

Department of Defense
**Strategic Sustainability
Performance Plan**
FY 2014





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 imperative for DoD. Incorporating sustainability into planning, decision-making, and day-to-day operations assures resilience, enabling us to do our job 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) summarizes our approach to sustainability through FY 2020. It establishes the path by which DoD 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 addresses climate change, which has an impact on national security, whether by increasing global instability, opening the Arctic, or 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 resilient force.

Our pursuit of improved sustainability yielded significant gains in FY 2013, further reducing greenhouse gas emissions, facility energy and water consumption, petroleum-based fuel used by vehicles, and solid waste. To improve resilience to climate change, we have been surveying the vulnerability of our coastal installations and updating seminal DoD publications and issuances to incorporate climate change considerations. Moving forward, areas of focus over the next two years include energy, climate change, and sustainable procurement. Our efforts will improve the resiliency of our fixed installations and further embed sustainability into the everyday fabric of conducting DoD business. Throughout our undertaking to improve sustainability and resilience, it remains critically important to engage our people, stakeholders, and the public.

While the goals in the DoD SSPP set the tone for our operations, 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. Therefore, the Department pursues sustainability opportunities based on data that presents the most compelling case in terms of mission productivity and long-term cost performance.

A handwritten signature in black ink, appearing to read "Frank Kendall", written over a horizontal line.

Frank Kendall
DoD Senior Sustainability Officer
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 man-made 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 at continual improvement to ensure our 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.

Leadership

The DoD Senior Sustainability Officer (SSO) is the Under Secretary of Defense for Acquisition, Technology and Logistics. This senior official is responsible for ensuring the effective and successful implementation of the SSPP across the Department. Reporting directly to the SSO is the Senior Sustainability Council (SSC), co-chaired by the Deputy Under Secretary of Defense for Installations and Environment and the Assistant Secretary of Defense for Operational Energy Plans and Programs. The SSC consists of approximately 20 senior officials from the Military Departments and key DoD Directorates, who collectively span all functions of the Department, in keeping 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

The Department has been steadily reducing its greenhouse gas (GHG) emissions every year since the fiscal year (FY) 2008 baseline, with target subject emissions in FY 2013 12.1% below baseline. DoD continued to ratchet down its target subject GHG emissions from Scope 1 and 2 sources in FY 2013, pushing the total to 10.3% below the FY 2008 baseline, surpassing the 10% target (Figure ES-1).¹ The success was driven by a 10% decline in emissions from facility stationary combustion and

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 the entity.

an 11% reduction in emissions from facility purchased electricity. The Department places a high priority on reducing the energy consumed by its fixed installations, especially fossil fuels. Every year, DoD actively pursues cost-effective measures to improve the efficiency of its installations, making extensive use of performance contracting financed by third parties (see Performance Contracting section below). DoD has been steadily decreasing the amount of energy used per square foot of building space over the last several years (Figure ES-2), but intensity rose slightly in FY 2013 from the previous year (by 0.6%) due to a continued decline in building area (0.9% from FY 2012 to FY 2013) and increased occupancy at installations due to returning warfighters.

