energy security upgrades. In January 2015, Marine Corps Base (MCB) Camp Lejeune and its local energy provider came to an agreement to build a 13 MW solar facility on the base.

Photo: U.S. Navy

The Army added approximately 40 MW of new renewable energy generation capacity in FY 2015, spread over 65 projects. The increase of 30% from the prior year is the largest gain in a single year in Army history. This brings the total Army installed renewable energy capacity to 159 MW (thermal and electric), representing 12.0% of the Army's total facility electricity consumption. Another 300 MW is in the final stages of development by the Army Office of Energy

Initiatives, the central management office for renewable energy projects larger than 10 MW.

The Army's approach to deploying renewable energy is comprehensive, including small-scale projects on rooftops or parking structures, utility-scale systems using private financing, and Military Construction (MILCON) for new construction. The Army financed many renewable energy projects in FY 2015 through programs that leveraged private financing, such as ESPCs, UESCs, renewable energy service/supply agreements, leases, and area-wide utility contracts with the General Services Administration (GSA). These projects are designed with on-site renewable energy capacity to enhance the energy assurance and resiliency of Army installations. The Army is committed to deploying renewable energy assets on Army land to enhance installation energy security, and is on target to meet its commitment plans to deploy 1 GW of renewable energy by 2025. This will enhance energy security, increase installation resilience, and create financial predictability during volatile economic times.

Photo: U.S. Marine Corps

The Air Force produced and procured 6.9% of its total electrical consumption from renewables, both electric and non-electric, in FY 2015, an increase of 5% from FY 2014. At the end of FY 2015, the Air Force had 311 renewable energy projects on 104 sites, either in operation or under construction, using a variety of project delivery methods: power purchase agreements (PPAs), enhanced-use leases (EULs), ECIP, and MILCON. The primary Air Force strategy for meeting renewable energy goals is now purchasing power from third-party financed PPA projects developed on bases. The main component of the agreement is a utility purchase agreement where the Air Force commits to a long-term purchase of all or most of the energy generated by a renewable power source. The Air Force provides a parcel of non-excess and underutilized land for the developer to lease at a fair market rent. The developer recoups its construction investment through the sale of power and tax credits, while the Air Force benefits by purchasing lower-cost power and gaining dedicated renewable electric supply on base.

DLA is developing a project consisting of three solar thermal roofs at Defense Supply Center Richmond, VA, estimated to yield 3 billion Btu annually. At the DIA HQ, construction began in FY 2015 on a 500-kilowatt (kW) roof-mounted solar PV array as part of an ESPC; the project came online in 2016. NSA completed a feasibility study in FY 2015 on solar energy for its cryptologic center in Hawaii, and is seeking funding based on the results.

Sub-Goal 1.3 – Vehicle Fleets

The Department continued to reduce the amount of petroleum-based fuel it used in its fleet of non-tactical vehicles in FY 2015, while ramping up its use of alternative fuels. Petroleum vehicle fuel declined by more than one-third compared to the FY 2005 baseline, while alternative fuel consumption rose 210%. Both results well exceeded their targets of 20% and 159%, respectively. Moving forward, DoD will measure the efficiency and environmental impact of its non-tactical vehicles with a new metric: average GHG emissions from the fleet per mile travelled, with FY 2014 as the base year. The FY 2015 DoD result for the new metric is 3.4% *above* the FY 2014 baseline. There is no target set by the U.S. Government for FY 2015; the first target for this metric is a 4% reduction in FY 2017. As shown in Figure 5, the Navy and Marine Corps reduced the carbon intensity of their fleet from FY 2014 to FY 2015, as did the combination of the other Defense

Agencies, while the GHG emissions per mile travelled increased in the Army and Air Force. A major factor driving performance on the new metric is the extent to which a Component's fleet has been electrified.

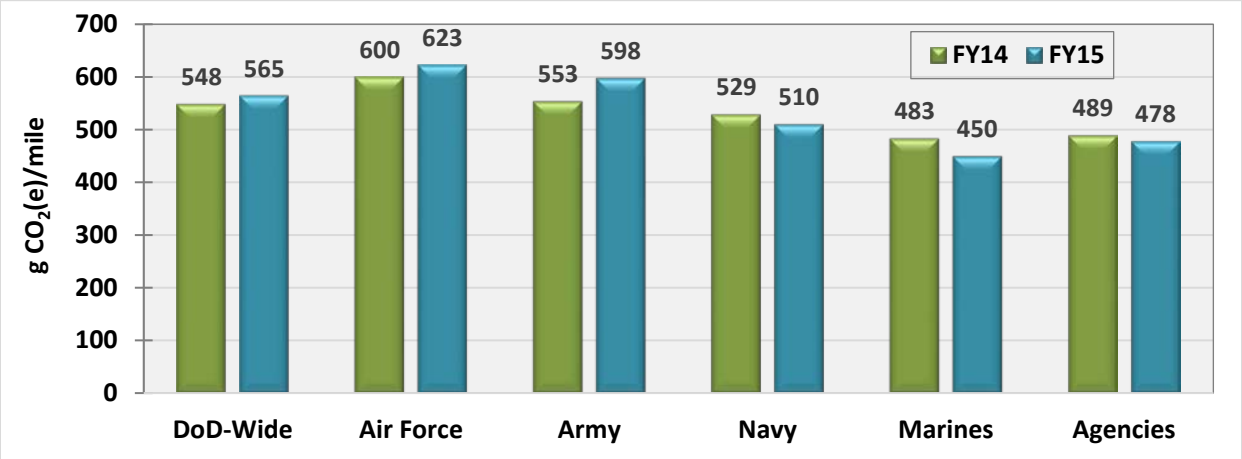


Figure 5. GHG Emissions per Mile Travelled, FY 2014 and FY 2015, DoD-Wide, the Services, and Other Defense Agencies

The Navy fleet consumed 25% less petroleum fuel in FY 2015 than in FY 2005, and 6% less than FY 2014, meeting the 20% reduction goal. The Navy has been implementing a suite of innovative measures to continue the transition to a cleaner fleet. A pilot project is still underway, in partnership with GSA, to determine the life cycle costs and payback of plug-in electric vehicle (EV) technology, both all-electric and gasoline-assisted EVs. The Navy has leased 19 EVs through the project, which will help define requirements for future base EV use. In FY 2015, the Navy completed a one-year pilot project of a plug-in hybrid-electric bucket truck at Joint Base (JB) Pearl Harbor Hickam, HI, and expects to finalize the report in FY 2016. The truck met its success criterion of a 40% relative increase in fuel economy, while also meeting important criteria such as a lack of major operational or safety issues. The project team captured data on noise level, brake wear, unscheduled maintenance issues, vehicle reliability, and drivability. To improve fleet data quality, the Navy is moving towards car-sharing, automated fleet management systems, and the use of Global Positioning System technology. As a result of the successful car-sharing pilots, the Navy is issuing a data call to identify additional candidate sites for inclusion in a new car-sharing contract in FY 2017. The installation of solar carports to function as EV charging stations at Navy installations—begun in FY 2013—continued in FY 2015, with eight of the proposed 11 carports commissioned thus far. This effort is part of a broader infrastructure project for alternative fuel systems at 20 sites which also includes stand-alone EV charging stations and E-85 fuel stations.

The Marine Corps achieved excellent results in FY 2015, reducing non-tactical vehicle petroleum fuel consumption by 44.5% compared to FY 2005, well in excess of the FY 2020 target of 30%. The reduction from FY 2014 was 8%. The Marine Corps' strategy involves a broad array of strategies. One is to increase the use of alternative fuels. Towards this end, nearly every USMC installation now has alternative fuel infrastructure installed, and the USMC is optimally placing alternative fuel vehicles (AFVs) on installations following an analysis of the mission, driving conditions, and fuel availability. MCB Camp Pendleton expanded its EV charging station capacity to 34 stations, and a state-of-the-art hydrogen fuel station is now in operation at MCB Hawaii, allowing personnel to refuel their leased hydrogen fuel-cell vehicles themselves. Another USMC approach is to

develop an advanced technology table of equipment to determine the ratio and type of vehicles suitable for replacing vehicles previously identified for removal from the fleet over the next four years. Vehicles for replacement will be right-typed with smaller, less expensive vehicles. Finally, the Marine Corps continues efforts to reduce the size of the fleet. In FY 2015, based on a review of its FY 2014 Vehicle Allocation Methodology study, the Marine Corps plans to reduce its fleet by 2,628 vehicles, for a total reduction of 18.2% from the FY 2011 baseline.

The Air Force reduction in the use of vehicle petroleum in FY 2015 was 15.9% from the FY 2005 baseline, falling short of the 20% goal. However, Air Force centralized fleet management at the strategic level has increased implementation of best practices and programs, which will help the Air Force meet future reduction goals for the use of petroleum, while ensuring the fleet is ready to meet mission requirements. The Air Force fleet currently has 14,517 AFVs in service. The Air Force continues to lead with technology development and deployment, ensuring its vehicles are sustainable economically and environmentally. The Vehicle Supply Chain Operations Squadron (formerly the Vehicle and Equipment Management Support Office) was named number 11 of the top 50 best-managed government fleets, out of 38,000 competing fleets. In FY 2015, the approach used by the Squadron for procuring, managing, and sustaining the fleet resulted in the removal of 2,008 vehicle authorizations and 1,025 vehicles identified for 'right-sizing' to more fuel efficient models. Since 2011, the Air Force has eliminated 11,031 vehicles from its inventory. In FY 2015, Los Angeles Air Force Base (AFB) became the first Federal facility to successfully field an all-EV fleet as part of DoD's vehicle-to-grid program, demonstrating the ability of EVs to sell electricity back to the utility grid.

EV charging station, Virginia Army National Guard

Photo: U.S. Army

The Army's reduction in petroleum fuel used by its non-tactical vehicle fleet reached 41% in FY 2015 from the FY 2005 baseline. This exceeds OSD's FY 2015 goal of 20% and FY 2020 cumulative goal of 30%. The Army achieved success through an aggressive three-part strategy to downsize the fleet, right-size the mix of vehicles to match the mission, and acquire alternative fuel and high fuel efficiency models. The Army continues to use the GSA vehicle replacement cycle as an opportunity to downsize and right-size the fleet, transitioning to hybrids, plug-in hybrids, and all-electric vehicles where permitted by the mission. Of the 63,487 non-tactical vehicles currently in the fleet as of the end of FY 2015, 37,147 are now alternative fuel and/or high-efficiency vehicles, representing 59% of the fleet. Alternative fuel use has increased 1,713% compared to the baseline, well above the FY 2015 goal of 159%. The Army emphasizes three requirements for its vehicles leased through GSA: vehicles will have the highest rating for GHG emission reductions; vehicles capable of using E-85 fuel (a blend of 85% ethanol and 15% gasoline) will only be located where E-85 fuel is available and will utilize the fuel exclusively; and vehicles will be the most efficient (highest miles per gallon) available on the market. The Army eliminated 1,684 non-tactical vehicles in FY 2015, and since FY 2011 it has reduced the size of its fleet by 16,400 vehicles.

DLA developed a Fleet Management Plan in FY 2015 that will guide future optimization of the fleet and improve vehicle data collection and analysis, as well as future fleet-related sustainability initiatives. DIA reduced its vehicle fleet size by 19% since FY 2012. NSA gives preference in vehicle purchasing to all-electric and hybrid-electric vehicles, and the fleet currently has 86 hybrids, 344 AFVs, and 16 EVs. In NRO, 23% of the fleet uses alternative fuel and, when the mission permitted it, NRO replaced GSA-leased vehicles with hybrids.

GOAL #2: Water Resources Management Improved

Sub-Goals 2.1 and 2.2 – Reducing the Use of Facility Water

The potable water intensity of the Department's facilities was 22.3% lower in FY 2015 than in the FY 2007 base year, well surpassing the 16% target. The Department will establish a baseline for the consumption of industrial, landscaping and agricultural (ILA) water beginning with FY 2016 data. DoD Components will track consumption and costs separately for each of the three water categories (industrial, landscaping, and agricultural), distinguishing between metered values and those that are estimated.

Photo: U.S. Marine Corps

Highly water-efficient washing machines aboard MCAS Cherry Point, NC

The Army recognizes the importance of water for ensuring mission readiness, and water use and security are a major objective in the Army's *Strategy 2025*, issued by ASA(IE&E). The Army's Net Zero Installations Policy (Army Directive 2014-02) directs all Army installations to implement mission-focused net zero water strategies to the maximum extent practical and fiscally prudent. The Army is well ahead of its potable water intensity reduction requirements, reducing water intensity 26.5% since FY 2007, to 42.3 gal/GSF. One of the largest contributors to reducing water intensity is detecting and repairing leaks in distribution systems, and several bases have undertaken significant modernizations of their systems. Based on an evaluation of Army Energy and Water Reporting System data, conducted by the Pacific Northwest National Laboratory, Army ILA water consumption was 21% less in FY 2015 than in FY 2010. The Army's Net Zero Water philosophy, along with DoD's UFC 1-200-02 (*High Performance and Sustainable Building Requirements*), encourage use of reclaimed water where life-cycle cost effective. The Army also requires projects to consider the use of native plant species and dry-scape alternatives be used to reduce outdoor water use. In FY 2015, in conjunction with the Pacific Northwest National Laboratory, the Army Reserve Command evaluated the potential for using harvested rainwater for tactical vehicle wash racks, and identified several sites for potential pilot projects.

The Air Force continued its strong progress reducing water intensity, reaching a 23.4% reduction from the FY 2007 baseline, against the target of 16%. The Air Force's FY 2015 water intensity was 42.8 gallons per square foot, 2.5% lower than FY 2014. The continued reductions were made possible through improvements such as leak detection, infrastructure repair, replacing plumbing fixtures, metering, and using non-potable water for ILA uses. Air Force ILA water consumption in FY 2015 was 1,495,674 thousand gallons, exceeding the 10% reduction goal from the FY 2010 baseline. FY 2015 initiatives aimed at improving ILA consumption performance included xeriscaping, efficient irrigation policies, and recycling water. The Air Force analyzed data across its installations and found that privatizing water utilities reduces water consumption an average of 28% compared to non-privatized systems. In FY 2015, the Air Force entered into a 50-year contract to privatize the water distribution and wastewater collection systems at Vandenberg AFB, CA. The move is expected to save 1.1 billion gallons of water and more than $9 million over the term of the contract. In recognition of the criticality of water availability to mission objectives, the Air Force initiated a program at five bases to produce Water Resources Management and Sustainment Plans. The plans will help identify regional concerns over water availability and security.

In FY 2015, the Navy reduced facility potable water intensity by 12% relative to the 2007 baseline.

Although this falls short of the 16% reduction goal, investments made in water efficiency, bundled with energy efficiency investments, are expected to increase momentum in water intensity reduction through FY 2019. The Navy is currently establishing a baseline for ILA water consumption by leveraging potable water data and measuring conservation from non-potable water projects, which include xeriscaping, water reuse and irrigation system upgrades. Compared to FY 2014, the Navy reduced ILA consumption 5.4%.

Photo: U.S. Army

JB Lewis-McChord, WA, upgraded its wastewater treatment plant to reclaim wastewater

Improving on its already significant progress of the last three years, the Marine Corps reduced potable water intensity by 31% from the FY 2007 baseline, far exceeding the 16% target and approaching the FY 2025 target of 36%. Progress was achieved through several strategies, including installation of low flow bathroom fixtures such as sink aerators, showerheads, toilets, and urinals. The Marine Corps is currently using guidance issued by the White House Council on Environmental Quality (CEQ) to establish a Service-wide FY 2010 consumption baseline, and to improve reporting protocols for ILA water use.

Water intensity for DLA was 1% below the FY 2007 baseline in FY 2015, but the agency has greatly improved recently, reducing the intensity of potable and industrial water combined by 13% in one year, from FY 2014. DLA is working to improve performance through conservation projects, awareness campaigns, and conservation guidance. As part of an ESPC, DIA installed low flow fixtures at its HQ, playing a large part in DIA's 56% reduction in water intensity from its FY 2007 baseline. NRO is replacing toilets and urinals with low flow fixtures through ECIP funding, and expects to reduce water usage 38% at one site alone. The WHS is engaged in a metering effort to accurately determine water usage across the Pentagon Reservation, which will allow it to establish a new baseline and identify problem areas of high water usage, facilitating easy identification of the areas most in need of investment. In FY 2015, WHS installed a new automatic boiler blowdown system and a heat exchanger to save potable water.

Sub-Goal 2.3 – Stormwater Runoff

Of DoD development and redevelopment projects in FY 2015 with 5,000 square feet or greater, 80% of them complied with the requirement to maintain pre-development hydrology to the maximum extent technically feasible. The Marine Corps and WHS achieved 100% compliance, the Air Force 95%, the Navy achieved 89% compliance, and the Army 74.5%.

The Air Force abides by all Sustainable Design and Development guidelines set forth by UFC 3-210-10 (*Low Impact Development*), and in FY 2015 had 78 projects compliant with maintaining pre-development hydrology, equivalent to 95% of all projects greater than 5,000 square feet. The Air Force developed and strengthened controls for post-construction management of stormwater runoff, addressing EISA §438 requirements in detail with stormwater management plans at many bases. Projects across the Air Force use LID techniques to manage stormwater, such as reducing impervious area, use of permeable pavement, and xeriscaping.

The Navy directs that all projects involving stormwater management consider LID in order to achieve the Navy goal for no major renovations and construction projects to cause a net increase in

Photo: U.S. Marine Corps

stormwater volume, or in sediment or nutrient loading. In FY 2015, eight out of nine qualifying Navy projects were able to maintain pre-development hydrology. All five of the Marine Corps' development projects over 5,000 square feet maintained pre-development hydrology. The Marine Corps accesses its stormwater management data through eProjects, an electronic tracking capability for LID measures developed by the Naval Facilities Engineering Command (NAVFAC), which was responsible for four of the USMC projects.

In FY 2015, the Army issued implementing guidance for *Army Stormwater Management Using Low Impact Development*. The Army also issued automated LID planning and cost estimating tools that complement the 2013 *Army Low Impact Development Technical User Guide*. The guide is for Master Planners, LID project designers, and installation Departments of Public Works, and supports the requirements of the Army's updated sustainable design and development policy (December 2013) regarding LID in master planning, project development, and planning project sites. In an effort to combat erosion, the Army completed an evaluation of the use of biopolymer seed coatings to enhance reseeding of damaged flora in training areas. The Army also conducted three webinars in FY 2015 on LID implementation, targeting master planners, design engineers, stormwater program managers, and contracting officer representatives.

Objective 2: DoD Readiness Maintained in the Face of Climate Change

GOAL #3: Greenhouse Gas Emissions Associated with DoD Operations Reduced

The Department's target subject GHG emissions were 13.3% lower in FY 2015 than the FY 2008 baseline, as shown in Table 4. Total DoD GHG emissions for FY 2015, for all categories subject to the reduction target, were 29.9 MMT CO_2(e) emissions, when third-party operated renewable energy generation is included.[4] Eighty percent of the inventory comes from just three source categories: purchased electricity (49%), stationary combustion (20%), and employee commuting (12%).