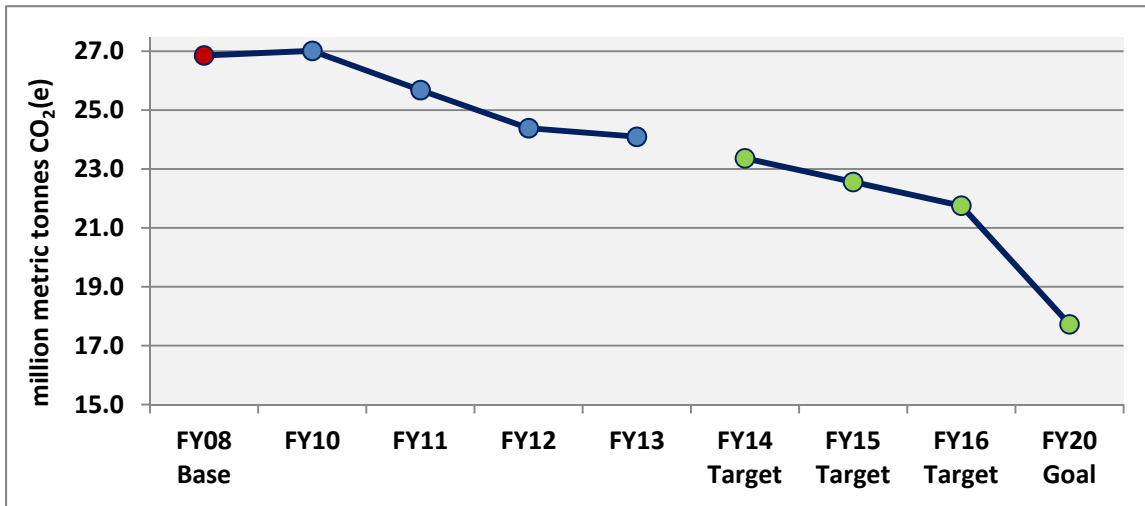


Figure ES-1. DoD Progress towards Its FY 2020 Goal for Scopes 1 and 2 GHG Emissions

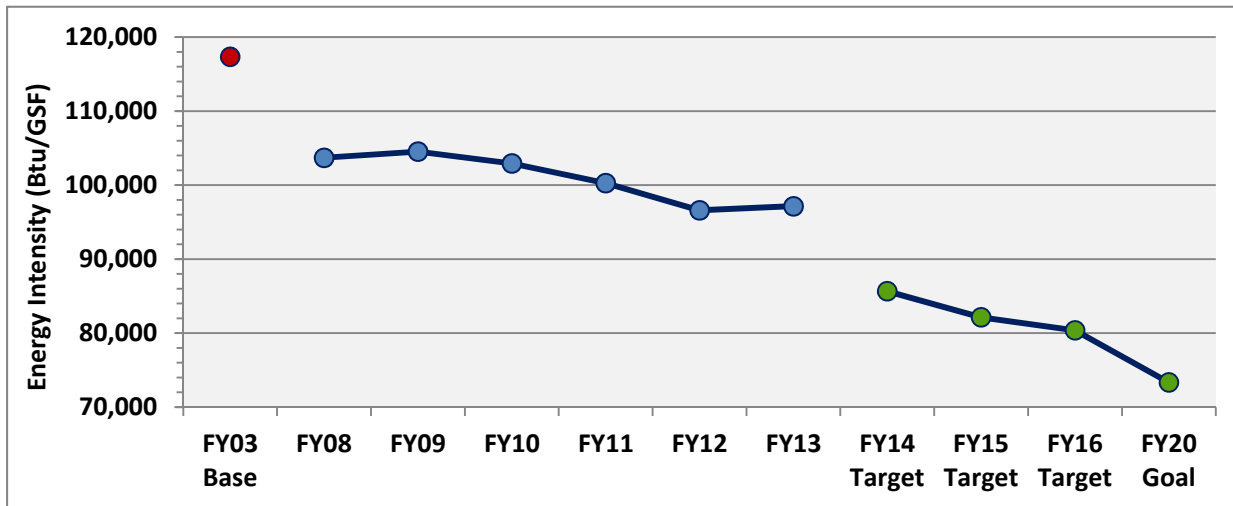


Figure ES-2. DoD Progress towards Its 37.5% Energy Intensity Reduction Goal for FY 2020

Moving forward, the Department’s central strategy for reducing target subject Scopes 1 and 2 emissions will be to continue improving the energy efficiency and renewable energy capacity of fixed installations. Figures ES-1 and ES-2 illustrate how ambitious DoD’s FY 2020 goals are for Scopes 1 and 2 GHG emissions and facility energy intensity.