Sub-Goal 3.1 – Scopes 1 and 2 Greenhouse Gas Emissions

The downwards trend in the Department's Scopes 1 and 2 GHG emissions continued in FY 2015, with emissions 12% lower than the FY 2008 baseline, although this was short of DoD's 16% target.

Sub-Goal 3.2 – Scope 3 Greenhouse Gas Emissions

The Department's Scope 3 GHG emissions in FY 2015 rose 2% from the prior year, but they were nonetheless nearly 18% lower than the FY 2008 base year, when Scope 3 hosted credits are included. The FY 2015 result surpassed DoD's 13.5% reduction target for FY 2020.

[4]This amount reflects the inclusion of Scope 3 credit DoD receives for renewable energy generation hosted on DoD land but operated by third parties, for which DoD does not retain the renewable energy certificates. Without this credit, target subject emissions totaled 30.8 MMT of CO_2(e).

Table 4. Change in DoD GHG Emissions (Subject to Target) From FY 2008 to FY 2015

Scope and Category		DoD GHG Emissions Subject to Target, million MT $CO2_{(e)}$							% Decrease (FY 2008 - 2015)
		FY 2008	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	
Scope 1	Stationary Combustion	6.73	6.68	6.40	6.08	6.06	6.06	5.85	
	Non-highway Vehicles, Aircraft, Ships, Equipment	1.74	0.99	1.56	1.46	1.44	1.30	1.34	
	Passenger Fleet Vehicles	0.73	0.68	0.64	0.62	0.53	0.51	0.48	
	Fugitive, Fluorinated Gases, Other	0.22	0.30	0.23	0.20	0.28	0.31	0.44	
	Fugitive, On-site Wastewater Treatment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	Fugitive, On-site Landfills	0.22	1.10	0.26	0.25	0.24	0.28	0.30	
	Industrial Process Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Scope 2	Purchased Electricity	16.35	15.91	15.74	15.05	14.56	14.61	14.58	
	Purchased Biomass Energy	0.00	0.01	0.01	0.01	0.01	0.01	0.00	
	Purchased Steam and Hot Water	0.86	1.76	1.02	0.95	1.26	0.83	0.74	
	Purchased Chilled Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Purchased CHP Electricity, Steam & Hot Water	0.00	0.00	0.03	0.00	0.00	0.00	0.00	
	Reductions for Renewable Energy Use	0.00	-0.42	-0.21	-0.23	-0.29	-0.08	-0.08	
Scopes 1 and 2		**26.86**	**27.01**	**25.68**	**24.39**	**24.10**	**23.82**	**23.65**	**11.9%**
Scope 3	Transmission & Distribution (T&D) Losses	1.05	1.04	1.01	0.98	0.96	0.96	0.96	
	T&D Losses REC Adjustment	n/a	n/a	n/a	0.0	-0.02	-0.01	-0.01	
	Employee Business Air Travel	2.30	1.89	2.39	2.09	1.67	1.69	1.82	
	Employee Business Ground Travel	0.24	0.33	0.24	0.26	0.21	0.22	0.23	
	Employee Commuting	3.40	3.47	3.84	3.82	3.74	3.66	3.59	
	Off-site Wastewater Treatment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
	Contracted Municipal Solid Waste Disposal	0.64	0.62	0.59	0.46	0.57	0.65	0.58	
	Credit for Hosting Renewable Energy Facilities	n/a	-0.75	-0.66	-0.67	-0.91	-1.03	-0.89	
Scope 3		**7.63**	**6.61**	**7.42**	**6.94**	**6.22**	**6.14**	**6.28**	**17.8%**
Total Emissions		**34.49**	**33.62**	**33.10**	**31.33**	**30.32**	**29.96**	**29.93**	**13.2%**

Sub-Goal 3.3 – Telework

Of those DoD employees eligible for regularly recurring telework in FY 2014, 14.0% teleworked at least one day per two-week pay period, falling somewhat short of the 15% target. Of those teleworking regularly, 62% do so one or two days per pay period, and 38% telework three or more days per pay period. Figure 6 shows the participation rate for the Services and seven other DoD Components having 2,000 or more employees eligible for regular teleworking. The Component with the highest participation was the Defense Information Systems Agency (DISA), with 77% of eligible employees teleworking on a regular basis. DCMA and the Defense Contract Audit Agency (DCAA) each had more than 61% participation.

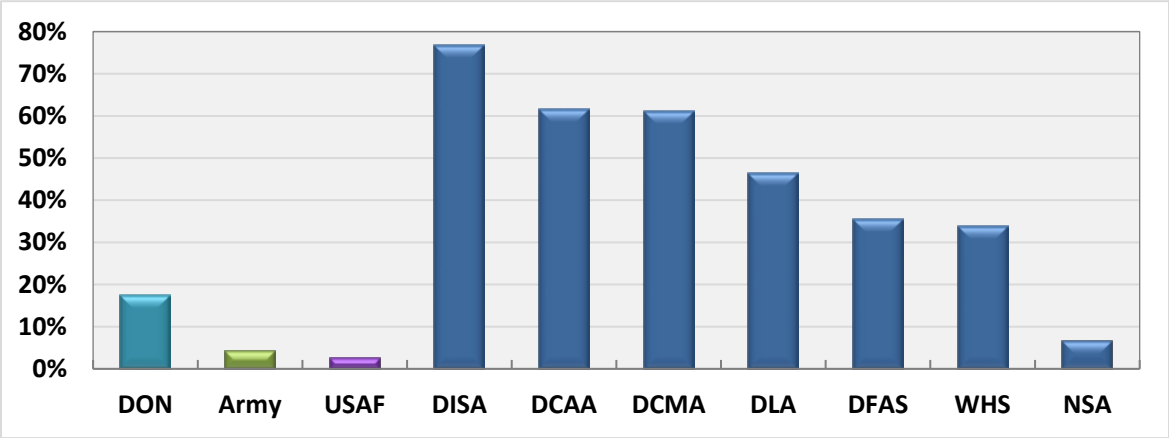


Figure 6. Regular Teleworking Participation in DoD, Shown for the MILDEPs and Components with at Least 2,000 Eligible Employees

The Department of the Navy issued its first comprehensive, enterprise-wide telework policy in May 2015. The policy reiterates the DON commitment to expanding telework opportunities wherever possible, outlines management responsibilities to overcome obstacles, and directs consistent implementation of telework programs throughout DON, including reporting requirements.

The Army issued an updated comprehensive Headquarters Department of Army telework policy on 20 August 2015. The Assistant Secretary of the Army for Manpower and Reserve Affairs works to increase regular and situational telework participation by highlighting the benefits of telework, including increased continuity of operations and employee satisfaction. Several Army Commands have also developed policies to implement regular and situational telework for eligible employees.

A number of Air Force policies, including the 2013 Air Force Instruction 36-816, *Civilian Telework Program*, promote the use of flexible work arrangements, including teleworking for eligible civilian employees. Consistent with workload and mission requirements, the Air Force encourages Installation Commanders, Tenant Commanders, and Heads of Activities to attempt to overcome artificial barriers and permit flexible work arrangements that allow employees to better balance their work and family responsibilities on a daily basis. Commanders are encouraged to regularly promote flexible work arrangements throughout their organizations for eligible employees, and to remind supervisors to inform applicants of available work/life flexibilities when filling vacancies.

In DLA, telework remains a cornerstone for enabling mission continuity, productivity, recruitment and retention efforts, and overall work-life balance for employees and management. DLA continues to substantially exceed the FY 2020 goal of 30%, experiencing a progressive increase in telework

participation due to improvements in technology, increased employee awareness, management acceptance, and overall personnel comfort with telework.

Sub-Goal 3.4 – Employee Air Travel


Navy videoteleconference with global participation

Photo: U.S. Navy

The FY 2015 GHG emissions associated with business air travel by DoD employees were 21% lower than the FY 2011 base year. DoD Components continue to follow the 2011 Secretary of Defense Track Four Initiative Decisions, requiring that travelers justify why travel is needed to accomplish the objective, and DoD employees are increasingly making use of electronic communication systems in lieu of travel. Given the Department's continued success on this sub-goal, and to streamline the framework of SSPP sub-goals, this sub-goal is being discontinued.

GOAL 4 – DoD Climate Change Vulnerability Assessed and Resiliency Improved

DoD expanded its climate adaptation and resilience efforts in 2015. The Department developed and staffed a DoD Directive titled *Climate Change Adaptation and Resilience*, DoDD 4715.21, issued on 14 January 2016. The DoDD establishes policy, roles, and responsibilities for the integration of climate change resilience across the Defense enterprise. The formal coordination of the new Directive during 2015 raised awareness of the roles and responsibilities across DoD for considering how a changing climate will effect mission execution. The DoDD solidified the commitment of the Department to fully integrate consideration of climate effects into its core policies, plans, programs, and operations. It was a significant step forward to direct the Defense-wide consideration of the effects of climate change and to plan for how to address these effects. DoD also made major strides in developing processes to address climate effects on a regional basis, collaborating with surrounding communities and local and state governments to identify ways to leverage one another's capabilities and become more resilient together. As the effects of a changing climate continue to affect today's perception of normal and the ability to carry out the DoD mission, it is critical that the Department have in place appropriate planning processes.

In FY 2015, DoD expanded the screening of DoD issuances (Directives, Instructions and Manuals) to identify those that should be updated to include the consideration of climate change impacts, beyond the initial focus on those relating to land and water management. An additional 87 issuances were identified for a more in-depth review and content update during the course of the regular review cycle, to be completed in 2025. The three DoD Regional Climate Change Adaptation Planning Pilot efforts continued at the Naval Support Activity Hampton Roads, VA, Michigan Army National Guard, and Mountain Home AFB, ID. All sites made good progress in convening stakeholders, reviewing climate effects, and identifying planning areas of common interest to pursue. In September 2015, DoD completed its qualitative Screening-Level Vulnerability Assessment Survey of impacts to DoD installations worldwide from severe weather and projected changes in sea level rise. The Department also completed a pilot test on four installations of the tool DoD developed to assess water needs, to help installations identify how much water they need to satisfy mission requirements. Based on feedback and lessons learned, the tool was updated and a second phase of pilot testing was initiated at 20 installations.

In March 2015, the Army's four-star Senior Energy and Sustainability Council directed its members

to begin implementing the DoD Roadmap, and designated Army leads for each of the Roadmap's four Lines of Effort. In FY 2015, the Army Deputy Chief of Staff for Operations, Plans, and Training (G-3/5/7) began a more robust evaluation of the impact of severe weather events on Army training lands and infrastructure. Repair cost data and recovery times, previously collected at the facility level, will be reported using existing enterprise data systems to enable Army-wide analysis. This analysis will facilitate future training rotation planning activities and enable adjustments to out-year budget development when needed. Also in FY 2015, the Army focused on the climate-related analysis factors already included in the 'military value' determination of stationing decisions. Additional climate information, such as projected water availability, can be paired with existing analysis factors (such as projected population growth) to better integrate climate change considerations. The Army began developing implementation guidance for common installation-level plans, such as Real Property Master Plans, water system planning, and Integrated Natural Resource Management Plans (INRMPs). Efforts in FY 2015 began with INRMPs, to develop guidance on how to integrate climate change into them, in accordance with DoDI 4715.03 (*Natural Resources Conservation Program*, March 2011). Army INRMP integration guidance will be issued in late FY 2016. The National Guard continued to evaluate the resiliency of its readiness centers to support anticipated increased demand for disaster response.

Photo: U.S. Navy

In FY 2015, the Navy made progress directly supporting the lines of effort necessary to achieve the broad adaptation goals of the DoD Climate Change Adaptation Roadmap. This included identifying and assessing the effects of climate change within the Navy, integrating consideration of these effects into Navy planning and risk management efforts, and collaborating with stakeholders. One of the key Navy adaptation efforts in FY 2015 was the Hampton Roads Pilot Project. The project takes a "whole of government" approach with the community at large, beyond the base fence line, to ensure the reliability of critical services such as roads leading to the base and utilities supplied to it. For collaboration efforts across the mid-Atlantic region, including the Hampton Roads Pilot Project, the Navy secured a Joint Land Use Study in 2015 to ensure that military and civilian leadership are available to continue critical adaptation planning with community stakeholders. Beyond Hampton Roads, through participation in such efforts as the DoD Screening Level Vulnerability Assessment Survey, the Navy established a vulnerability baseline from which to examine potential disruptions to the mission on individual installations. The Navy continues to update internal policies to promote resiliency to climate change. One such product is the Strategic Communications Plan prepared by NAVFAC, which standardizes Navy communication concerning climate risks to Navy infrastructure and mission readiness. The Plan was released in 2015 and serves as a resource for installations to communicate with and engage local communities.

The Air Force has observed a number of instances at its installations in which recent trends have diverged sharply from historical patterns, in ways that negatively impact operations. Examples include accelerated erosion at the Point Lonely Former Short Range Radar Site, and the deterioration of the rock seawall at the Cape Lisburne Long Range Radar Station, both in Alaska. In response, AFCEC conducted a preliminary coastal erosion study with the ultimate goal of developing a scientifically repeatable process to assist the Air Force in evaluating the long terms risks from coastal

erosion, and making asset management decisions to enhance the resiliency of Air Force early warning assets. The preliminary study characterized the vulnerability and increasing risk that accelerated erosion rates caused by climate change pose to the long-term viability of three Air Force Long Range Radar Sites on the Arctic coast: at Barter Island, Oliktok, and Cape Lisburne. The study considered potential impacts to built infrastructure fundamental to the early warning missions of these sites, such as airfields and radomes (enclosures that protect radar antenna). It also examined areas of environmental concern, such as landfills, threatened and endangered species, cultural resources, and sites regulated by state and federal officials. The Air Force will use the information gained from the study to update existing land use management plans, and support a more detailed vulnerability assessment to be conducted at the installation determined to be most at risk.

Erosion flanking revetment, Oliktok Long Range Radar Site, Point Oliktok, AK

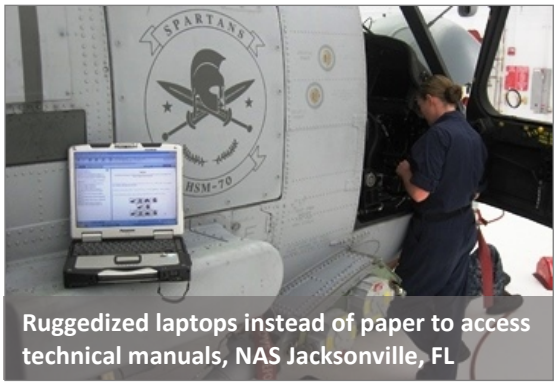
Photo: U.S. Air Force

Objective #3: The Ongoing Performance of DoD Assets Ensured by Minimizing Waste and Pollution

GOAL #5: Solid Waste Minimized and Optimally Managed

Sub-Goal 5.1 – The Use of Paper

The goal of sub-goal 5.1 is for 95% of all DoD employees to be covered by policies to reduce the use of printing paper as of the end of FY 2015. The Department achieved this goal as of FY 2015, with all MILDEPs having issued and implementing policy to reduce the use of printing paper, along with ten other DoD Components: DCMA, DeCA, DLA, MDA, NRO, NSA, WHS, National Geospatial-Intelligence Agency (NGA), Defense Health Agency (formerly the Tricare Management Activity), and Defense Finance and Accounting Services. These Components comprise nearly 98% of all DoD employees, exceeding the 95% target for FY 2015.



Ruggedized laptops instead of paper to access technical manuals, NAS Jacksonville, FL

Photo: U.S. Navy

The Department is undergoing an ongoing shift away from printing, via a suite of proven approaches. Some examples of these are as follows:

1. **Duplex Printing**. Setting printing devices to default to duplex (double-sided) printing, which saves on energy and toner as well as paper. By using the duplex setting when printing, the Navy has saved over $10 million per year over the 500,000 users in the DON, a reduction of over 460,000 reams of paper per year.
2. **Print on Demand**. Print on Demand is "print what you need, as you need it", avoiding overprinting.
3. **Electronic Documentation.** More Components are moving toward electronic document review to reduce the volume of paper waste generated. The Army, for example, uses digital staff action systems to improve records control, and under the Army's Net Zero Waste

efforts, installations are implementing "go paperless" campaigns. The Air Force uses electronic communications as the primary means of maintaining information on policies and procedures. It maintains or submits most documentation in electronic format; processes staff workflow and coordination electronically; scans records and images; and uses smart forms. DLA requires that documents be coordinated, reviewed, revised, and approved electronically.


Accessing technical order manuals on an iPad, Shaw AFB, SC

Photo: U.S. Air Force

4. **Printers.** Many Components are reducing the number of desk-side printers and moving printing to more centralized locations, a strategy known to reduce printing. Components are also replacing older printers with newer energy-efficient models.

5. **Electronic Storage and Web-Based Document Sharing.** DoD Components are increasingly using electronic storage to manage documents, as well as SharePoint and other web-based sites to share documents and facilitate the electronic review of documents. In the Air Force, for example, AFCEC uses eDASH, a document management and communications electronic dashboard. Air Force electronic flight bags have been highly successful at reducing the use of paper, as well as fuel, by replacing paper-based flight tasks with mobile, electronic information management systems. The Army has implemented electronic filing systems to help reduce the use of paper, while increasing efficiency.

Sub-Goals 5.2 and 5.3 – Solid Waste Diversion

Of the quantity of non-hazardous solid waste it generated in FY 2015, the Department diverted 46% of it away from disposal, falling short of the 50% goal. DoD diverted 82% of its C&D debris in FY 2015, well above the 60% target. As shown in Table 5, every Military Service as well as DLA exceeded the target C&D target, but only two of these met or exceeded the target for non-hazardous solid waste.

Table 5. Percent Solid Waste Diverted from Disposal in FY 2015

Component	Non-Hazardous Municipal	C&D Debris
Army	51%	77%
USN	37%	83%
USAF	50%	87%
USMC	33%	64%
DLA	46%	84%
DoD-wide	**46%**	**82%**
Target	50%	60%

The Air Force increased diversion of non-hazardous solid waste by 2%, reaching the FY 2015 50% goal for diversion. The economic benefit to the Air Force of integrated solid waste management and solid waste diversion for FY 2015 is estimated to be over $60 million. The Air Force remains committed to finding cost-effective and innovative ways to continue achieving the 50% reduction goal. One crucial approach is the use of the Simplified Acquisition of Base Engineering Requirements for contracts and task orders covering maintenance, repair, and minor and new construction services at Air Force bases. This approach requires recycling, the use of recovered products when available, diversion of 50% of non-hazardous solid waste, and the recycling of all C&D debris to the maximum extent practicable. The Air Force continued its strong performance in reducing the disposal of C&D debris, diverting 87% from the waste stream, again exceeding the target. Runway construction and refurbishment

Winning Solid Waste Strategy

Among the strategies used by the Air Force to reduce solid waste disposal is to reuse moving supplies. Vance AFB, which has airmen rotating through on training yearly, captured and stored all moving supplies used by the Airmen when moving in, and returned them to the Airmen to use when moving out, saving more than $58,000.

activities present significant concrete and asphalt recycling opportunities.