The Department's Scope 3 GHG emissions were 18.5% lower in FY 2013 than the FY 2008 base year, driven largely by reductions in employee business travel and a continued increase in credit for hosting renewable energy facilities. The FY 2013 reduction in Scope 3 emissions easily surpassed even DoD's FY 2020 target, which is 13.5%. In the near future, further reductions in Scope 3 emissions will continue to be dominated by decreasing employee air travel and increasing credit for hosting renewable energy facilities. DoD will extend the downwards slope in travel emissions by placing a high bar for travel and improving the technological capability to support virtual meetings, such as video teleconferencing.

Sustainable Buildings

As a percentage of its inventory of 45,614 buildings with areas greater than 5,000 gross square feet, only about 1% of the buildings met the criteria of the *Guiding Principles of Federal Leadership in High Performance and Sustainable Buildings* in FY 2013. However, the number has tripled in the three years from FY 2010 to FY 2013. Since EO 13514 was issued in October 2009, DoD has been aggressively putting in place a suite of critical Department-wide policies and criteria that dictate how DoD facilities should be sited, designed, built, operated, maintained, re-used, and demolished, to ensure that all new construction and major renovations result in high-performance sustainable buildings. These issuances cut across the many sectors that collectively determine facility sustainability: buildings, energy and water intensity, stormwater and solid waste management, and renewable energy:

- December 2009 – DoD Instruction (DoDI) 4170-11, *Installation Energy Management*
- January 2010 – “DoD Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA)”
- October 2010 – “Department of Defense Sustainable Buildings Policy”
- November 2010 – Unified Facility Criteria (UFC) 3-210-10, *Low Impact Development*
- May 2012 – UFC 2-100-01, *Installation Master Planning*
- March 2013 – UFC 1-200-02, *High Performance and Sustainable Building Requirements*
- April 2013 – “Utilities Meter Policy”
- November 2013 – “Department of Defense Sustainable Buildings Policy” (an update of the October 2010 policy)

Significantly increasing the portion of DoD buildings meeting the Guiding Principles is a challenge given the tens of thousands of older, existing buildings. New construction and major renovations are not an issue, since all such projects will meet the criteria, but these are insufficient in number to appreciably increase the percentage of compliant buildings in the near term. For existing buildings, the Military Services will continue to invest in projects to improve building performance and sustainability, based on lifecycle return on investment, and they will use total building commissioning to optimize the performance of all building systems.

Fleet Management

The use of fuel by the Department's non-tactical fleet of motor vehicles has declined sharply since the FY 2005 base year: 23% by the end of FY 2013. The use of petroleum-based fuels was 26.1% lower in FY 2013 than the FY 2005 baseline, while the vehicle fleet used 153% more alternative fuels than in FY 2005. Both of these achievements easily surpass the FY 2013 federal government targets of 16% and 114%, respectively, and are close to the FY 2015 targets of 20% and 159%, respectively. Figure ES-3 shows the climb in DoD's consumption of alternative fuels, while the use of petroleum-based fuels has steadily fallen.