The Army's waste diversion rate was 51.4% in FY 2015, up 2.2% from FY 2014. It increased composting by 63.6% from FY 2014, while reducing the amount of solid waste generated by 39%. Recycling revenues totaled $39 million, a 4.8% increase from FY 2014. Some installations saw revenue in excess of $1 million, demonstrating the viability of Qualified Recycling Programs. These achievements are due to continued efforts through the Army's Net Zero Waste program, which primarily emphasizes waste avoidance, while also striving for reuse, recycling, and energy recovery where cost effective. Exchange of information at quarterly Command calls has increased diversion rates at Army facilities around the world. Installation Management Command developed a Net Zero Waste course that was attended by 27 installations in FY 2015. The courses provide not only education on the net zero waste hierarchy and solid waste management best practices, but an opportunity for base personnel to interact with Army leadership. The Army continued efforts to reduce food and organic waste, which represents a large portion of all solid waste. Based on a successful demonstration at Fort Lee, VA, nine additional sites have been selected for dehydration systems in troop dining facilities. The Army diverted 77% of its C&D debris in FY 2015. Crushing waste concrete and asphalt and reusing as aggregate for constructing on-post roadbeds is a key factor in this success. To facilitate the diversion of C&D debris, the Army issued an Engineering Construction Bulletin to provide guidance on the deconstruction of existing buildings, where market or re-use opportunities exist.

The Navy's diversion rate was 37% in FY 2015, a decline from 45% in FY 2014, due to one-time occurrences at two installations. The Navy projects that its diversion rate over the next several years will be constrained to the range of 40% to 45%, due to financial constraints on the Navy integrated solid waste management program. With C&D debris, however, the Navy was highly successful, diverting 83% from the waste stream. Strategies for this success include requiring contractors to have management and diversion plans for their construction waste, and using reporting requirements established in the Unified Facilities Guide Specification *Construction and Demolition Waste Management*. The Marine Corps diverted 33.5% of its non-hazardous solid waste, and 63.9% of its C&D debris.

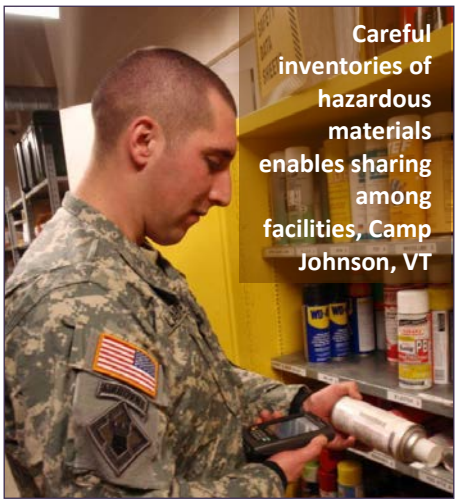
Photo: U.S. Army

DLA achieved an excellent C&D diversion rate of 84%, but fell short with non-hazardous solid waste, reaching only 46%. DLA attributes its C&D success to better oversight and contractor performance. WHS diverted 42% of its solid waste in FY 2015 through a single-stream sorting facility contract.

GOAL #6: The Use and Release of Chemicals of Environmental Concern Minimized

Sub-Goal 6.1 – Chemical Use, Release, and Transfer

For CY 2014, the total quantity of toxic chemicals released from DoD installations, as reported under the Toxics Release Inventory (TRI), was 17.7% less than the CY 2006 base year, exceeding the 5% target.



Careful inventories of hazardous materials enables sharing among facilities, Camp Johnson, VT

Photo: U.S. Army

Air Force reported on-site releases and off-site transfers of toxic chemicals were down 43% in CY 2014 from the CY 2006 baseline. Part of this success was due to the conversion in FY 2015 of a coal-fired boiler at Wright-Patterson AFB to run on natural gas, while another coal-fired boiler was decommissioned. The ongoing shift to natural gas at the base is resulting in significant reductions in emissions of hydrochloric acid. Another factor was the elimination of nitric acid processing associated with the manufacture of F-16 fighter jets.

The Navy CY 2014 releases were 35% higher than the CY 2006 baseline. To identify ways of improving performance in the future, the Navy completed an in-depth study in FY 2015 of its top ten TRI chemicals during the last five reporting years. The study documented the sources of chemical releases, identified the materials and processes that generate these releases, and investigated technology solutions to help reduce or eliminate these releases. The study provided a number of recommendations, including a number of commercially available technologies with the potential to reduce many of these chemicals, such as nitrates, lead, zinc, and xylene. It also recommended a number of potential solutions being used at other federal agencies and commercial entities. Various Navy Research Development Testing and Evaluation programs will test these potential solutions. In the fall of 2015, the Navy completed the phase-out of sulfur-containing coal and No. 6 fuel oil at the Naval Support Facility Indian Head power plant. Since the plant accounted for more than 90% of sulfuric acid aerosol emissions for the Navy, this change resulted in significant reductions in emissions.

The 35% reduction achieved by the Marine Corps in CY 2014 was due in large part to infrastructure improvements in non-range facilities, in addition to reductions in the number of personnel on base. The Marine Corps continued to implement its Authorized Use List policy, which prohibits installations from purchasing or using hazardous materials not found on an approved list.

The Army saw a slight increase in TRI releases in CY 2014, attributed to improved reporting as well as a shift from off-site disposal to off-site recycling and treatment. The Army's past goals at reducing trichloroethylene, methylene chloride, and hexavalent chromium culminated in FY 2014. Under those efforts, the Army achieved cumulative reductions at Anniston Army Depot of 99.6% in the use of methylene chloride and 91.3% in trichloroethylene. These represent vast reductions Army-wide because, in CY 2006, the majority of the Army's use of these chemicals occurred at Anniston Army Depot.

DLA saw an overall increase in releases in CY 2014 due to a mission-related escalation in operations at the Defense Supply Center Richmond, VA, which serves as the home of DoD's Ozone Depleting Substance Reserve. Since this program provides DoD with the capability to recover and centrally receive, reclaim, store, and issue ozone depleting substances in support of mission critical weapons systems, warfighter demand influences the volume of product processed by the Reserve.

Setting up mosquito trap, U.S. Naval Hospital Guam

Photo: U.S. Navy

Sub-Goals 6.2 and 6.3 – Pesticides

To help ensure that individuals apply pesticides only when necessary and do so safely and effectively, DoD requires individuals applying pesticides on its installations to be appropriately certified. The overall rate for certification of DoD applicators and its contract personnel in FY 2015 was 99.6%. Due to constant turnover in personnel, the Department is unlikely to achieve an exact 100.0% rate. Installation Integrated Pest Management Plans (IPMPs) describe how the installation will prevent, manage, and control animal and plant pests while following the principles of integrated pest management and complying with DoD and Component policy and federal, state, and local laws. The percentage of installations having these plans approved and updated was 94.2% in FY 2015.

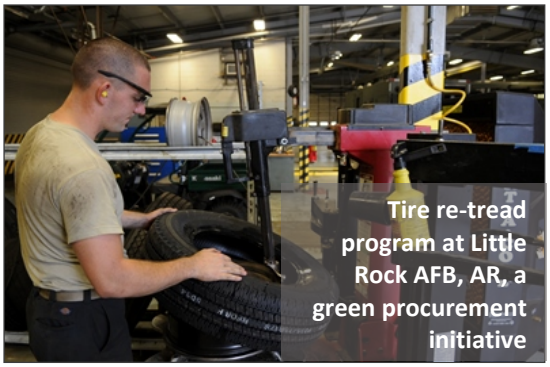
Objective #4: Continuous Improvement in the DoD Mission Achieved through Management and Practices Built on Sustainability and Community

GOAL #7: Sustainability Practices Become the Norm

Sub-Goal 7.1 – Procuring Sustainable Goods and Services

OSD, DLA, GSA and other federal agencies have been working together to recommend changes to the Federal Procurement Data System to enable it to track all sustainable procurement data categories in the future. Until sufficient automated systems are in place to enable DoD to accurately report the extent of sustainable procurement, the Department manually reviewed 1,814 contract actions from FY 2015 with values over $3,000 for their compliance with sustainable procurement requirements, finding 96.1% of them to be in compliance. The review process included contracts from the Military Services, DLA, MDA, DeCA, DCMA, NGA, NSA, WHS, Defense Finance and Accounting Services, and the Defense Health Agency. The result is down somewhat from the previous year due to an improvement in the Army review process methodology, but the nearly 100% compliance reflects the fact that sustainability has successfully become woven into the everyday fabric of procurement in the Military Services, DLA, and other DoD Components.

Photo: U.S. Air Force



Tire re-tread program at Little Rock AFB, AR, a green procurement initiative

The Army updated its five two-page 'Quick Guides' in FY 2015. These summarize the applicable sustainable procurement requirements for five common installation-level activities (food service, vehicle maintenance, building operation and maintenance, administrative offices) and also include sources for corresponding sustainable products. The Army also developed three new Quick Guides in FY 2015 (for lodging and barracks, custodial services, and Morale, Welfare, and Recreation Programs). Army Contracting Command issued Contracting Note 15-05 to raise awareness of and compliance with sustainable procurement guidance, and the Army engaged in numerous training activities on sustainable procurement in FY 2015, targeting requirements for generators, contract professionals, and those on installations holding purchase cards. Several Army installations developed formal Sustainable Procurement Plans with a framework and path forward for installation-wide participation in sustainable procurement. Some installations incorporated sustainable procurement initiatives into their Pollution Prevention Plans as part of their overall program to reduce waste, eliminate hazardous substances, and conserve energy and water.

The Air Force continued to demand excellence in sustainable procurement in FY 2015, through a system of specifications and requirements. These included specifying products (such as paint and carpeting) having no volatile organic content, specifying custodial cleaning products that meet Green Seal Product Standards, specifying minimum recycled content for carpet backing and nylon face fiber, and requiring that USDA-designated, bio-based products be used to the maximum extent possible for aircraft washing and corrosion control services.

One core of the Navy drive for sustainable procurement is its "Buy it Green" guide (updated in 2014), which contains Green Procurement requirements, customized ordering instructions for DLA and GSA purchasing websites, and a consolidated list of products available that meet the goals of the Green Procurement initiatives. The catalog includes background information and requirements for sustainable procurement, listing of green products for high demand items, and guidance to assist card holders for improved web-based ordering. In addition, the Navy uses the "Contract It Green" guide, which provides information on the relevant sections of the Federal Acquisition Regulation that apply to integrating green decision-making into the acquisition lifecycle. The guide includes a list of types of contracts with green opportunities, sample language for Statements of Work, links to specific green programs, and an overview of GSA's new interactive Sustainable Facilities Tool. The Marine Corps Sustainable Acquisition and Procurement Program follows the requirements in EO 13693 to promote sustainable purchasing practices. The Marine Corps also educates contract writers, vendors, and product purchasers about sustainability requirements and mandates.

DLA worked closely with OSD, GSA, and other federal agencies in FY 2015 in proposing changes to the Federal Procurement Data System to allow adequate tracking of all sustainable procurement data categories. DIA finalized its ability to track sustainable procurement with the FY 2015 implementation of version 9.4 of its Contract Management System. DIA also requires green procurement training for all acquisition personnel.

Sub-Goal 7.2 – Electronic Stewardship and the Efficient Use of Data Centers

Electronic Stewardship

The Department's Military Services and other Components have policies in place to ensure that:

- electronic purchases meet the standards of EPEAT;
- power management features are enabled for all desktops, laptops, and monitors; and
- the disposition of electronics with sensitive materials are controlled by security procedures and regulations.

Photo: U.S. Marine Corps

Collection of electronic waste generates revenue aboard MCAS Miramar, CA

Some DoD Components are constrained with regard to purchasing. For example, electronic equipment purchased by NSA and NRO frequently must meet mission-specific requirements that preclude purchasing restrictions, and security procedures and regulations restrict the specifications of equipment that may be procured. DoD Components hold events that help employees to recycle their home electronics. MDA, for example, collected more than five tons of used personal electronic equipment in FY 2015.

DLA Disposition Services processed 89% of the end-of-life electronics it received in FY 2015 through certified recyclers, 28.2 million pounds out of 32.3 million pounds. Future performance will be improved due to DLA's recent procurement of certified recycling services.

Data Centers

Efforts continue across the Department to consolidate data centers and make the remaining ones more efficient. As per the 2013 memorandum from the DoD Chief Information Officer, titled *DoD Component Data Center Consolidation Implementation Plans*, DoD tracks progress towards the following goals, in order to improve data center operational efficiencies and promote data center energy optimization, efficiency, and performance:

1. Reduce total number of operating systems by >30%
2. Increase the ratio of operating systems to full-time equivalent staff to >40
3. Increase virtualization to >80%
4. Increase the number of virtual operating systems per host to >8.

The baseline for the first goal will not be established until later this FY, but the results for the other three are 19.3, 43%, and 4.2, respectively. The Navy leads the Services for all three metrics. DoD has installed energy meters at all core data centers and actively manages power usage effectiveness. With regard to the consolidation of underutilized and inefficient data centers, DoD has closed almost 580 data centers, 16,462 servers, and 577,903 GSF of floor area through FY 2015, with more planned.

USMC completed its effort toward the Federal Data Center Consolidation Initiative by going from 33 to 11 data centers. USMC data centers are efficient due to the reorganizational approach which allows necessary redundancy, flexibility, scalability, and security. The primary focus of the Army's data center consolidation effort is to improve the security of its information technology (IT) systems and achieve the federal ratio for utilizing central processing units. Army efforts also focused on metering on-post Army data centers. The Air Force is pursuing a number of approaches to optimize efficiency, including the use of ESPCs, immersing servers in oil, and connecting high-density, performance-optimized data centers directly to the power grid at the sub-station level.

Information Technology Support Center at MCB Camp LeJeune, NC, a product of USMC data center consolidation

Photo: U.S. Marine Corps

DIA continued consolidating and modernizing its data centers around the globe, through measures that include: using thermal containment and in-row power distribution and in-row cooling; monitoring and reporting cabinet temperature and humidity levels; removing aged computing devices; and aggressively using computer virtualization to further reduce energy requirements. NRO established a Data Center Management Office to develop an enterprise-wide approach for meeting future data center needs, including improved efficiency. NRO is establishing, tracking, managing, analyzing, and reporting metrics to better manage the energy used by the data centers it owns.

Sub-Goal 7.3 – High Performance, Sustainable Buildings

The portion of DoD buildings meeting the criteria for conformance with the revised Guiding Principles for Sustainable Federal Buildings (hereafter referred to as the Guiding Principles) continued to rise, with 1.5% of applicable building area conforming in FY 2015. Although far from the goal of 15%, this represents an increase of more than 77% since FY 2010 (Figure 7).

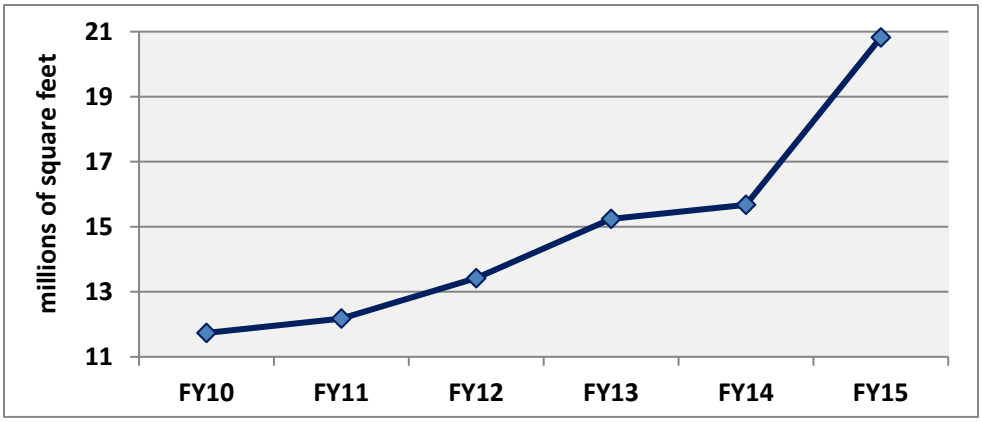


Figure 7. Rise in DoD Building Area Conforming to the Guiding Principles

The Army increased the portion of its applicable building area that complies with the Guiding Principles to 2.2% in FY 2015, the highest rate among the Services. The Army's efforts to meet the Guiding Principles are two-fold: ensuring new construction is designed to meet the criteria, and leveraging appropriated and third-party funds to make improvements to existing buildings. To augment existing Army and DoD policy, guidance, and criteria relating to high-performing buildings, in FY 2015 the Army issued three new Engineering Construction Bulletins (ECBs) to support high-performance buildings:

1. Advanced Metering and Connectivity (ECB 2015-2)
2. Total Building Commissioning Process (ECB 2015-6)
3. Life Cycle Cost Analysis Requirements (ECB 2015-7)

Of approximately 15,000 eligible buildings in the Air Force, 165 of them met the Guiding Principles, an increase of 41 buildings over the previous year. In keeping with EO 13693, which requires that costs and savings be considered from a full life-cycle perspective, the Air Force gives preference to projects with the highest return on investment. Therefore, Air Force success in meeting this goal is directly linked to the competitiveness of projects to improve buildings with regard to energy and water efficiency improvements. All new construction will adhere to the Guiding Principles, but progress towards the entire inventory will remain incremental.

Photo: U.S. Navy

During FY 2015, the Navy added 23 new buildings meeting the criteria of the Guiding Principles, while the Marine Corps added three. The Marine Corps is revising its Order for Energy so it will be able to track data for sub-goal 7.3. However, the Marine Corps abides by NAVFAC ECB 2011-01 (*Navy Shore Energy Building Standard*), requiring that repairs and renovations comply with the Guiding Principles, and it has incorporated sustainable design principles in all new construction and major renovations.

Sub-Goal 7.4 – Environmental Management Systems

Environmental Management Systems used by the Military Service installations and DLA facilities provide a valuable framework to guide sustainability improvements, and monitor and evaluate

performance. However, the metric previously used for this sub-goal was based on a metric of the federal government that has been obsolete for several years. Therefore, the Department will continue to discuss EMSs in its SSPP, but it will no longer track progress with a quantitative metric.


Photo: U.S. Marine Corps

EMS of MCAS Miramar, CA, supports protection of endangered species like this San Diego Mesa Mint

The Services are participating on the Interagency EMS Community of Practice advisory group that is examining EMS issues to include how to measure effectiveness and whether to adopt the new International Organization for Standardization (ISO) 14001:2015 version of the EMS standard. DoD will examine the value of adopting any new EMS metrics when they have been developed. In the meantime, each Service is defining EMS effectiveness in accordance with the EMS implementing policy they have established.

eDASH is an Internet-based SharePoint environmental information repository and clearinghouse managed by AFCEC. It is the only Air Force-approved location for housing web pages, information, documents, resources, and tools relating to the environmental portfolio. Built using Microsoft SharePoint™ software, eDASH is a low-cost, fully integrated, and scalable solution approved for use by all Air Force employees and contractors issued a DoD Common Access Card. Each EMS-appropriate facility has a presence on eDASH, using a standardized template that is integrated with overall program pages managed by AFCEC subject matter experts. eDASH effectively supports standardized and centralized environmental program management and execution. Overall program goals, program and policy guidance, and environmental panel objectives are pushed from the top-level pages to the installation level, giving base personnel the context to understand how their activities—and their installations—are progressing toward helping the enterprise meet Air Force goals. In FY 2015, the Air Force implemented an EMS tool to provide electronic capability and standardize the approach for developing and maintaining the Air Force's Environmental Action Plans. The tool helps the Air Force and installations create, track, update, and report on progress in meeting priorities for minimizing environmental impacts and translating goals into concrete actions.