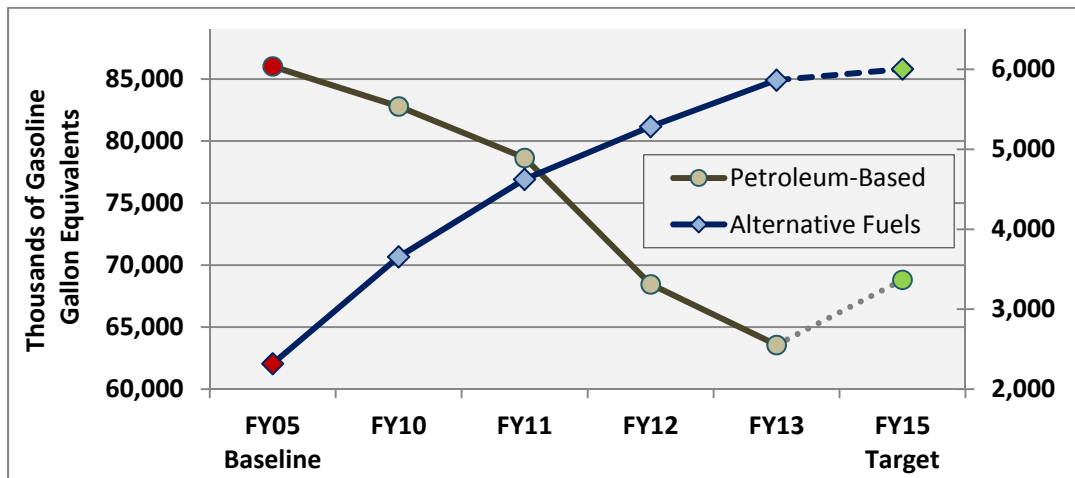


Figure ES-3. The Use of Petroleum-Based Fuels by DoD's Non-Tactical Fleet has Fallen While Alternative Fuel Use Has Steadily Climbed

The Military Services and other DoD Components have a comprehensive suite of approaches they will continue to use to reduce the environmental impacts of the Department's vehicle fleets. The most common among them are to:

- install more alternative fueling infrastructure and position alternative fuel vehicles where the fuel and fueling infrastructure are available, where practical;
- downsize vehicles, including replacing those vehicles that do not leave the base, with low-speed neighborhood electric vehicles (EVs);
- downsize the vehicle fleet by eliminating all unjustified vehicles;
- make use of the replacement cycle for vehicles procured through the General Services Administration to replace higher mileage vehicles with those that emit fewer GHGs; and
- increase the number of EVs and electric hybrids that are full size and for heavy duty applications.

Water Use Efficiency and Management

In FY 2013, the Department again excelled at driving down the potable water intensity of its facilities, with intensity falling 19.8% below the FY 2007 baseline level. This far surpasses the target of a 12% reduction for FY 2013. The Services and other DoD Components will continue to improve their stewardship over the use of potable water, through the following water efficiency and conservation measures:

- conducting water evaluations of facilities every four years;
- water reclamation, recycle and reuse;
- low-water landscaping;
- leak detection and repair; and
- low-flow plumbing fixtures.

To effectively manage stormwater runoff, all Services will ensure that low impact development features are integrated into the design and construction of facilities with a footprint 5,000 square feet or greater.

Pollution Prevention and Waste Reduction

The Department has six sub-goals that contribute to preventing pollution and reducing waste. For solid waste, DoD met its 46% FY 2013 target for diverting non-hazardous solid waste from disposal, and its 73% diversion of construction and demolition (C&D) debris from disposal well exceeded the 56% target. The Department established a sub-goal to have at least 95% of its employees covered by Component-level policies to reduce the use of printing paper by FY 2015. By the end of FY 2013, 58% of all DoD employees were covered by such policies, exceeding the 55% target. DoD has three sub-goals specific to minimizing the use and release of chemicals of environmental concern. One of these tracks the quantity of toxic chemicals released into the environment and transferred off-site, as reported under the Toxics Release Inventory. For the calendar year (CY) 2012 reporting year, DoD reduced these chemicals by 23.4% relative to the CY 2006 base year. The other two DoD sub-goals on chemicals address the proper use of pesticides. One of these is for individuals applying pesticides on installations to be appropriately certified, to help ensure that individuals apply pesticides only when necessary and do so safely and effectively. The overall certification rate in FY 2013 was 99.6%. The other pesticide sub-goal is for all installations to have Integrated Pest Management Plans and for these to be updated and reviewed annually. In FY 2013, 100% of installations had the plans, and the percentage of them updated on time was 91%.

In CY 2014, DoD will issue a DoDI on integrated solid waste management. The new DoDI will lay out policy, responsibilities, and procedures for implementing a solid waste diversion program, establishing an overarching approach that supersedes various earlier issuances, including the current DoDI on Qualified Recycling Programs. The Services will continue to improve upon their already excellent performance with solid waste management by updating policies and guidance, identifying new approaches, and continuing employee outreach and the dissemination of success stories. Both the Navy and Army have plans in FY 2014 to focus on reducing the disposal of food waste. To reduce harmful chemicals, each of the Services has a process in place. The Navy will continue to review chemical releases to identify potential chemicals and processes where opportunities exist to reduce the use and release of chemicals of concern. The Marine Corps will continue to implement its Authorized Use List policy, which prohibits installations from purchasing or using hazardous materials not found on an approved list. The Air Force hazardous material management program minimizes the use of toxic chemicals to the least hazardous material capable of meeting mission requirements. The Army continually conducts projects at installations to identify new ways of reducing chemicals in its processes, and in FY 2014 it will focus on reducing the use of hexavalent chromium-containing epoxy primers.

Sustainable Procurement

Of the 2,193 FY 2013 contract actions DoD manually reviewed for sustainable procurement requirements, 98% of them were in compliance. As part of its efforts to continuously improve procurement, in FY 2013 the Department developed the DoD Sustainable Products Center, and launched it in March 2014 on <https://www.denix.osd.mil/spc/>. DoD conducted a series of pilots at military installations in FY 2013 to demonstrate and field test alternative green products and services. Also in FY 2013, the Department updated language in Military Standard 961, "Defense and Program-Unique Specifications Format and Content," to incorporate sustainable procurement requirements and put greater emphasis on requirements for environmentally preferable and biobased products in Military Specifications. DoD issued the update in January 2014.

The Department developed a draft DoDI on Sustainable Procurement in FY 2013 to further promote the sustainable procurement of goods and services. Currently undergoing review, the DoDI is slated for issuance by the end of CY 2014. The new DoDI builds upon earlier strategy and guidance

documents, establishing policy, assigning responsibility, and providing compliance goals and direction across DoD. DoD expects the DoDI to have a significant impact in ensuring that procurement is conducted sustainably across the enterprise, from government purchase cards to major contracts.

Electronic Stewardship and Data Centers

Of all covered electronics acquisitions in FY 2013, an estimated 99.9% were registered with the Electronic Product Environmental Assessment Tool (EPEAT). The DoD Electronics Stewardship Implementation Plan stipulates that contracts require all relevant electronics to be registered with EPEAT, that all information technology (IT) 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. The Department handles the disposition of all of its excess or surplus electronic products in an environmentally sound manner. The vast majority of DoD electronics equipment at the end of its useful life passes through the DLA's Disposition Services, which has long had a rigorous system in place to ensure environmentally sound disposition.

For its data centers, the Department is both reducing its inventory and improving efficiency, focusing on core data centers. DoD plans to close nearly 50% of its data centers, and in the past four years (February 2010 through February 2014), it has closed 277 of them. Another 207 are slated for closure by the end of FY 2014. To optimize the efficiency of its centers, DoD has developed a series of "levers" it uses and will continue to use to drive efficiency, such as the ratio of operating systems to full-time equivalents, percent virtualization, and ratio of virtual operating systems to host machine. DoD has established threshold and objective values for these levers, and the DoD Chief Information Officer has issued related guidance to the Components to reach these values by the end of FY 2018.

Renewable Energy

As a percentage of electricity consumed by DoD facilities in FY 2013, DoD produced or procured 11.8% from renewable sources (electric and non-electric), exceeding the target of 10%. To help ensure the energy security of fixed installations, the Department will continue to emphasize 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 ramping up renewable energy capacity.

Climate Change Adaptation

The Department is committed to addressing the impacts of climate change on our installations and the roles and missions we undertake. Our 2012 Climate Change Adaptation Roadmap provided a good starting point for defining and describing the challenges of climate change. EO 13653, *Preparing the United States for the Impacts of Climate Change*, outlines more specific requirements for agency adaptation plans. The 2014 Roadmap, provided as an appendix to this SSPP, builds off the previous Roadmap and incorporates the Department's approach to meeting these challenges.