During FY 2015, the Navy implemented a performance-based audit strategy for scoping integrated EMS and compliance audits. The Navy further streamlined the EMS framework across the enterprise, which has improved communication, enhanced environmental performance oversight, and facilitated resource planning. Navy facilities report an increasing number of EMS benefits, such as better environmental compliance and awareness across the workforce, improved regulator and community relationships, increased quality of training, a greater understanding of roles and responsibilities to reduce environmental impacts and risk.

Among Army facilities designated as appropriate for EMS implementation in FY 2015, there was a decline in those considered fully implemented. The Army attributes the downward trend to an increased focus on outcomes, and less emphasis on the EMS framework itself.

DLA coordinated with DLA Headquarters Organizations to assist in the development of an enterprise-wide EMS framework to provide policy and guidance to field activities. As of FY 2015, nine of 11 Facilities and Organizations had implemented EMSs, implementing corrective actions as needed to address minor external audit findings. The two EMSs that have not declared conformance improved their existing EMS documentation to better position their organizations to declare conformance in the future.

III.2 The Way Forward

Objective #1: The Continued Availability of Resources Critical to the DoD Mission is Ensured

GOAL #1: The Use of Fossil Fuels Reduced

Sub-Goal 1.1 – Facility Energy Intensity

The Department continues to view third-party, performance-based contracting of energy efficiency improvements as one of its most cost-effective paths to reducing fossil fuel consumption by its facilities. With this goal in mind, DoD aims to award $450 million in performance-based contracts in both FY 2017 and FY 2018.

The Air Force is dedicated to a strong facility energy management program that accounts for all energy consumed at installations, and is committed to improving resiliency, reducing demand, assuring supply and fostering an energy aware culture while enhancing the energy pillar of mission assurance. The Air Force continues to increase its emphasis on ESPC and UESC contract vehicles due to the decrease in direct funding for energy conservation efforts and the increased significance being placed on performance contracting by the Administration. Air Force targets for performance-based contracting are $474 million for CY 2016 and $41 million for CY 2017. This will complement a planned $159 million in investments through ECIP and facility SRM funding from FY 2016 through FY 2018. In FY 2016, the Air Force will replace several legacy database systems with new, commercial, off-the-shelf facilities management software, TRIRIGA. This software will replace the Air Force Energy Reporting System over the course of the next 18 months at active and reserve installations. The Air Force will train Installation Energy Managers on how to enter energy information into TRIRIGA. Also in FY 2016, AFCEC will create a new installation energy vision, strategy, and an AFCEC Facility Energy Implementation plan. Foundational concepts include the vision statement "Mission Assurance through Energy Assurance" and pillars of resiliency and efficiency enabled by leveraging technology and increasing cultural and behavioral awareness.

Photo: U.S. Air Force

To counter a tendency towards a fragmented or "siloed" approach to achieving resilient, cleaner, and cost-competitive power, the Air Force will transition to a more comprehensive approach to energy challenges, by holistically balancing the objectives of Air Force energy projects. To enhance an enterprise-wide approach to mission assurance through energy assurance, the Air Force is establishing an Air Force Office of Energy Assurance. This office will serve as a central management office for the development, implementation, and oversight of large-scale renewable and alternative energy projects. By the end of CY 2017, the office will facilitate at least ten energy assurance projects, and it will support the Air Force's Resilient Energy Demonstration Initiative, which will lead two pilot projects to design and procure smart, cyber-secure microgrids on critical installations. Resource requirements for the FY 2016 – FY 2021 period are $18 million annually, including expertise from the National Renewable Energy Laboratory and Pacific Northwest National Laboratory. The Air Force Office of Energy Assurance will leverage partnerships with the Army's Office of Energy Initiatives and Navy's Renewable Energy Program Office to develop dedicated

energy project identification, validation, facilitation, and management capabilities.

The Army's multi-faceted strategy to reduce its energy intensity includes energy policy, enhanced energy management (including advanced metering and training for energy managers), and investments in facility energy efficiency initiatives. In FY 2016, the Army will continue to utilize appropriated funds (such as ECIP and SRM funding) for projects that reduce energy demand and improve installation energy security. The Army is also aggressively pursuing performance-based contracting. The Army's Net Zero Energy efforts will continue to focus on reducing total energy demand and improving energy efficiency in FY 2016. Net Zero Energy also focuses on increasing the use of renewable energy where cost-effective and appropriate (see Sub-Goal 1.2). All Army installations are beginning to pursue Net Zero Energy strategies per the Army's 2014 Net Zero Directive. The Army will continue its enterprise-wide utility metering program, and by the end of FY 2016 all advanced meters installed under the Army's Central Meter Program will be connected to the Army's Meter Data Management System. Follow-on phases will connect meters installed under other programs (such as MILCON, ESPCs and UESCs). Once fully functional, the Meter Data Management System will help installations pinpoint energy savings and opportunities for avoiding utility costs, as well as improving cost accounting for large tenants that reimburse for installation utilities services. Building on efforts that began under a project of the DoD Environmental Security Technology Certification Program, the Army will continue to evaluate the effectiveness of retro-commissioning using data from building automation systems to identify operational problems that can be corrected at little to no cost, such as incorrect temperature set backs and malfunctioning system shut-offs. The Army is also focusing on microgrids to increase installation resilience. One is slated for completion at Tooele Army Depot in FY 2017, and conceptual designs for microgrids are underway at additional installations.


Energy efficient barracks under construction, Fort Eustis, VA

Photo: U.S. Army

The Army Materiel Command will work in FY 2016 to improve energy efficiency at its industrial facilities, which are among the Army's largest energy users. The primary areas of focus are performance contracting and maximizing participation in utility incentives. Army Installation Management Command continues its focus on improving energy efficiency, with Operations Order 15-013 requiring installations to implement comprehensive Energy Action Plans, including ensuring that new designs meet or exceed standard 90.1-2010 of the American Society of Heating, Refrigerating and Air-Conditioning Engineers. The Order also requires that installations evaluate 39 low- and no-cost energy efficiency measures and implement all that are appropriate as resources become available. The Army National Guard is prioritizing its FY 2016 energy efficiency efforts on task-critical assets supporting their key response missions, and on developing an Energy Manager's Handbook for issuance later this year. The Army Reserve will continue its efficiency efforts in FY 2016, conducting comprehensive energy and water evaluations, and using its Energy Performance Dashboard to track 64 energy measures.

The Navy plans to reduce shore energy consumption through a phased approach that dedicates funds towards proven energy efficiency technologies, first to lower total energy demand, and then to focus on renewable energy initiatives that increase energy security. The Navy will achieve the most cost-effective approach to reduce energy consumption, protect critical assets, and enable the use of renewable energy technology by increasing the energy efficiency of current facilities and

utility systems, and implementing a culture of conservation through data transparency. By FY 2020, the Navy plans to reduce consumption by 23 million Btu from the FY 2003 base year—a reduction in overall consumption by 50%—both through directly financed projects (Restoration and Modernization Energy, Energy Major Maintenance and Repair Program, and Energy Military Construction) and third-party, performance-based financing.

To support this reduction, the Navy will continue to invest in facility energy management systems, audits, and personnel to provide leaders greater visibility into energy consumption by tracking consumption at the facility-level. This will enable Navy energy consumption practices to evolve by directly linking consumption to behavior awareness and accountability at the level of installations and regional commands. In addition, the Navy will drive further reductions by engaging with its tenants to incentivize positive changes in energy usage. The Navy Smart Energy program will be accomplished by the ongoing installation of advanced metering infrastructure, which will capture 85% of overall consumption at the installation level. To generate actionable information, data from the meters will be transported via the Centralized and Integrated Reporting for the Comprehensive Utilities Information Tracking System ("CIRCUITS") and the public safety network. The Navy will follow up this effort by integrating advanced metering with other industrial control systems, to including direct digital controls and Supervisory Control and Data Acquisition ("SCADA") systems.

Photo: U.S. Marine Corps

Energy management control room, Cogeneration Plant 2, MCAGCC Twentynine Palms, CA

For the Marine Corps, volatility in energy prices and the potential vulnerability of supply due to manmade and natural disasters, places USMC installations and training areas at risk. Congressional legislation and Presidential directives have mandated DoD installations to diversify supply and improve the resiliency of energy-related infrastructure. Addressing these concerns requires the assistance of everyone who manages, works, and lives onboard USMC installations. USMC strives for a concerted effort by all Marines and civilians to achieve congressional energy mandates. These mandates will be met by reducing the level of energy resources utilized during all facets of day-to-day activities. Marine Corps installations will continue their progress on energy efficiency, guided by their Energy and Water Strategy documents that have been developed in each Region. These strategies emphasize both the technical and the behavioral, promoting an Energy Ethos campaign that encourages Marines to take personal ownership over energy consumption. By making smart efficiency improvements to existing facilities, investing in energy efficient new construction, partnering with private industry for the development of renewable resources, and leveraging the resourcefulness of individual Marines, USMC will provide increased energy security with reduced energy costs to better support the Marine Corps mission.

WHS will complete Phase 3 of its comprehensive recommissioning of the Pentagon by FY 2017. Additional phases are in the planning stages, and will be executed once Phase 3 is completed. Designs for several interior lighting projects have been in progress and will be completed by the end of FY 2016. For the Pentagon Reservation metering initiative—which spans electric, natural gas, steam, domestic water, chilled water, and hot water meters—the first phase of metering will be complete in FY 2016. Once these meters are installed, WHS will implement a second phase of the

project to install additional sub-meters in spaces such as data centers and corridors, allowing for more targeted energy efficiency efforts.

DCMA is currently partnering with DLA Energy to award an ESPC at its Cleveland site. The primary approach of DIA to meet the future energy efficiency goals will be to execute ongoing DIA ESPC energy projects, but it also plans to identify additional projects which qualify for ECIP MILCON funding, as well as identifying internal funding with operations and maintenance funds. NRO has a number of projects underway and plans to reduce energy intensity by upgrading lighting with light-emitting diodes (LEDs), replacing and right sizing chillers and boilers, developing an advanced metering plan, constructing two LEED-certified buildings, and monitoring building loads.

Sub-Goal 1.2 – Renewable Energy

The Army is on track to achieve its commitment to install 1 GW of on-site power production by FY 2025, to enhance energy assurance and resiliency at Army installations. The Army's renewable energy efforts will continue on two fronts in FY 2016: utility-scale projects (>10 MW) financed by third parties, developed by the Army's Office of Energy Initiatives, and smaller-scale projects initiated at installations. For each utility-scale project, the Office of Energy Initiatives weighs a set of identified risk factors against the potential contribution to the Army's energy portfolio, moving the project forward if the risks can be mitigated. The office has 13 projects, with a total capacity of approximately 300 MW, in the final stages of development in FY 2016, with more projects in the pre-award stage. The Army is also pursuing smaller-scale renewable energy systems. The Army Net Zero Directive includes a renewable energy component, requiring all permanent Army installations to implement renewable energy projects when they are lifecycle cost effective. ESPC and UESC financing mechanisms will also be used to fund small-scale renewable energy projects. With partners under the Residential Communities Initiative, the Army is installing rooftop PV systems in housing areas operated by the initiative, and it plans to more than double the amount of rooftop PV units in these areas to approximately 42 MW by FY 2018.

The Navy's Shore Energy Strategy will increase its use of alternative energy technologies and will meet renewable energy targets where it is cost effective and achievable, as the viability of these sources increases and expands geographically. The Navy is committed to integrating renewable energy technology where and when the investment and development of the technology is directly advantageous to achieve Navy goals. DON plans to leverage all funding opportunities to support the Navy's renewable efforts, including ECIP, third-party financing, PPAs, and EULs. The Assistant Secretary of the Navy for Energy, Installations, and Environment committed to supporting the Renewable Energy Program Office for an additional three years to pursue additional renewable energy opportunities and leverage technology to maximize alternative sources of energy.


Rooftop PV panels pre-heat water for the boiler, MCAS Miramar, CA

Photo: U.S. Marine Corps

The Marine Corps will evaluate the viability of power purchase and leasing agreements to implement large-scale renewable energy projects and develop geothermal energy resources in a manner that protects the operational mission. The Marine Corps is committed to taking a leadership position in on-site renewable power

development with the assistance of private sector financing and development expertise. USMC will primarily accomplish this sub-goal through both directly funded construction and alternative financing, such as that provided by ESPCs, PPAs, and EULs.

The Air Force renewable energy plan focuses on developing cost-effective, on-base renewable projects—for both electric and non-electric forms of energy. The Air Force Renewable Energy Project Development Subpanel will continue to provide leadership for, and coordination of, renewable energy projects by providing a forum, process, and tools for evaluating potential projects. The Air Force has three execution strategies to develop renewable energy in place on Air Force property (or adjacent federal property). One is the use of PPAs with third parties under either a utility purchase contract or EUL. This allows third party developers to obtain financing and build renewable generation with cost recovery through a long-term utility purchase agreement. The second execution strategy is to enter into an agreement to provide renewable energy financed by a utility or other third party. The third strategy is a direct Air Force investment through MILCON or other fund sources, in cases where a project is cost effective and best suited for the location and need.

DLA continues to develop economically feasible renewable energy projects at it sites, with the latest project consisting of three solar thermal roofs at the Defense Supply Center Richmond, VA. Currently in the design stage, the $1.3 million project is estimated to produce three billion Btu annually. DIA is planning to install a 200 kW solar PV system over a new parking garage at Headquarters, scheduled for completion in FY 2017. DIA is also seeking opportunities to add solar PV at its other buildings and campuses. Based on a feasibility study conducted in FY 2015, NSA is seeking funding for renewable energy projects for its cryptologic center in Hawaii. Other DoD Components meet their renewable energy targets by purchasing renewable energy credits.

Sub-Goal 1.3 – Vehicle Fleets

The Navy plans to continue purchasing fuel-efficient and AFVs where there is existing or planned infrastructure. The Navy also plans to increase the use of telematics in FY 2016 to identify vehicles suitable for converting to AFVs, as well as to determine optimum fleet size and improve driver behavior. In addition to these strategies, the Navy is working to increase the number of EVs, right size the fleet using the vehicle allocation methodology, and increase driving efficiency while decreasing miles travelled.

The Marine Corps' vision is outlined in its *Non-Tactical Vehicle (NTV) Fleet Energy Campaign Plan*. Execution of this plan will reduce petroleum usage and harmful emissions while ensuring a cost-effective, low-emission non-tactical fleet that is right-sized and aligned to the Marine Corps' mission. The plan promotes:

- smart utilization and acquisition of alternative fuel and hybrid vehicles,
- construction and maintenance of fleet supporting infrastructure,
- collection and careful analysis of operational and vehicle data, and
- improvement of awareness and efficient behavior in vehicle operators.

The Marine Corps has two specific initiatives planned for FY 2016. First, Marine Corps Installations West will lease 101 dedicated electric sedans, beginning in September 2016. An additional 58 are planned for FY 2017 and will be placed into service as funding permits. The second initiative deploys telematics in new passenger and light-duty acquisitions by 19 March 2017. Updated fuel management systems will capture more accurate data, identify inefficient vehicle operations in real-time, and implement stronger controls on fuel dispensing and purchasing.

The Air Force will continue to implement its Vehicle Fleet Management Plan in FY 2016, which maps out a systematic approach to vehicle acquisition, use, maintenance, refueling, and replacement. A key Air Force strategy is to procure the most fuel-efficient and cost-effective vehicle that meets mission requirements. Also tied to a verifiable mission are Air Force vehicle authorizations, which are geared to minimizing the number of vehicles needed to accomplish the mission, and maximizing the utilization of all vehicles. In FY 2016, the Air Force will continue this strategy, conducting additional vehicle validations, both virtually and via site visits, to identify and reduce vehicle authorizations that are no longer required to support changing mission needs, and to "right-size" the remaining vehicle authorizations. In FY 2016, the focus of the vehicle-to-grid program at Los Angeles AFB will be to demonstrate the viability of EVs in providing stability to the grid, earning monetary compensation from the local utility, and reducing base power needs. Also in FY 2016, the Air Force will perform a demonstration on 20% bio-based motor oil at four installations and will also evaluate the cost effectiveness of converting existing conventional fuel vehicles to LPG fuel.

Photo: U.S. Army

Electric recycling truck, Fort Carson, CO

The Army will continue its vehicle-to-grid technology efforts, including a pilot project at Fort Hood (TX) in FY 2016, deploying charging stations to support the installation's hybrid-electric trucks and EVs. The system can provide demand response, peak shaving, and ancillary services in addition to limited emergency backup power to critical functions. As part of a pilot program with GSA and CEQ, the Army committed to adding 50 Ford C-Max EV sedans to its non-tactical fleet by the end of FY 2016. The Army is continuing to develop and implement strategies to transition its diesel buses and large trucks to vehicles fueled by compressed natural gas (CNG) or liquid petroleum gas. This effort will include a fleet cost-benefit analysis to evaluate options for investing in additional CNG vehicles and infrastructure. Finally, the Army will continue to emphasize the relocation of its E-85 vehicles to areas where E-85 fuel is available, and will continue to pursue opportunities to install E-85 and biodiesel fuel pumps on installations that dispense over 100,000 gallons of fuel annually.

DLA's reduction in fleet-wide GHGs per mile already met the FY 2016 requirements, but DLA will continue to work toward achieving future targets. DLA developed a Fleet Management Plan that will guide the agency's efforts to improve vehicle data gathering, data analysis, and fleet-related sustainability issues. DIA will reduce fleet GHGs by replacing less efficient vehicles with hybrids and EVs. NRO plans to replace GSA leased vehicles with hybrids or E-85 engines.

GOAL #2: Water Resources Management Improved

Sub-Goals 2.1 and 2.2 – Reducing the Use of Facility Water

The Department will establish a baseline for ILA water consumption beginning with FY 2016 data. DoD Components will track consumption separately for each of the three water categories, both metered values and those that are estimated, along with associated costs such as sewage fees.

For the Air Force, water efficiency remains an important strategy, particularly for bases in located in areas that are arid or have serious water constraints. In FY 2016, the Air Force will continue to invest in proven approaches to reducing potable water consumption that generate sufficiently high returns in water and financial savings. Examples of actions that typically meet the criteria for returns are: leak detection and repair; low-flow plumbing fixtures; disconnecting irrigation systems; efficient


Effluent from wastewater treatment plant at Scott AFB, IL, used for irrigation

Photo: U.S. Air Force

irrigation systems, including the use of non-potable reclaimed water and harvested rainwater; xeriscaping and native plants in landscaping; water efficiency design principles incorporated into new MILCON projects; and metering. The Air Force will continue its Water Resources Management and Sustainment Plans pilot program, to aid the Air Force in identifying common risks and opportunities at installations regarding the continued availability of water. The Air Force will continue to collaborate in FY 2016 with DoD leadership and the other Services to identify steps that can be taken to protect Air Force water rights while identifying ways to reduce or conserve ILA water consumption.

In FY 2016, under the Army's Net Zero Water Directive, installations will continue to focus on improving water efficiency and conservation measures to reduce water demand. Installations are implementing projects to install more efficient fixtures, use alternative sources of water, and increase water awareness and education. Several are pursuing the use of ESPCs to finance water efficiency and reduce consumption intensity. The Army is evaluating lessons learned from measures implemented by installations in California in response to the drought, and implementing them across the enterprise where applicable. The Army will continue its Net Zero Water collaboration with EPA in FY 2016. Where life-cycle cost effective, Army projects will implement "purple pipe" strategies to distribute reclaimed wastewater for reuse, in accordance with the December 2013 update of Army's sustainable design and development policy. This policy also requires that landscape and irrigation strategies consider the use of native plants and dry-scape alternatives to reduce outdoor water use. Regarding water rights, the Army acts in accordance with the May 2014 DoD policy *Water Rights and Water Resources Management on Department of Defense Installations and Ranges in the United States and Territories*, and Army Directive 2014-08, *Water Rights Policy for Army Installations in the United States*. The Army will continue to work to identify and preserve its water rights to ensure that the Army has enough water to carry out its missions without significant disruptions. Each Army Command is required to report annually on water rights, including: an assessment of whether existing access to water is sufficient to meet mission requirements; the state of documentation and efforts to assert and maintain their rights; and a current summary of all water rights and water resource conflicts.

In FY 2016, the Navy will focus on reducing the use of potable water at installations by installing water efficient appliances and low-flow fixtures, and through the use of "smart" irrigation systems to reduce demand for treated water used for landscaping. Potable water consumption used in irrigation will be measured to evaluate reduction in water costs and calculate the payback period for the "smart" irrigation system.


Vehicle wash station at Fort Carson, CO, recycles water

Photo: U.S. Army

The Marine Corps has long recognized the positive impact water conservation has on the training mission. The focus of the Marine Corps water management program is to reduce water intensity of existing facilities, increase efficiency of

new construction, install advanced meters, and procure water-efficient products. Both the Navy and the Marine Corps perform a comprehensive water evaluation of facilities every four years with the goal of promoting innovation and implementing water conservation measures based on return on investment and impact to critical infrastructure.

NSA has already partnered with a local municipality and is close to completing a water infrastructure project on its Washington campus to use reclaimed water in the cooling towers. The project is anticipated to reduce potable water consumption beginning in FY 2017. DIA will work to obtain a permit for a groundwater well to be used as a non-potable water source for the cooling towers and irrigation, which will significantly reduce potable ILA water consumption.

Sub-Goal 2.3 – Stormwater Runoff

The Army is continuing to develop its LID Planning and Cost Estimating Tool; the tool is currently in beta testing, targeted for release in the third quarter of FY 2016. The Army will also finalize the methodology to track and report on compliance with stormwater management requirements at the project and installation level, which will improve Army-wide reporting. Other ongoing Army activities include: development of LID supplements to Army garrison installation design guides to enhance sustainable stormwater practices; development of appropriate LID category codes for best management practices, and additional LID webinars to improve understanding and implementation at the staff level.

The Navy seeks to continue to enhance LID policy through several initiatives. The Navy will continue to foster relationships with academia, regulators, and the private sector to develop and optimize existing LID guidance and stormwater best management practices. Updates are underway to guidance documents such as UFCs, which will clarify LID to the end user and support the Navy and Marine Corps in meeting stormwater management requirements. All projects designed by NAVFAC are tracked in the eProjects program, where LID compliance is monitored and documented. For projects outside of NAVFAC design, the Marine Corps will be issuing an annual data call to collect information related to the SSPP. All projects will continue to follow DON and DoD LID policy to meet EISA Section 438 requirements, satisfy Chesapeake Bay Total Maximum Daily Load goals, and improve environmental stewardship by the Navy and Marine Corps.


Stormwater management at Fort Bragg, NC

Photo: U.S. Army

In FY 2016, the Air Force will continue to evaluate the effectiveness of alternative engineering and low impact design options, such as permeable pavers, to manage storm water flow at Air Force locations and facilitate infiltration of stormwater into the ground. The Air Force expects to achieve 100% compliance with sub-goal 2.3 in FY 2016 and beyond, through applicable Air Force policy, UFC 3-210-10 on Low Impact Development (with Change 1, February 2016), and enhanced outreach to Air Force construction and water managers.

Objective 2: DoD Readiness Maintained in the Face of Climate Change

GOAL #3: Greenhouse Gas Emissions Associated with DoD Operations Reduced

Sub-Goal 3.1 – Scopes 1 and 2 Greenhouse Gas Emissions

The main path by which the Department intends to achieve its goal for Scopes 1 and 2 GHG emission reductions is through Goal 1: reducing the consumption of fossil fuels by facilities and vehicles, and increasing the use of renewable energy. Some reductions will also result from a continued migration to cleaner fuels, in both stationary and mobile applications.

Sub-Goal 3.2 – Scope 3 Greenhouse Gas Emissions

The Department's main approach to reducing Scope 3 GHG emissions is through reduced emissions from employee air travel (Sub-Goal 3.4) and the continued recognition of third-party renewable energy projects on DoD-managed lands providing hosted renewable energy credits.

Sub-Goal 3.3 – Telework

DON will continue aiming for an increased participation in teleworking, while balancing workplace needs and IT resources. Many positions occupied by DON employees are not currently telework eligible for various reasons, such as the need to be on-site to perform maintenance, medical, and other types of work, or the need for access to specialized equipment. However, DoD plans to amend telework eligibility codes for positions and employees, which will likely increase eligibility for situational telework. In addition to telework training that is required for both employees and supervisors, the DON Civilian Employee Assistance Program offers educational sessions regarding teleworking successfully and managing teleworkers, which can be used to support telework for both employees and supervisors.

The Air Force is committed to maximizing employee participation in telework to the extent that mission is not disrupted or jeopardized. To provide better balance for employees, consistent with workload and mission requirements, the Air Force will continue encouraging Installation Commanders, Tenant Commanders, and Heads of Activities to incorporate plans for telework arrangements into their Continuity of Operations plans, and continue urging them to overcome perceived barriers and permit flexible work arrangements. The Air Force will also continue to assess telework requests against eligibility criteria, and it expects the number of personnel deemed eligible to telework on a regular, recurring basis to continue to increase.

Videoteleconference at Clay Kaserne, Germany, with U.S.

Photo: U.S. Army

Telework in DLA will remain one of the agency's cornerstones in enabling mission continuity, productivity, recruitment and retention efforts, as well as overall work life balance for employees and management. DLA anticipates a continued progressive increase in telework participation due to improvements in technology, increased employee awareness, management acceptance, and overall personnel comfort level with telework. DIA expects to see a further increase in telework agreements in 2016 and into the future through its continued marketing of the program to those employees eligible to telework, and by identifying additional secure teleworking spaces so that a much greater percentage of

employees can participate in the program. In FY 2016 and FY 2017, MDA will continue to promote awareness of telework opportunities, including through the publication of educational materials. MDA will also monitor and audit actual participation against the number of telework agreements to determine whether additional measures are necessary to increase teleworking participation.

Sub-Goal 3.4 – Employee Air Travel

Given the Department's continued success on this sub-goal, and to streamline the framework of SSPP sub-goals, this sub-goal is being discontinued. Air travel will continue to receive scrutiny across the Department, with all employees required to justify that travel is necessary to meet objectives, as per the 2011 DoD *Track Four Efficiency Initiatives Decisions*. The Military Services and other DoD Components reinforce this requirement, and continue to improve the technological capability to support virtual meetings with geographically dispersed participants, such as video teleconferencing.

GOAL 4 – DoD Climate Change Vulnerability Assessed and Resiliency Improved

As required by DoDD 4715.21, *Climate Change Adaptation and Resilience*, the Department will identify, review, and update appropriate DoD Issuances to ensure that the effects of a changing climate on DoD mission execution will be considered. Of those issuances identified thus far for updating, DoD plans to have updated 20% of them by the end of FY 2017. An example of one such targeted issuance is DoDI 6055.17, *DoD Installations Emergency Management Program*. Effective adaptation planning requires coordination with other Federal agencies, state and local partners, Tribal governments, and private stakeholders. To this end, DoD will leverage results and lessons learned from regional climate change planning pilots and the Joint Land Use Study to update Departmental guidance, with the aim of ensuring that the effects of a changing climate are incorporated into installation master planning, documentation relating to the National Environmental Policy Act, and encroachment management plans. By the first quarter of FY 2017, the Department will update the DoD National Preparedness Guide to incorporate planning for the effects of a changing climate into two relevant mission areas: Defense Support to Civil Authorities and Humanitarian Assistance/Disaster Relief.

Climate change adaptation will continue to receive senior-level engagement by the Army in FY 2016. Implementation of the DoD Climate Change Adaptation Roadmap and DoDD 4715.21 are a primary agenda item at the four-star level meetings of the Army Senior Energy and Sustainability Council. During FY 2016 meetings, Army leads for the Roadmap's lines of effort will report on their respective plans to assess their vulnerabilities, develop and issue integrated planning guidance, and implement adaptation strategies where warranted. The Army will continue to develop a planning framework to integrate climate change considerations into existing installation- level plans. This effort includes modifying a tool developed for U.S. Army Corps of Engineers Civil Works projects to enable it to be used by Army installations. Other FY 2016 efforts include issuing guidance on planning for potable water systems and on integrating climate change considerations into INRMPs. As one of three DoD pilots undertaken at the request of CEQ, the Michigan Army National Guard collaborated with other state and federal agencies and neighboring cities on climate change resilience and adaptation planning. A report that summarizes the collaboration effort and its outcomes is in development and will be released publically later in FY 2016.

The Navy will continue implementing the goals of the 2014 DoD Climate Change Adaptation Roadmap by identifying and assessing the effects of climate change on DON, integrating consideration of these effects into DON planning and risk management efforts, and collaborating

with stakeholders. The Navy will continue to directly support the lines of effort necessary to achieve the broad adaptation goals of the Roadmap, including the Navy's continued active involvement in the Hampton Roads Pilot Project, and an assessment of all installations for potential vulnerabilities to climate change. Internal policies continue to be updated, reflecting the Navy's intent to implement adaptation efforts that comply with DoD policy and Executive Orders relating to climate change adaptation.

Photo: U.S. Army Corps of Engineers

In FY 2016, the Air Force will continue to incorporate climate change adaptation and resilience into formal policy, planning, risk management, and operational processes. The Air Force will take measures to adapt current and future operations to address the impacts of changing climate conditions, and continue implementing the goals of the 2014 DoD Climate Change Adaptation Roadmap. With the inclusion of climate change in the Air Force 2014-2034 Strategic Environment Assessment, the challenges posed by climate change were acknowledged as having significant implications. In FY 2016, the Air Force will stand up an Enterprise Installation Planning Panel to provide written policy, guidance, and advice to key mission partners and stakeholders. The Panel will integrate climate change elements into existing Air Force planning, including Installation Development Plans, Installation Complex Encroachment Management Action Plans, and Emergency Management Plans. The Air Force will collaborate with external stakeholders to anticipate and manage shared or common climate-related risks to build resilience. This includes the climate change resilience pilot project launched in FY 2015 at Mountain Home AFB, focused on the region-specific impacts of climate change. The purpose of the pilot is to develop shared, actionable information and plans among the stakeholders, who consist of the base, federal, state and local authorities, regional and tribal officials, universities, and non-profit organizations. The Air Force will also pursue more accurate coastal erosion prediction capabilities in order to better understand observed coastal erosion on the North Slope of Alaska and enable more accurate risk-based resource decisions to ensure the long-term viability of Air Force long-range radar sites.

Objective #3: The Ongoing Performance of DoD Assets Ensured by Minimizing Waste and Pollution

GOAL #5: Solid Waste Minimized and Optimally Managed

Sub-Goal 5.1 – The Use of Paper

This sub-goal ended in FY 2015.

Sub-Goals 5.2 and 5.3 – Solid Waste Diversion

The Department expects to issue a DoDI titled *Integrated Recycling and Solid Waste Management* in the summer of 2016. This issuance will improve solid waste management throughout the Department by detailing policy, responsibilities, and procedures for implementing a solid waste diversion program.

The Army will continue to focus on solid waste minimization and diversion in FY 2016, including updating its guidance on solid waste management and Qualified Recycling Programs based on the new DoDI on integrated solid waste management. The Army's focus on food and organic waste will continue in FY 2016, since it accounts for more than a quarter of installation solid waste. As part of this, the Army is installing an additional nine dehydration systems in dining facilities, following the successful piloting of dehydration systems in FY 2015, with additional systems planned as funding becomes available. A pilot to test the feasibility of using food waste to augment wastewater treatment plant digesters will continue at Fort Huachuca in FY 2016, in partnership with EPA. The Army will also pursue making food donations a means of reducing food waste. Installation Management Command is planning to bring staff from high-performing installations to assist those struggling to meet diversion goals. The Army Reserve will continue to implement its Solid Waste Strategy in FY 2016, under which each Regional Support Command and installation will focus on source reduction (through sustainable procurement and material reuse) and recycling. Army Medical Command will eliminate single-use medical devices in favor of reprocessing and sterilization of equipment where feasible, following the processes of the Federal Food and Drug Administration.

In FY 2016, the Navy will continue to leverage its working group on integrated solid waste management to disseminate best practices and focus on areas where diversion can be increased. The focus in FY 2016 is likely to remain on food waste handling in galley areas. This has the potential to significantly increase diversion in locations that operate galleys and/or food service operations. The Navy will also continue working on revisions to its guide on Qualified Recycling Programs, which will help these programs operate more effectively, including increasing diversion rates. Finally, the Navy will update its 2014 policy manual OPNAV M-5090.1, *Environmental Readiness Program Manual*, to include the most recent solid waste policies to increase diversion rates.


Drum being prepared for recycling, Eglin AFB, FL

Photo: U.S. Air Force

The Marine Corps is implementing several initiatives to support installation efforts to increase solid waste diversion. This includes periodically publishing a newsletter to engage the installation pollution prevention community and increase awareness of solid waste diversion goals, current and future initiatives, and success stories from around the Marine Corps.

The Air Force will continue to implement an Asset Management Program in FY 2016 that includes waste management as one of its five primary mission lines. The Air Force Waste Activity Management Plans will guide the investment strategy and approach for achieving program goals in solid waste management. Integrated solid waste management in the Air Force is governed by the 2009 Air Force Instruction 32-7042, *Waste Management*, which addresses diversion through reuse, donation, recycling, Qualified Recycling Programs, composting, and mulching. The Air Force expects the additional guidance and direction provided in the new DoDI to further enhance the ability of the Air Force to cost-effectively manage non-hazardous solid waste. For C&D debris, the Air Force is committed to maximizing diversion of its waste stream in the most cost-effective manner possible. Year-to-year diversion rates can vary significantly based on the type of C&D projects executed each year, but it is expected that runway construction and refurbishment activities in FY 2016 will present significant C&D recycling opportunities.

GOAL #6: The Use and Release of Chemicals of Environmental Concern Minimized

Sub-Goal 6.1 – Chemical Use, Release, and Transfer

DoD will replace the TRI form of sub-goal 6.1 with one focused on the Military Services' Toxic and Hazardous Chemicals Reduction Plans. This new sub-goal is still being developed by OSD and the Services, with some reporting in the FY 2017 SSPP and full reporting beginning with the FY 2018 SSPP. Most of the goals from the Service's original Toxic and Hazardous Chemical Reduction Plans from 2009 under EO 13423 have been met, are on track to be met, or have been superseded by other metrics currently in the SSPP.

During FY 2016, the Air Force will continue to use its standardized Hazardous Material Tracking System to track and review opportunities to reduce or eliminate the use, production, release, and transfer of toxic chemicals. The Air Force will also continue to reduce the use of processes that are heavily dependent on toxic chemicals as it shifts to newer weapon system platforms. Between these two efforts, and on-going phase out of additional toxic materials in weapon system components, the Air Force expects to remain on track to exceed TRI reduction targets.

Stripping paint using corn starch, which is then recycled, JB San Antonio-Randolph, TX

Photo: U.S. Air Force

In FY 2016, the Navy will utilize the in-depth study it conducted in FY 2015 of its top TRI chemicals during the last five reporting years to help guide an overall chemical reduction plan strategy. Based on its analysis, the Navy drafted an implementation plan with proposed annual reduction goals for the seven-year period from FY 2017 to FY 2023 for each of the top ten TRI chemicals. The reduction goals vary depending on the sources of the chemical emissions, the ease of making changes in the processes that generate them, and the availability or lack of material substitutes. The Navy plan will take into account the potential success of any studies already underway by the Navy Research Development Testing and Evaluation program for process or chemical alternatives, and it will coordinate and compare these efforts with other DoD agencies. Meanwhile, other ongoing initiatives continue, including testing anti-fouling hull paints without copper, and material substitutions for paints and paint strippers containing xylene. Regarding the management of hazardous materials, the Navy increasingly relies on contractors to own the Navy's hazardous material inventory until it is requisitioned for use by a unit or shop. Contractor handling of the inventory greatly reduces the amount of hazardous waste generated due to shelf-life expiration. Nitrate compounds are still about 50% of the total TRI chemical emissions for the Navy. Individual Navy activities are investigating initiatives to reduce nitrates released from their wastewater treatment plants.

The Marine Corps will continue to explore and implement opportunities to reduce TRI releases. The vast majority of the Marine Corps' total releases and off-site transfers are nitrate compounds released from wastewater treatment facilities. While some Marine Corps installations completed upgrades to their wastewater treatment plants, aging infrastructure at other installations continues to pose a challenge in this area, since upgrades to wastewater treatment infrastructure can require significant investment. Independent of pollution prevention or reduction technologies, the quantity of some toxic chemicals released or transferred is directly proportional to the number of personnel based at an installation at any given time and according to dynamic variables such as USMC training and deployment schedules.

The Army is reviewing chemical usage across the Army to develop a new chemical reduction plan. In addition to reviewing chemicals that constitute the majority of the Army's TRI reported emissions, the Army effort will consider chemicals of concern for workplace and occupational exposure, and/or chemicals targeted for reduction and/or elimination under regulations such the European Union's Registration, Evaluation, Authorisation and Restriction of Chemicals, and similar regulatory schemes.

Sub-Goals 6.2 and 6.3 – Pesticides

DoD's pest management programs are essential to prevent pest and disease vectors from adversely affecting the Department's operations and the ecosystems over which DoD has stewardship. On an ongoing basis, the Military Services evaluate opportunities to minimize the use of pesticides while maintaining mission support requirements.

In FY 2016, the Air Force will continue to ensure that pest management personnel receive appropriate training, certified individuals are used to apply pesticides in a manner consistent with their intended use, and IPMPs are updated and implemented, with a focus on insect disease vectors and invasive plant species. The Air Force will continue to collaborate as needed with federal, state, and local officials to support pest management initiatives impacting Air Force installations and surrounding communities.

Hive created for honey bees; testing assured no harm from pesticides; Langley AFB, VA

Photo: U.S. Air Force

NAVFAC Applied Biology conducts pest management program reviews at each installation every three years. During these reviews, NAVFAC ensures that all pesticide applicators (DoD or contract) are appropriately certified. The Navy requires IPMPs at 83 installations, and the USMC requires IPMPs at 19 installations, all of which must be rewritten every five years. In FY 2015, there were seven Navy IPMPs and two USMC IPMPs that were not rewritten, either due to lack of personnel to write the plans or because they were unfunded. The IPMP rewrite is funded by the installation and written by NAVFAC Applied Biology on a reimbursable basis. Funding for the rewrite should be made a higher priority and should be planned for in the POM process well in advance of the current IPMP's expiration date. If requested by an installation or region, NAVFAC will conduct recertification training for pesticide applicators at a specific location on a reimbursable basis.