Performance Contracting

One of the primary means by which DoD is improving the energy efficiency of its facilities and ramping up the amount of energy it generates from renewable sources is through performance-based contracts, because upfront costs are covered by third parties other than the federal government. The Department awarded 32 ESPCs worth \$541 million and 41 UESCs worth \$159

million in the two-year period from CY 2012 to CY 2013. DoD plans to award \$600 million in performance contracts in FY 2014 and another \$1 billion in FY 2015 and FY 2016 combined.

Progress on Administration Priorities

Climate Change Adaptation Plan

Climate change is a clear national security concern. It affects us today and is forecast to affect us more significantly in the future. The Department is taking sensible, measured steps to mitigate the mission risk posed by climate change, managing the unavoidable and preparing for the possible.

Biobased Purchasing Strategies

Under the Defense Standardization Program overage document review program, in which documents must be reviewed every five years, DoD reviewed 5,436 military and federal specifications, standards, handbooks, and commercial item descriptions in CY 2013. Part of this process was to evaluate whether revisions need to be made to incorporate biobased materials. The CY 2013 review identified 170 documents as having the potential for revisions pertaining to biobased materials, and so far DoD has revised 16 of these.

Fleet Management Plans

The fleet management plans for DoD non-tactical vehicle fleets are handled at the Component level, with the Military Services, DLA, and other DoD Components each preparing their own Fleet Management Plan.

Energy Savings Performance Contracts

As explained in the preceding section, performance contracting is critically important to the Department's facility energy reduction goals. In the two years following the launch of the Presidential Performance Contracting Challenge in December 2011, DoD awarded \$700 million in performance contracts.

Part I: DoD Sustainability Policy and Governance

I.1 Sustainability and the DoD Mission

The Department of Defense's (DoD's) 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. Sustainability is not an individual Departmental program; rather, it is an

“Sustainability’ and ‘sustainable’ mean to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans.”

– Executive Orders 13423 and 13514

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 the Department's day-to-day activities and military operations, and DoD personnel are applying this mindset to improve mission performance and reduce life cycle costs. The Department recognizes that it can address many key issues facing DoD

through smart investments that improve sustainability while meeting mission requirements, such as using energy and water more efficiently, acquiring more energy from renewable sources, designing buildings for high performance, reducing the use of toxic and hazardous chemicals, and optimally managing solid waste.

The DoD Strategic Sustainability Performance Plan (SSPP) provides a coherent approach both for complying with multiple federal requirements for sustainability and for ensuring the mission is accomplished. The SSPP goals do not directly address combat and support operations, such as contingency basing, ships, aircraft, and tactical vehicles. However, this section of the SSPP will repeatedly touch upon the Department's operational activities because the linkages between sustainability and the DoD mission are strong and direct across the board, including for combat operations. For this reason, the Department is working to improve the sustainability of contingency basing as a means of enhancing force effectiveness and mission outcomes. This involves applying the principles of sustainability in policy, doctrine, organizations, training, materiel, leadership, personnel, and facilities. The expected results are improvements 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 in the face of 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](#).

This section of the SSPP discusses the link between sustainability and the DoD mission in terms of four key priority areas for the Department:

1. Energy and Reliance on Energy
2. Chemicals of Environmental Concern
3. Water Resources Management
4. Maintaining Readiness in the Face of Climate Change