In FY 2016, the Army will continue to ensure that pest management personnel receive appropriate training and anticipates that 100% of its pesticide applicators will be certified or recertified. Army installations will continue to maintain and implement current IPMPs, which support the Integrated Natural Resource Management Plans to ensure safe and environmentally sound pesticide applications. Major areas of concentration will be surveillance and control of insect disease vectors, feral and invasive species, and collaboration with federal, state, and local agencies to support installation or local pest management requirements or initiatives.

Objective #4: Continuous Improvement in the DoD Mission Achieved through Management and Practices Built on Sustainability and Community

GOAL #7: Sustainability Practices Become the Norm

Sub-Goal 7.1 – Procuring Sustainable Goods and Services

The DoDI titled *Procurement of Sustainable Goods and Services* is currently undergoing formal coordination, with issuance expected by the end of 2016. The DoDI establishes policy, assigns responsibility, and provides compliance goals and direction for the sustainable procurement of goods and services. The Instruction also outlines procurement preferences, new contract requirements, training procedures, and program evaluation processes for sustainable procurement. Due to the fact that procurement is executed within DoD at many levels and by many organizational entities—spanning government purchase cards to major contracts—the Department expects the DoDI to have a significant impact in ensuring that procurement is conducted sustainably across DoD.

After the DoD Instruction on sustainable procurement is issued, the Army will update its sustainable procurement policy and related implementing guidance. The Army will update its contract review guide (developed earlier in FY 2016), to include a checklist to assist Army contracting personnel in the execution of solicitation and contract awards. The Army maintains an internal SharePoint site containing information to assist contracting and operational requirements personnel. The website includes information on enabling authorities, regulatory resources, training resources, and links to other federal sustainable procurement websites, such as FedCenter and GSA. Army Installation Management Command, working with Army Contracting Command, will continue to incorporate sustainable procurement requirements into the primary tasks of its performance work statements, and it will update its contract Quality Assurance Surveillance Plans to include sustainable procurement requirements. In FY 2016, the Army National Guard will continue to provide training on sustainable procurement and to develop and implement Sustainable Procurement Plans; to date, 29 states and territories have implemented their plans. Army Medical Command will track and report the percentage of cleaning products that are certified green cleaning chemicals, as part of its participation in Practice Greenhealth programs.

Photo: U.S. Air Force

The Air Force will continue best procurement practices, including maintaining familiarity with the EPA's Comprehensive Procurement Guidelines, and specifying minimum energy efficiency standards and the procurement of non-toxic and carcinogen-free products to ensure protection of human health at all stages of application, during fire conditions or during the cleaning or maintenance of equipment. The Air Force also requires the procurement of:

- recycled or recovered paper, metal, or cement/concrete products;
- products with low content of volatile organic compounds or products containing no ozone-depleting substances; and
- bio-based and other environmentally preferred products.

The Air Force will update its policies and instructions for consistency with the new DoDI on the sustainable procurement of goods and services.

The Navy will continue to integrate environmental considerations into purchasing by providing outreach support to Navy Purchasing Card Holders and Contracting Specialists, and will continue offering on-line "Knowledge Nuggets" training tutorials targeted to Contracting Specialists and Navy personnel holding purchase cards. The Marine Corps continues to work with the GSA and the DLA to procure sustainable products at all installations purging all unnecessary products like Styrofoam from the supply chain. The USMC also educates contract writers, vendors, and product purchasers about sustainability requirements and mandates, but the Marine Corps currently has no sustainable procurement policy.

Photo: U.S. Navy

In FY 2016, DIA will begin tracking sustainable procurement compliance with its Contract Management System, and will enforce the use of the green procurement fields in the software. MDA will update its training on sustainable procurement and will incorporate lessons learned on sustainable procurement to improve future solicitations and contract actions.

Sub-Goal 7.2 – Electronic Stewardship and the Efficient Use of Data Centers

Electronic Stewardship

DLA Disposition Services processed only 89% of the end-of-life electronics it received in FY 2015 through certified recyclers. DLA is rectifying the problem through two electronic scrap sales contracts it awarded in November 2015 to recyclers certified under Responsible Recycling©. These replaced earlier contracts that processed end-of-life electronics under conditions of Demilitarization as a Condition of Sales and Scrap Mutilation. Therefore, the percentage of electronics processed through certified recyclers will greatly increase in FY 2016.

Data Centers

The Department will continue to focus on improving the effectiveness and energy efficiency of its data centers, to comply with the policy memorandum M-16-19 issued in 2016 by the Office of Management and Budget, establishing the Data Center Optimization Initiative. The new policy replaces the Federal Data Center Consolidation Initiative and expands on requirements established in EO 13693, including power usage effectiveness targets of between 1.2 and 1.4 for new data centers, and ≤1.5 for existing data centers.[5]

The DoD Chief Information Officer is updating the DoD Compute and Storage Strategy, and reviewing the existing data center and cloud policies with an intent to update them. DoD has developed a series of "efficiency levers" it will continue to use to drive efficiency, such as the ratio of operating systems to full time equivalents, percent virtualization, and the ratio of virtual operating systems to host machines. DoD has established threshold and objective values for these, and the DoD Chief Information Officer has issued related guidance to the Components to reach these values by the end of FY 2018. DoD has developed a Total Cost of Ownership Model and will continue to use it to estimate potential savings, identify targets for consolidation and provide savings estimates

[5] Power usage effectiveness is the ratio of the total energy consumed by a data center to the total energy consumed by the IT equipment in that data center. Ideally, this ratio is 1.0, with all energy consumed by the data center is solely used by IT equipment.

to Congress. The Department plans to close approximately 364 additional data centers through FY 2016.

The Air Force is pursuing a number of approaches to optimize efficiency, including the use of ESPCs, immersing servers in oil, and connecting high-density, performance-optimized data centers directly to the power grid at the sub-station level. The primary focus of the Army is to improve the security of its IT systems and to meter on-post Army data centers.

In WHS, DISA will model air and thermal flow at all Pentagon data centers in FY 2016 using a computational fluid dynamics software that will allow WHS to identify energy and cost-effective measures to improve operational efficiencies. WHS is in the process of executing an ECIP project to incorporate best practices into data centers throughout the Pentagon and Mark Center, including arranging server racks into cold aisles, retrofitting server racks with blanking panels, and reducing air leakage from underfloor supply plenums with air-sealing grommets. WHS is also investigating the usage of direct-to-chip liquid cooling technologies in data centers to displace mission critical requirements.

MDA will continue to improve the efficiency of its data centers in FY 2016 by participating in the Department of Energy's Certified Data Center Energy Practitioner Program. DIA will continue with the consolidation and modernization of its main data center and conduct an aggressive consolidation of all computing devices and data center spaces. For its other data centers around the globe, DIA will continue to identify older computing devices and equipment for removal. DCMA will consolidate its data centers into DISA or other data centers managed by DoD by FY 2018.

Sub-Goal 7.3 – High Performance, Sustainable Buildings

The Army will update its sustainable design and development policy to incorporate the requirements of EO 13693, DoD implementation guidance on the new EO, the revised Guiding Principles, and the pending update to UFC 1-200-02. This will ensure that new construction is designed according to Federal high performance sustainable building requirements. In addition, the Army will continue to integrate proven new or underutilized technologies into standard designs and specifications. The Army will also leverage appropriated and third-party funds to make strategic improvements to the Army existing inventory of more than 40,000 buildings subject to the Guiding Principles.

Martin Army Community Hospital, Fort Benning, GA, on track for LEED Gold

Photo: U.S. Army

The Navy and Marine Corps will continue to follow the September 2014 NAVFAC Engineering Construction Bulletin 2014-02, *NAVFAC Sustainability and Energy Requirements*, to ensure that all repairs and alterations of existing buildings comply with the Guiding Principles, and that building repair projects exceeding $2.5 million are developed to reduce maintenance costs and the consumption of energy, water, and materials. In FY 2015, the Navy will continue with the certification of 17 facilities to either Silver or Gold LEED ratings.

The Air Force expects all new construction and major renovations to comply with the Guiding Principles, based on a suite of recent issuances, including UFC 1-200-02, the November 2013 *Department of Defense Sustainable Buildings Policy*, and two 2014 Air Force Instructions. For existing

buildings, the Air Force will base its decisions to invest in projects that improve the performance and sustainability of buildings based on the projects' life cycle return on investment. The Air Force success in improving the performance of its buildings is directly linked to the ability of building improvement projects to favorably compete with all projects and requirements through the Air Force Integrated Priority List process.

Sub-Goal 7.4 – Environmental Management Systems

During FY 2016, the Navy will issue an updated environmental readiness policy to adopt concepts of the newly revised ISO 14001:2015 standard, titled *Environmental management systems – Requirements with guidance for use*. The update will include additional emphasis on scoping the EMS, leadership and commitment, risk planning, and continual improvement. USMC installations will continue the comprehensive Environmental Management Repository data collection portal developed by Headquarters Marine Corps, which helps installations identify trends and track progress towards their EMS goals and requirements.

In FY 2016, the Air Force will continue implementing EMSs at appropriate facilities in accordance with Air Force Instruction 32-7001, *Environmental Management*, and participating in the federal Interagency EMS Community of Practice advisory group. Commanders will continue to utilize the Air Force EMS framework to identify and manage daily operations that generate waste and pollution. The framework uses a hierarchy that gives preference to eliminating or reducing pollution at its source by adopting less hazardous alternatives and reengineering processes, packages, systems and facilities. The Air Force will continue to manage EMS-generated information via the eDASH site to more easily understand the enterprise-wide implications of pollution prevention opportunities, target high-valued opportunities for risk reduction and efficiencies across the life cycle, and allow for sharing of lessons learned and best practices with users from across the Air Force. In FY 2016, the Air Force will implement a new Management Review tool in e-DASH that will allow appropriate facilities and installations to create their annual EMS review electronically for leadership, increasing the efficiency of the review process.

The Army will continue to maintain those EMSs that have proven effective, review and update its EMS guidance, and address the transition to ISO 14001:2015.

DLA is continuing with the implementation of an enterprise-wide EMS framework in CY 2016, which will serve both as an overarching framework for DLA environmental policies, while explaining EMS roles, responsibilities, and procedures for all levels of the agency.

IV. Sustainability Highlights for Military Installations and DLA

IV.1 Department of the Army

Tobyhanna Army Depot

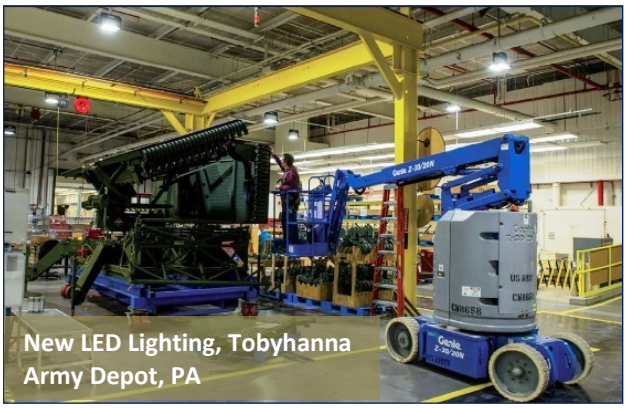

New LED Lighting, Tobyhanna Army Depot, PA

Photo: U.S. Army

Tobyhanna Army Depot, PA, is addressing sustainability on multiple, cost-effective fronts. The Depot is in the midst of a five-year program that replaced indoor fluorescent lights with LED lighting in six warehouse bays spanning approximately six acres of floor space, and it is now replacing all exterior lighting with LEDs. The switch to long-lived LEDs has eliminated the waste associated with replacing outdoor sodium vapor bulbs, and has reduced the amount of fluorescent bulbs in the waste stream by more than a ton annually. So far the program is saving approximately $6,300 and over 1.3 million kilowatt-hours of electricity annually.

Another cost-saving innovation is the reclamation system built into the Depot's wastewater treatment plant in 2014. In FY 2015, the Depot consumed 90% less potable water as a result of using reclaimed wastewater, which meets the standards of the Pennsylvania Department of Environmental Protection. The resulting savings are more than $50,000 annually, so the system will pay for the initial $120,000 cost for the reclamation component in just 2.4 years. Also, since less potable water is needed, the quantity of chemicals needed by the potable water treatment plant have been reduced by an estimated 13%.

Tobyhanna also has various programs and approaches to ensure that procurement is conducted sustainably. The installation's Buy Recycled program requires that all employees responsible for purchasing first consider items with recycled content. Employees responsible for purchasing products receive training on bio-based product requirements as well as the Buy Recycled program. The Depot established criteria on products relating to compliance with Federal sustainability requirements, as well as to performance, and it ensures that the criteria are met via a 'must buy' list of over 190 products, ranging from copier paper to toner cartridges to re-refined lubricants for vehicles.

Fort Lee


Collection of end product from dehydrator, Fort Lee, VA

Photo: U.S. Army

The troop dining facility at Fort Lee (VA) partnered with the culinary school and field test kitchen of the Joint Culinary Center of Excellence—part of the U.S. Army Quartermaster School, also located at Fort Lee—on a pilot project to test the dehydration of food waste. Pulpers and dehydrators were installed in all of these facilities, processing all food waste and food-related waste materials generated from them. The project collected data on equipment capacity, run-time, energy demand, and staffing requirements. The results showed that the equipment reduced the weight of food waste by 90%, diverting an estimated 3,500 pounds of food waste from the landfill every week. Based on the positive results, the Army had dehydrator equipment installed at all Fort Lee's dining facilities, which serve more than four million meals annually.

Fort Hood

The Army's Office of Energy Initiatives worked with DLA and Fort Hood (TX) to plan a hybrid solar-wind renewable energy project. With a planned capacity of 65 MW of electricity, all of which will be used by the installation, the project is the first of its kind because it includes both an on-post solar array and an off-site wind farm. The wind farm will be about 350 miles northwest of Fort Hood with approximately 20 turbines, with the electricity delivered via a substation operated by a utility that serves the base. The on-site solar PV array will consist of more than 63,000 panels covering an area equal to about ten football fields. The Army estimates that it will save approximately $169 million over the course of the 30-year contract.

Solar array project planning, Fort Hood, TX

Photo: U.S. Army

The base is also a leader in mobile forms of renewable energy, serving as the Army's site for a vehicle-to-grid pilot demonstration. The installation has fourteen Level 2 charging stations (240 or 208 volt) for Ford F-150 hybrid electric trucks and five DC fast-charging stations (480 volt) for Nissan LEAFs®, which can support up to 55 vehicles. These charging stations are enabled for vehicle-to-grid operation, which means they can provide demand response, peak shaving, and ancillary services in the wholesale electricity market, as well as limited emergency backup power to critical base functions. The stations were developed to provide up to 100 kW of power. One of the reasons Fort Hood was chosen for the pilot is that it is located within the Electric Reliability Council of Texas service area, which operates a demand response program called the Fast Responding Regulation Service. Fort Hood's infrastructure supports the stability of the electric distribution system and periods of high demand within the domain of the Electric Reliability Council of Texas.

Fort Bliss

When Fort Bliss (TX) signed on as one of the Army's eight Net Zero Waste pilot installations in FY 2011, its solid waste diversion rate was only 24%. Since that time, the installation's commitment to implement outreach programs and expand recycling opportunities has paid off, yielding a diversion rate of more than 45% by FY 2015. Fort Bliss recycling outreach efforts include newsletters, public service announcements, social media campaigns, training, events, contests, and awards. In FY 2015, the Fort Bliss recycling team participated in or hosted over 40 outreach events, including Shredder Days, Earth Day, and Recycle Rama. Over 59,000 Soldiers, civilians, contractors and tenant partners have received recycling training to date. The non-profit organization Keep Texas Beautiful awarded Fort Bliss first place in their 2015 Government Category in recognition of the installation's achievements.

Recycle Hero campaign, Fort Bliss, TX

Photo: U.S. Army

Part of the Fort Bliss outreach effort is the "three Rs for solid waste" approach: Rally, Reward, and Recognize. To rally the installation, Fort Bliss' leaders challenged everyone to raise their recycling

numbers, in turn raising revenue that funds Soldiers' Morale, Welfare and Recreation programs. Fort Bliss' recycling Grand Challenge is a competition that uses proceeds from the Qualified Recycling Program to reward the top recycling Unit for the month with a $1,000 contribution to the Unit's Morale, Welfare and Recreation fund. Winners also receive a 10' x 6' poster recognizing the Unit at the installation's entrance gates. Finally, the Recycle Hero campaign recognizes individuals who go beyond the call of duty to recycle. Recycle Hero campaign posters and signs have become a "call to action" for others to increase their recycling efforts.

Fort Leonard Wood

Army Net Zero pilot installations have proved to be a source for lessons learned and best practices for other installations. Using JB Lewis-McChord's barracks deconstruction project as a model, Fort Leonard Wood (MO) undertook the deconstruction of three buildings from the World War II era: a laundry, warehouse, and chapel. The deconstruction project, awarded in September 2014, cost $10.31 per square foot, including the salvage of reusable materials. When deconstructing the buildings, the contractor removed the greatest amount of materials, components, and products that were intact and suitable for reuse or recycling. Out of 1,717 tons of material removed, 1,246 tons were reused or recycled, for a 72.5% diversion rate.

Photo: U.S. Army

Sorting materials during deconstruction, Fort Leonard Wood, MO

Colorado Army National Guard

The Colorado Army National Guard received a LEED Platinum rating in May 2015 from the U.S. Green Building Council for its new North Colorado Springs Readiness Center. This high-performance achievement was realized with no additional cost over a standard building. The facility is the new home for approximately 345 Colorado Army National Guard Soldiers, most of whom serve part-time, occupying 63,000 GSF on 23 acres. The facility includes classrooms, administrative offices, maintenance facilities, warehouse space, and medical facilities. The base used efficient geothermal heating and cooling to improve the energy efficiency of the building by 48% over baseline model 90.1-2004 of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers. Rooftop solar PV panels are generating approximately 13% of the building's energy. The facility consumes 40% less indoor water due to efficient plumbing fixtures, and 50% less water for landscaping, compared to a standard building. Approximately 20% of the building materials consisted of recycled content, and more than 75% of C&D debris was diverted over the course of construction.

LEED Platinum North Colorado Springs Readiness Center, Colorado Army National Guard, Colorado Springs, CO

Photo: Senger Design Group

IV.2 Department of the Navy

Naval Air Station North Island

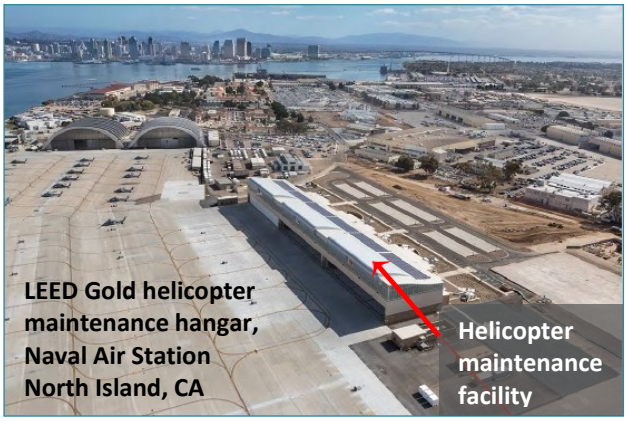


Photo: U.S. Navy

The helicopter maintenance hangar at Naval Air Station North Island, completed in 2014, was awarded LEED certification, as well as achieving a high-end design aesthetic. The $60 million facility comprises 112,000 square feet, including a two-story industrial maintenance and administrative facility attached to the hangar bay that is used to maintain 39 MH-60 helicopters. Energy efficient measures include an improved thermal envelope, a solar reflective roof, high-efficiency glazing, interior lighting with lower power density, occupancy sensors, daylight harvesting, high-efficiency variable air volume systems, and solar water heating. These features will reduce energy costs by an estimated 37% annually over a standard design. Low-flow plumbing fixtures will reduce indoor potable water use by 40%, and landscaping and irrigation systems will reduce potable water consumption for irrigation by almost 60% from the calculated baseline case. The facility also will provide an enriched environment for occupants with abundant natural light, an elevated *brise soleil* (architectural feature built on the façade of a building to deflect sunlight), and covered outdoor break areas. An FY 2015 Federal Energy and Water Management Award was presented to the station for these achievements.

Naval Support Activity Annapolis

Naval Support Activity Annapolis, MD, upgraded its water treatment plant in 2015, with the project coming online early in 2016. The improvements are projected to reduce by 40% the amount of water the installation needs to withdraw from its three groundwater wells, while also saving 130 million gallons of water every year. The gains from this $7.7 million project are due to capturing filter backwash and adding a sludge-dewatering process based on centrifuges and gravity settlers. The dewatering process yields a cake that can be removed in a roll-off dumpster with a frequency on the order of months, rather than the weekly removal by five tankers required previously. The project will drastically reduce operational costs, saving $1.5 million annually, due to reduced costs for energy, treatment chemicals, and disposal fees. At the same time, precious groundwater is being preserved and impacts to the imperiled Chesapeake Bay are mitigated due to reduced discharges of treated effluent.

MCAGCC Twentynine Palms

In FY 2015, the Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms continued to earn its reputation for a relentless pursuit of energy and water efficiency. The installation reduced potable water consumption by 130 million gallons from FY 2014 to FY 2015, achieving a 54% reduction in potable water intensity compared to the FY 2007 baseline. The per capita water usage of MCAGCC Twentynine Palms in FY 2015 was 69 gallons per person per day. The Installation established a Water Conservation Task Force in FY 2015 to focus on enhancing water conservation and efficiency in the future. The Task Force helped develop the Commanding General's Water Conservation Policy, Drought Response Plan, and a new base bulletin. New measures implemented on base include:

- high-efficiency standards for plumbing fixtures in new or remodeled structures;
- no wet cleaning on hard surface areas unless authorized;
- development and implementation of plans to reduce irrigation, including guidelines for time of use, frequency, and duration of application;
- limited washing of government non-tactical vehicles to the extent possible and using a closed loop system;
- equipping hoses with a positive shut off nozzle that prevents water from running when the hose is not in use;
- conversion of green space to desert landscaping, and the installation of synthetic turf;
- utilization of recycled and/or non-potable water supplies, where possible, in place of potable water;
- replacing water usage for dust control at construction sites and on military vehicle roadways with commercially available agents that offer a tested, persistent mitigation solution; and
- using recycled water to support irrigation needs at the Combat Center's Golf Course.

Photo: U.S. Marine Corps

Also, the installation's Exercise Support Division earned the 2015 Secretary of the Navy Energy and Water Management Award in the United States Marine Corps Expeditionary Category for their ability to record information on the amount of energy used by ground equipment in an expeditionary environment.

Marine Corps Base Camp Pendleton

Marine Corps Base Camp Pendleton has been actively institutionalizing sustainability measures, spanning facility energy and water efficiency, renewable energy, vehicle efficiency, and solid waste. For the energy and water aspects of this work, the base received an FY 2015 Federal Energy and Water Management Award. In FY 2014, the energy team coordinated efforts to complete 19 projects with a total value of $26 million to improve energy and water efficiency, upgrading more than 1,000 buildings representing 50% of base facilities. The improvements are generating an estimated 102 billion Btu and $2.2 million annually in savings. The projects included retrofitting interior and exterior lighting to LEDs, upgrading boilers, installing small, efficient HVAC units, retro-commissioning 200 facilities, and installing water and natural gas meters. The base installed spectrally-selective film on windows to help resolve comfort issues in older buildings without having to install central cooling systems. A new comprehensive water efficiency project is installing 26,000 low-flow plumbing fixtures in 249 buildings, which will save an additional 133 million gallons of water per year.

Photo: U.S. Marine Corps

The base continued expanding its infrastructure for charging EVs, with 34 stations currently in place. In FY 2014, the base also added five photovoltaic systems totaling 185 kW, bringing the base's total capacity to 14 MW and avoiding $1.4 million in electricity costs annually. With regard to solid waste, Camp Pendleton reported the greatest reduction in solid

waste generation within the Marine Corps, slashing the amount of waste by 25% in just the one year from FY 2014 to FY 2015.

Marine Corps Logistics Base Albany

Marine Corps Logistics Base (MCLB) Albany installed a new geothermal system to efficiently provide a significant portion of the HVAC needs of the Marine Corps Logistics Command's headquarters building. The technology is a cold borehole thermal energy storage system, consisting of 300 boreholes drilled over 200 feet into the ground. The boreholes are connected to the HVAC system in the building, allowing cold water to be stored underground during milder months. The stored cold water is then used during summer months to reduce the cost of cooling the building by as much as 50%. During the summer months, warm water is stored on the outskirt of the boreholes while cold water is pulled through the air conditioning system from the center of the 300 boreholes to cool the building. In the winter, cold water is stored and warmer water is pulled through to heat the building. The project allowed the base to remove a cooling tower, which was substituted with adiabatic dry-coolers, allowing the amount of cooling water used by the building to be reduced by at least 2.4 million gallons per year.


Installation of geothermal system, MCLB Albany, GA

Photo: U.S. Marine Corps

IV.3 Department of the Air Force

Joint Base Cape Cod

Among the military tenants on JB Cape Cod are the Cape Cod Air Force Station and Otis Air National Guard Base. The Cape Cod Air Force Station reduced facility energy use by 21% in FY 2014, relative to the FY 2003 baseline, a decline of nearly ten billion Btu. Lighting and motor upgrades and the installation of variable frequency drives were funded with $300,000 in investment at no additional cost to the Air Force. The installation is reaping about $150,000 in energy savings every year as a result. Another project was to replace the installation's 450-ton chillers with energy-efficient models and a free-cooling system. The free-cooling system takes advantage of drops in outdoor air temperature to bypass the chillers, saving energy while reducing wear on the chillers. The station also installed two 1.68 MW wind turbines, which generated almost 19 billion Btu of electricity, offsetting about half of the energy consumed on the installation in FY 2014. The resulting savings was nearly $805,000. Stephen Mellin, Support Officer for the 6th Space Warning Squadron, was honored with an FY 2015 Federal Energy and Water Management Award for his instrumental innovation and leadership in helping the installation realize these benefits.


Wind turbine installation, JB Cape Cod, MA

Photo: U.S. Air Force

In FY 2015, the Air Force issued a Notice of Intent to Award a contract to install a ground-mounted solar PV array on top of a capped landfill at Otis Air National Guard Base. The array will have a capacity in excess of 6 MW and span about 60 acres. The array will be connected via underground

conduit to transformers that will be connected to the main power grid serving the site. When completed in FY 2016, the project is expected to provide 30% of the base's annual power demand.

Eglin AFB

Eglin AFB realized significant savings by combining its energy management control system with real-time pricing. The approach integrated direct digital controls, meters, and energy analyses across 131 buildings, paying for itself in just two years by saving 181 billion Btu of electricity and gas and $3.4 million. The control system collects real-time data from more than 1600 meters, which enabled trend analysis, remote diagnosis, load-shedding, occupancy set-backs, and the implementation of full-scale, real-time pricing. After the team mitigated the cost risks inherent in real-time pricing, the system was used for more complex savings strategies, such as raising cooling set-points during premium rate periods. Beyond the savings relating to pricing, another $1.5 million in savings was realized through optimization that reduced energy consumption and improved maintenance. Moreover, the Eglin AFB energy team benchmarked this new practice, setting the baseline for future analysis, continuous commissioning, and energy-savings projects, serving as a best practice for the entire Air Force to follow. The 96th Civil Engineer Group at Eglin AFB was presented with an FY 2015 Federal Energy and Water Management Award for this accomplishment.

Photo: U.S. Air Force

Energy management control system, Eglin AFB, FL

The Air Force also initiated the process in FY 2015 of leasing 240 acres of non-excess, underutilized property at Eglin AFB to the local utility provider, Gulf Power Company, to develop a 30 MW solar PV array under an EUL agreement. The arrangement allows Gulf Power and their third party developer to construct, own, operate, and maintain the PV array on base property through a sublease and PPA. In return for use of the land, Gulf Power will make infrastructure upgrades at Eglin AFB to improve the base's energy security and resiliency. The upgrades will include replacing a substation switcher and a 20 megavolt-ampere transformer. The solar panel racking system will be designed to withstand winds of 145 miles per hour, and will generate over 60,000 MW-hours per year. The power generated from the array will be transmitted to a nearby Gulf Power substation and enter the local power grid.

Royal Air Force Mildenhall

The base energy team at Royal Air Force (RAF) Mildenhall carried out independent research and development that resulted in the adoption of a technology across 26 base facilities, a move that is estimated to pay for itself in fewer than 14 months once completed. The technology is a new innovative oil-saving device called the Dynamic Burner Management Unit. It is a solid-state, electronic controller for boilers that optimizes the firing pattern of gas or oil boilers by monitoring flow and return. The team tested the technology on two facility types: a large temporary lodging facility and a small office facility. Given the annual oil bill of more than $3 million at RAF Mildenhall, the team quickly recognized the potential of deploying the units site-wide, when their tests showed a 7% savings in oil in the lodging facility and an impressive 26% savings in the office

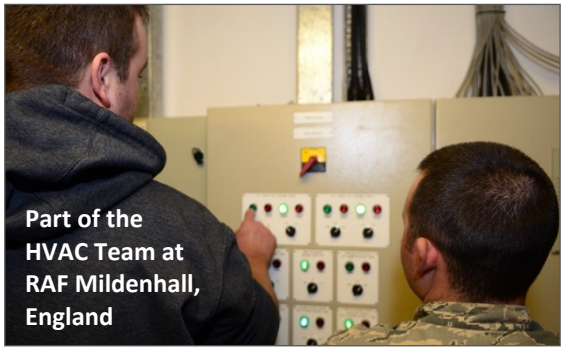


Photo: U.S. Air Force

Part of the HVAC Team at RAF Mildenhall, England

facility. The base assessed the impact of incorporating 49 units on boilers across 26 facilities, and a business case was developed showing a simple payback of fewer than 14 months based on a conservative 5% annual savings. When completed, the project is expected to save $700,000 and 25 billion Btu annually. The base was presented with an FY 2015 Federal Energy and Water Management Award for their initiative.

Joint Base Elmendorf Richardson

The energy team on Joint Base Elmendorf Richardson (JBER) implemented upgrades to lighting and HVAC that reduced energy consumption by 133 billion Btu, avoiding more than $2 million in energy and maintenance costs. The foundation of JBER's program involved completing facility audits and uploading data into the Pacific Air Force's Energy, Condition, and Optimization Management Estimating Tool (eCOMET), which allowed energy managers to identify and track energy efficiency opportunities and develop cost-effective projects to improve energy efficiency. JBER also capitalized on in-house expertise to reduce the costs of designing these energy projects. Together the implemented projects reduced JBER's facility energy use intensity by almost 64% from the FY 2003 baseline, and reduced GHG emissions by an estimated 3,165 metric tons of CO_2(e). The base received an FY 2015 Federal Energy and Water Management Award for this work.


Photo: U.S. Air Force

Energy management control system, JBER, AK

Laughlin AFB

Laughlin AFB executed an aggressive xeriscaping initiative in FY 2014 that saved 17 million gallons of potable water, a 10% decrease in the base's total annual water consumption from FY 2013. Once the second phase of the work is complete, the base expects to save a total of 40 million gallons per year—a reduction of 60% in its annual irrigation requirements. Previously, more than half of the base's potable water consumption went to irrigation, because the base's landscaping consisted of turf grasses and shrubs more suitable to locations with twice Laughlin's annual rainfall. Laughlin re-landscaped with indigenous, drought-tolerant plants, trees, and grasses, enhanced with earth and rock surroundings, to create a natural yet aesthetically pleasing appearance that mimics the base's desert climate. The base also installed computerized irrigation controls to maximize the efficiency of all water used. The estimated annual savings of $715,000 in water, electricity, and maintenance costs will pay for the $7 million initiative in ten years. Beyond the base, the change to landscaping appropriate for the climate has enhanced community relations and reduced water stress in the area as a whole, helping to ensure a sustainable water supply to support Laughlin's mission into the future. An FY 2015 Federal Energy and Water Management Award was presented to the base for these accomplishments.


Desert landscaping, Laughlin AFB, TX

Photo: U.S. Air Force

Wright-Patterson AFB

Wright-Patterson AFB operates a recycling and composting program that diverts more than 1,500 tons of solid waste from disposal in landfills. A key component of the effort is a program to recycle ceiling tiles, which has resulted in more than 1.1 million square feet, or 706,000 pounds, of tiles being recycled since its inception, the largest amount among federal facilities. The base also installed a collection and recycling system for aircraft de-icing fluid and switched to road salt for melting ice on paved surfaces rather than urea, which can lead to excess nutrients in surface waters.

Photo: U.S. Air Force

Wright-Patterson AFB made significant progress in FY 2014 and FY 2015 converting the boilers in its two central heating plants from coal to natural gas, resulting in significant reductions in hydrochloric acid emissions under TRI. The conversion at one of the plants began in March 2014 and was completed in February 2015. The other plant is still burning coal but uses less each year, with the conversion to be completed in 2016. At that point, the release of hydrochloric acid from Wright-Patterson AFB will be eliminated.

In FY 2015, the Ohio EPA recognized Wright-Patterson AFB with its Silver-Level *Encouraging Environmental Excellence* award for its ongoing commitment to exceed regulatory compliance obligations and achieve exceptional accomplishments in environmental stewardship.

Dover AFB

Photo: U.S. Air Force

Demolished concrete from the renovation of the 70-year old north-south runway at Dover AFB, 01-19, is being recycled. After the concrete is broken into rubble on site, the contractor loads it onto trucks and hauls it about a quarter mile away to be further pulverized. There, a concrete crusher creates an aggregate product that can be recycled for use in various foundations, concrete and asphalt mixes. Demolition began in March 2015, and the renovation is expected to be completed in June 2016.

Pesticide Innovations – Multiple Bases

Air Force pest management programs prevent pest and disease vectors from adversely affecting military operations. Some proven Air Force pest management approaches are highlighted here. **JB San Antonio-Lackland**, TX, is home to the Military Working Dog program, training over 700 dogs annually. To suppress insects that transmit Chagas disease to both dogs and people, the base employs a new mist sprayer that uses turbulent air, enabling the pesticide to permeate even thick and deep vegetation. The base also established ecosystem management initiatives to reduce the habitats that support disease-carrying insects and mammals, such as prescribed burning and mechanical removal of vegetation.

JB Charleston, SC, uses night-time application of pesticides aided by night-vision goggles for its low-altitude application of pesticides to manage mosquitos. The approach is effective because

mosquitos are active at night, while pollinators and other desirable insects such as honey bees typically are not. The efficacy of the system is evident in the fact that only 0.85 ounces of pesticide per acre, applied over 18,000 acres, achieved a 98% reduction in mosquito populations.

To minimize the number of herbicide applications needed to remove 90% to 95% of Wisteria, a fast-growing vine that kills trees, **Little Rock AFB**, AR, experimented with a brush cutter attachment for the mechanical removal of the plant. The innovation allowed for the removal of over 174,000 wisteria vines on 29 acres of commercial timber, saving 12,000 trees and reducing the seed source that could threaten nearby forest stands, all while minimizing the use of herbicide.

Goats instead of herbicides, F.E. Warren AFB, WY

Photo: U.S. Air Force

Malmstrom AFB, MT initiated a three-year project to bring a professional team with 1,500 goats to graze more than eight noxious weed species over 1,300 acres. The project is promoting combat readiness and training continuity and reducing the use and costs of expensive herbicides.

Appendix A. DoD SSPP Sub-Goals

SUB-GOAL 1.1 Energy Intensity of Facilities Reduced 30% by FY 2015 from FY 2003, and 25% by FY 2025 from FY 2015

Metric: The percent reduction in the total energy (British thermal units, Btu) consumed by DoD facilities per gross square foot (GSF) of total DoD building space. A facility is defined by the Energy Independence and Security Act of 2007 (EISA) §432(1)(C) as any building, installation, structure, or other property (including any applicable fixtures) owned or operated by, or constructed or manufactured and leased to, DoD. The term "facility" includes a group of facilities at a single location, or multiple locations managed as an integrated operation, and contractor-operated facilities owned by DoD. It does not include any land or site for which the cost of utilities is not paid by the Federal Government.

Annual Planning Targets and Results

FY	2010	2012	2013	2014	2015	2016	2017	2018	2020	2025
FY03 base	15%	21%	24%	27%	30%					
FY15 base						2.5%	5.0%	7.5%	12.5%	25%
RESULTS	11.4%	17.7%	17.2%	17.6%	**19.9%**					
Btu/GSF	102,929	96,593	97,149	96,647	93,962					
billion Btu	210,691	187,397	182,576	181,463	184,836					
million GSF	1,949.7	1,896.1	1,879.3	1,877.6	1847.4					
FY03 Btu/GSF	116,134	117,344								

SUB-GOAL 1.2 By FY 2025, Produce or Procure Energy from Renewable Sources in an Amount that Represents at Least 25% of Electricity Consumed by Facilities

Metric: The numerator is the sum of renewable energy that DoD produced, a DoD-controlled location produced, or a DoD component procured from another source. The denominator is the total electric consumption of facilities as published in the DoD Annual Energy Management Report. Renewable energy is defined in 10 United States Code (U.S.C.) §2924(7) as either thermal or electrical energy that is produced from renewable sources, including solar, wind, biomass, landfill gas, ocean (including tidal, wave, current, and thermal), geothermal (including electricity and heat pumps), municipal solid waste, and new hydroelectric generation capacity if achieved from increased efficiency or additions of new capacity at existing hydroelectric projects.

Annual Planning Targets and Results*

FY	2010	2012	2013	2014	2015	2016	2017	2018	2019	2020	2025
Targets	10%	12%	10%	11%	12%	13%	14%	15%	16%	18%	25%
RESULTS	9.6%	9.6%	11.8%	12.3%	**12.4%**						

**Title 10, U.S.C. §2911(e) (2) required that DoD establish an interim renewable energy goal in FY 2018, which led to an adjustment of targets for FY 2013 through FY 2017.*

SUB-GOAL 1.3 GHG Emissions per Mile from the Non-Tactical Fleet Reduced 30% by FY 2025, from FY 2014

Metric: The percent reduction in the GHG emissions per mile travelled by DoD non-tactical motor vehicle fleets relative to FY 2014.

Annual Planning Targets and Results

Fiscal year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Targets	%	none		4%				15%				30%
RESULTS	n/a	(3.4%)										
g CO_2(e)/mi	546	564.6										

SUB-GOAL 2.1 Potable Water Consumption Intensity by Facilities Reduced 36% by FY 2025 from FY 2007

Metric: The percent reduction relative to FY 2007 in potable water consumed by DoD facilities per GSF of total building space. Consumption includes the loss of water after it is delivered (e.g., though leaking or malfunctioning fixtures, such as toilets). A facility is defined as per EISA §432(1)(C).

Annual Planning Targets and Results

FY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2020	2025
Targets	6%	8%	10%	12%	14%	16%	18%	20%	22%	26%	36%
RESULTS	12.6%	10.8%	18.6%	19.8%	21.5%	**22.3%**					

SUB-GOAL 2.2 Industrial, Landscaping, and Agricultural Water Consumption Reduced 18% by FY 2025 from FY 2016

Metric: The percent reduction relative to FY 2016 in the amount of water consumed by DoD facilities for agricultural, landscaping, and industrial purposes.

Annual Planning Targets and Results

Fiscal year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Targets		2%	4%	6%	8%	10%	12%	14%	16%	18%
RESULTS	n/a									
million gallons										

SUB-GOAL 2.3 All Development and Redevelopment Projects of 5,000 Square Feet or Greater Maintain Pre-Development Hydrology to the Maximum Extent Technically Feasible

Metric: The percent of covered projects substantially completed in the reporting year (those development and redevelopment projects of 5,000 square feet or greater) that can demonstrate with documentation that stormwater design objectives were met through practices that infiltrate, evapotranspire, and/or harvest and use the rainfall to the maximum extent technically feasible. The criterion for maximum extent technically feasible is the full employment of accepted and reasonable stormwater infiltration and reuse technologies subject to site and applicable regulatory constraints.

Annual Planning Targets and Results

Fiscal year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2025
Targets	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULTS	n/a	98%	98.9%	79.4%	**79.7%**						

SUB-GOAL 3.1 Greenhouse Gas Emissions from Scope 1 and 2 Sources Reduced 42% by FY 2025 from FY 2008

Metric: The percent reduction of GHG emissions from combined Scopes 1 and 2 sources from the FY 2008 baseline (subject to DoD emissions reduction target, reported in units of million metric tons of carbon dioxide equivalent, MMT CO_2(e)).

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2018	2020	2025
Targets	3%	5%	7%	10%	13%	16%	19%	28%	34%	42%
Results	3.6%	4.4%	9.2%	10.3%	11.3%	**11.9%**				
MMT CO_2(e)	27.012	25.681	24.387	24.099	23.820	23.649				

FY 2008 Baseline [MMT CO_2(e)]: 28.021 for FY 2010, 26.855 for all subsequent years

SUB-GOAL 3.2 Greenhouse Gas Emissions from Scope 3 Sources Reduced 25% by FY 2025 from FY 2008

Metric: The percent reduction of GHG emissions (subject to DoD emissions reduction target) from Scope 3 sources from the FY 2008 baseline.

Annual Planning Targets and Results

Fiscal year	2010	2012	2013	2014	2015	2016	2017	2018	2020	2025
Targets	0%	1%	2%	3%	4%	5%	7%	9%	13.5%	25%
Results w/Hosted RE*	4.8%	9.1%	18.5%	19.5%	**17.8%**					
Results without Hosted RE**	(6.0%)	0.4%	6.6%	6.0%	6.1%					
MMT CO_2(e)*	6.607	6.939	6.224	6.144	6.278					
MMT CO_2(e)**	7.355	7.605	7.132	7.175	7.171					

FY 2008 Baseline [MMT CO_2(e)]: 6.940 for FY 2010, 7.413 for FY 2011, and 7.634 for all subsequent years

**Including credit for renewable energy (RE) generation operated by third-parties.*
*** Without including the RE credits.*

SUB-GOAL 3.3 30% of Eligible Employees Teleworking at Least Once Per Bi-Weekly Pay Period, on a Regular, Recurring Basis by FY 2025

Metric: The percent of DoD employees eligible to telework who are doing so at least once per bi-weekly pay period on a regular, recurring basis. Telework can be at any approved location: home, a telework center, and/or a secure telework site meeting the additional requirements for facility construction, network security, and access control for employees needing access to classified networks. An employee's day off during a compressed work schedule cycle does not count as a telework day.

Annual Planning Targets and Results

Fiscal year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2022	2025
Targets	10%	12%	14%	15%	17%	19%	21%	23%	25%	27%	30%
RESULTS	8%	13.4%	14.5%	**14.0%**							

SUB-GOAL 3.4 Greenhouse Gas Emissions from Employee Air Travel Reduced 7% from FY 2011 Levels by FY 2020

Metric: The percent reduction of GHG emissions from air travel by DoD employees on DoD business, relative to FY 2011, as calculated from travel data captured by the Defense Travel Management Office. *{This metric is being discontinued beginning with FY 2016 reporting.}*

Annual Planning Targets and Results

Fiscal year	2011	2012	2013	2014	2015
Targets	0%	0%	1%	2%	2%
RESULTS	n/a	12.2%	30.0%	29.0%	**21.1%**
MMT CO_2(e)	2.39*	2.09	1.67	1.69	1.82

**The Air Travel number in the FY 2011 data submission will not match this value, as this is an improved estimate developed after the FY 2011 data were submitted.*

SUB-GOAL 5.1 By FY 2015, at Least 95% of DoD Employees Covered by Policies to Reduce the Use of Printing Paper

Metric: The percent of total DoD employees (active military and civilian) in DoD Components that have issued policy to reduce the use of printing paper.

Annual Planning Targets and Results

Fiscal year	2011	2012	2013	2014	2015
Targets	35%	45%	55%	60%	95%
RESULTS	34%	57%	57%	64%	**98%**

SUB-GOAL 5.2 50% of Non-Hazardous Solid Waste Annually Diverted from Disposal

Metric: The percent of the total non-hazardous solid waste stream generated and collected by DoD facilities (by weight), without construction and demolition debris, that is directed away from disposal, for example by reuse, recycling, and/or composting.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	40%	42%	44%	46%	48%	50%	50%	50%	50%	50%	50%
RESULTS	39%	40%	49%	46%	46%	**46%**					
Generated*	2.014	2.245	2.144	1.901	1.889	1.994					
Diverted*	0.777	0.909	1.048	0.872	0.875	0.920					

**million tons*

SUB-GOAL 5.3 60% of Construction and Demolition Debris Annually Diverted from Disposal

Metric

The percent of construction and demolition materials and debris generated and collected by DoD facilities (by weight) that is directed away from disposal, for example by reuse, recycling, and/or mulching.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	50%	52%	54%	56%	58%	60%	60%	60%	60%	60%	60%
RESULTS	73%	77%	74%	73%	82%	**82%**					
Generated*	4.108	4.140	4.922	3.145	5.697	3.482					
Diverted*	2.984	3.195	3.645	2.293	4.658	2.851					

**million tons*

SUB-GOAL 6.1 On-Site Releases and Off-Site Transfers of Toxic Chemicals Reduced 15% by CY 2019 from CY 2006

(CY 2015 will be the last year of reporting this sub-goal, as it will be replaced with a new sub-goal on Toxic and Hazardous Chemicals Reduction Plans, beginning with the FY 2018 SSPP.)

Metric: The toxic chemicals released into the environment and transferred off-site (in total pounds), as a percentage of the calendar year (CY) 2006 baseline. The chemicals reported are the sum of releases reported on Environmental Protection Agency Form R Part II from: (1) Section 5 (Quantity of the Toxic Chemical Entering Each Environmental Medium On-Site), (2) Section 6.1 (Discharges to Publicly Owned Treatment Works, and (3) Section 6.2 (Transfers to Other Off-Site Locations) for disposal and treatment. This sub-goal does not include releases and off-site transfers from operational range activities. DoD toxic chemical reporting to the Environmental Protection Agency is done by calendar year, so fiscal year reporting on this sub-goal corresponds to data for the previous calendar year (e.g., FY 2015 reporting is CY 2014 data).

Annual Planning Targets and Results

CY	2010	2011	2012	2013	2014	2015
Targets	-	-	-	-	5%	
RESULTS	2.5%	(6.6%)	23.4%	15.5%	**17.6%**	
pounds	20,198,710	22,073,843	15,869,588	17,506,428	17,063,611	

CY 2006 Baseline: 20,710,301 pounds

(a negative number corresponds to an increase from baseline)

SUB-GOAL 6.2 100% of DoD Personnel and Contractors Who Apply Pesticides Are Properly Certified

Metric: Percent of personnel who applied pesticides on DoD installations during the fiscal year who were properly certified. Direct hire employees, certified in accordance with DoD 4150.07-M, Volume 1, have a maximum of two years to become certified after initial employment. Contracted employees shall have appropriate State or host-nation certification in the appropriate categories at the time the contract is effective. These certifications are in accordance with EPA rules and regulations and are accepted as valid certifications.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULTS	99.4%	99.2%	99.0%	99.6%	99.6%	**99.6%**					

SUB-GOAL 6.3 All DoD Installations Have Integrated Pest Management Plans Prepared, Reviewed, and Updated Annually by Pest Management Professionals

Metric: The percent of DoD installations that maintained integrated pest management plans that a DoD-certified pest management consultant and/or the installation pest management coordinator prepared, reviewed, and updated annually. These plans describe how the installation will prevent, manage, and control animal and plant pests while following the principles of integrated pest management and federal, state, and local laws. The plans are generated by the installation, are updated annually, and are reviewed and approved by the respective Military Department senior pest management professional(s).

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULTS	84.6%	90.2%	96.7%	90.9%	95.6%	**94.2%**					

SUB-GOAL 7.1 All Procurement Conducted Sustainably

Metric: The percent of contract actions (new contracts and modifications) that adhere to the principles of sustainability by containing requirements for (as relevant and where such products and services meet DoD performance requirements): energy-efficient (ENERGY STAR or Federal Energy Management Program [FEMP] designated), water-efficient, biobased, environmentally preferable, non-ozone depleting, containing recycled content, and/or are non-toxic or less-toxic alternatives. The sub-goal applies to products and services, including task and delivery orders, but excluding the acquisition of weapon systems and their components and spare parts. The results shown are from DoD's annual review of a subset of contract actions, as explained in Part III.1.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2020	2025
Targets	-	95%	95%	95%	95%	95%	100%	100%	100%	100%	100%
RESULTS	n/a	82.6%	95.0%	98.0%	97.5%	**96.1%**					

SUB-GOAL 7.2 Electronic Stewardship and Data Centers

Metrics: This sub-goal consists of three metrics pertaining to agency progress toward EPEAT and end of life goals.

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
% of Monitors and PCs/laptops purchased agency-wide in compliance with EPEAT											
Targets	-	95%	95%	95%	95%	95%	100%	100%	100%	100%	100%
RESULTS	-	98%	99%	99.9%	96%	**99%**	*(estimated)*				

% of Electronics at end-of-life disposed through GSA Xcess®, CFL, Unicor, or Certified Recycler (Responsible Recycling©, E-Stewards)											
Targets	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULTS	100%	100%	100%	100%	87%	**89%**					

% of Electronics at end-of-life disposed through non-Certified Recyclers											
Targets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
RESULTS	0%	0%	0%	0%	13%	**11%**					

SUB-GOAL 7.3 15% of Existing Buildings Conform to the Guiding Principles on High Performance and Sustainable Buildings by FY 2025

Metric: The percent of building area in applicable buildings over 5,000 GSF (owned and leased) that meet the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles), as per the December 2008 implementation guidance developed by the Interagency Sustainability Work Group.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2020	2025
Targets	-	7%	9%	11%	13%	-	-	-	-	15%
RESULTS (% of GSF)	0.89%	0.89%	0.97%	1.09%	1.11%	**1.50%**				
GSF conforming to Principles (million)	11.734	12.176	13.418	15.241	15.676	20.820				
Total applicable GSF (million)	1316.85	1361.20	1382.69	1397.31	1408.18	1389.12				

SUB-GOAL 7.4 All Environmental Management Systems Effectively Implemented and Maintained

Metric: This metric is being discontinued because it was based on a federal EMS Metric that has not been in use for several years. The SSPP will continue to discuss EMSs qualitatively.

(Previous metric: An overall green rating requires at least 80% of all EMS-appropriate facilities and organizations to have green EMSs, with no more than 5% total red EMSs. An overall yellow requires no more than 10% red EMSs. An overall red is assigned when the status is neither green nor yellow.)

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015
Targets	-	green	green	green	green	green
RESULTS	red	red	red	red	yellow	**n/a**

Appendix B. Lists of Figures and Tables

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Appendix C: DoD Multimodal Access Plan for Commuters

I. Agency Workplace Charging Plan

Individual DoD Components—the Military Services and other Defense Agencies and Activities—are investigating policy and logistical approaches for providing employees with infrastructure to charge their vehicles in ways that are in accordance with Section 1413(c)(2) of the Fixing America's Surface Transportation Act, which requires that employees pay fees for using the infrastructure. Meanwhile, some preparations have been made to enable employees to charge their electric and plug-in hybrid vehicles at the workplace. For example, a building recently constructed for the Missile Defense Agency includes the conduit required to install equipment to charge electric vehicles and plug-in hybrids. Once it finds a successful DoD employee EV charging program to use as a model, the Defense Intelligence Agency plans to install electric charging stations for employees in its new Headquarters parking garage, when construction is complete in FY 2017. WHS is assessing the feasibility of installing EV charging infrastructure in accordance with the Pentagon Master Plan and the Mark Center Transportation Management Plan to provide infrastructure for use by employees commuting in electric and plug-in hybrid vehicles.

II. Agency Bicycling and Active Commuter Program

Given the complex organizational structure of DoD, and the worldwide distribution of its facilities, a DoD-wide strategy for promoting active commuting (i.e., not motorized) is not practical. However, active commuting, especially bicycling, is practiced in facilities compatible with it, especially on military installations and in urban areas. WHS, for example, already offers some infrastructure for bicyclists at the Pentagon and other facilities in the National Capital area, especially at the Mark Center. In its draft *Pentagon Reservation Master Plan Update*, WHS identified plans for improvements to increase bicycle commuting. Walking and biking are already common on military installations, where many DoD personnel are located. Active commuting is becoming more common in DoD due to the 2012 UFC 2-100-01, *Installation Master Planning*, which calls for installation designs that facilitate walking and biking.

III. Agency Telecommuting and Teleconferencing Expansion Plan

A key DoD strategy for more sustainable commuting is to increase teleworking, which reduces all commuting miles travelled by any mode of transportation. The Department of the Navy will continue aiming for increased participation in teleworking, while balancing workplace needs and information technology resources. Many positions occupied by DON employees are not currently telework eligible for various reasons, such as the need to be on-site to perform maintenance, medical, and other types of work, or the need for access to specialized equipment. However, DoD plans to amend telework eligibility codes for positions and employees, which will likely increase eligibility for situational telework. In addition to telework training that is required for both employees and supervisors, the DON Civilian Employee Assistance Program offers educational sessions regarding teleworking successfully and managing teleworkers, which can be used to support telework for both employees and supervisors.

The Air Force is committed to maximizing employee participation in telework to the extent that the mission is not disrupted or jeopardized. In FY 2016, the Air Force will encourage Installation Commanders, Tenant Commanders, and Heads of Activities to incorporate plans for telework arrangements into their Continuity of Operations plans, and will continue urging them to overcome artificial barriers and permit flexible work arrangements that provide better balance for employees,

consistent with workload and mission requirements. The Air Force will continue to assess telework requests against eligibility criteria, and expects the number of personnel deemed eligible to telework on a regular, recurring basis to continue to increase.

The Army, via the Assistant Secretary of the Army for Manpower and Reserve Affairs, works to increase telework participation by highlighting the benefits of telework, including increased continuity of operations and employee satisfaction.

IV. Agency Carpooling and Transit Plan

In urban areas served by mass transit, DoD Components operate or participate in programs, such as National Capital Region Mass Transit Benefit Program, that provide subsidies to personnel for costs incurred in their commute by mass transit. Components promote ridesharing in various ways, such as providing priority parking for carpools and vanpools, and establishing a secure website where commuters can identify other commuters wanting to ride share. In addition to buses, employees located at the Mark Center have access to shuttles connecting the facility to four different Metro stations.

Appendix D. Acronyms and Units

AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFV	alternative fuel vehicle
ASA(IE&E)	Assistant Secretary of the Army for Installations, Energy and Environment
Btu	British thermal unit(s)
C&D	construction and demolition
CEQ	Council on Environmental Quality
$CO_2(e)$	carbon dioxide equivalents
CY	calendar year
DCMA	Defense Contract Management Agency
DeCA	Defense Commissary Agency
DCAA	Defense Contract Audit Agency
DENIX	DoD Environment, Safety and Occupational Health Network and Information Exchange
DIA	Defense Intelligence Agency
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DoD	Department of Defense
DoDD	DoD Directive
DoDI	Department of Defense Instruction
DON	Department of the Navy
ECB	Engineering Construction Bulletin
ECIP	Energy Conservation Investment Program
EISA	Energy Independence and Security Act of 2007
EMS	Environmental Management System
EO	Executive Order
EPEAT	Electronic Product Environmental Assessment Tool
ESPC	Energy Savings Performance Contract
EUL	enhanced-use lease
EV	electric vehicle
FY	fiscal year
GHG	greenhouse gas
GSA	General Services Administration
GSF	gross square foot/feet
GW	gigawatt(s)

HQ	headquarters
HVAC	heating, ventilation, and cooling
ILA	industrial, landscaping, and agricultural
INRMP	Integrated Natural Resource Management Plan
IPMP	Integrated Pest Management Plan
IT	information technology
JBER	Joint Base Elmendorf Richardson
kW	kilowatt(s)
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
LID	low impact development
MCAGCC	Marine Corps Air Ground Combat Center
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCLB	Marine Corps Logistics Base
MDA	Missile Defense Agency
MILCON	Military Construction
MILDEP	Military Department
MMT CO_2(e)	million metric tons of carbon dioxide equivalent
MW	megawatt(s)
NAVFAC	Naval Facilities Engineering Command
NGA	National Geospatial-Intelligence Agency
NRO	National Reconnaissance Office
NSA	National Security Agency/Central Security Service
OPNAV	Chief of Naval Operations Instruction
OSD	Office of the Secretary of Defense
PPA	power purchase agreement
PV	photovoltaic
RAF	Royal Air Force
SRM	Sustainment, Restoration, and Modernization
SSC	Senior Sustainability Council
SSPP	Strategic Sustainability Performance Plan
TRI	Toxics Release Inventory
UESC	Utility Energy Services Contract
UFC	Unified Facilities Criteria
USMC	U.S. Marine Corps
USN	U.S. Navy
WHS	Washington Headquarters Services