I.1.A Energy and Reliance on Energy

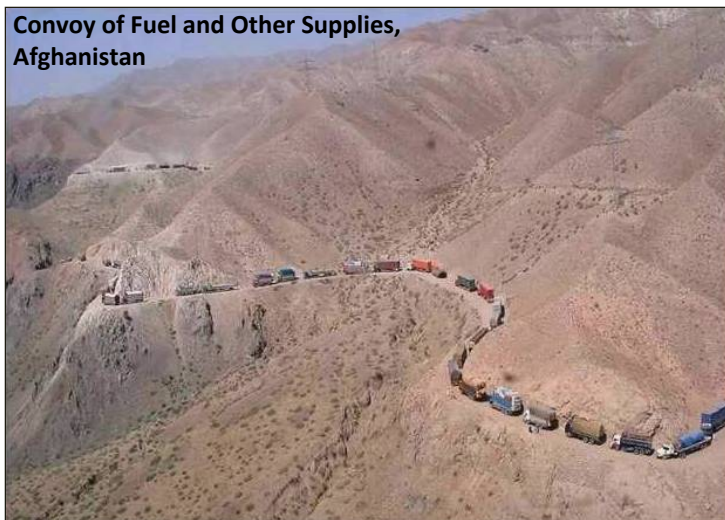
The Department's need for energy poses an array of security challenges. Foremost is the operational risk to forces deployed around the globe. Attacks on fuel convoys and fixed energy supplies have demonstrated the vulnerability of our supply networks, and future adversaries likely will possess additional capabilities to target global logistics and fuel infrastructure with even greater lethality. Even without threats to our energy supplies, the vast distances in operational theatres such as the Pacific, combined with the increasing fuel demands of new platforms, creates a substantial energy burden on the Department.

In addition, the Department depends on a broader energy supply chain, including petroleum networks and electricity networks, that 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. Additionally, the operational and logistical benefits of purchasing energy closest to the point of use means that the Department is subject to physical attack, political unrest, and mismanagement associated with overseas suppliers. Another enduring challenge is the price volatility of a fungible, globally traded commodity such as petroleum. Regardless of the changing domestic energy context here in the United States, global oil markets are subject to significant price volatility, raising DoD's costs and complicating budget and acquisition decisions.

With respect to electricity, DoD's reliance on the commercial grid to deliver electricity to hundreds of installations places the continuity of critical missions at risk. Many installations lack the infrastructure to generate their electrical power supply, making them potentially vulnerable to intermittent or prolonged power disruption caused by natural disasters, attacks, or sheer overload of the grid. 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 power projection and homeland defense capability. This means that an energy threat to bases in the United States can be a threat to operations abroad.

The Department is making great strides in addressing these challenges, including institutionalizing changes in the Department's use of energy. In June 2013, the Deputy Secretary of Defense issued "Deputy's Management Action Group Guidance for a Comprehensive Defense Energy Policy." This guidance highlighted how changes in the Department's use of energy are needed to enhance military capability, improve energy security, and mitigate costs, and initiated the development of an overarching DoD energy policy, [DoD Directive 4180.01](#), signed in April 2014. This policy adapts core business processes – including requirements, acquisition, planning, programming, budgeting, mission assurance, operations, and training – to improve the Department's use and management of energy.



Convoy of Fuel and Other Supplies, Afghanistan

Photo: U.S. Army

Use of Energy in Facilities

Relating specifically to the fixed installations under the purview of this SSPP, the Department continues to pursue an investment strategy designed to reduce energy demand in fixed installations, while increasing the supply of renewable energy sources. The Department is committed to renewable energy not only because it is dedicated to showing leadership in sustainability, but because on-site renewable energy and storage improves resilience and thus mission readiness. Military installations are generally well situated to support solar, wind, geothermal, and other forms of renewable energy, as long as the type of energy facility, its siting, and its physical and operational characteristics are carefully evaluated to avoid degradation to the mission or readiness. Efforts to curb demand for energy – through conservation and improved energy efficiency – are by far the most cost-effective ways to improve an installation’s energy profile. A large fraction of DoD energy efficiency investments goes to retrofit existing buildings. Typical retrofit projects install high efficiency heating, ventilation and cooling systems, energy management control systems, and more efficient lighting.

The Department is taking advantage of the fact that DoD’s fixed installations offer an ideal test bed for next-generation energy technologies developed by industry, the Department of Energy (DOE), and university laboratories, filling the gap between research and broad commercial deployment. Emerging energy technologies hold the promise for dramatic improvements in energy performance but face major impediments to commercialization and deployment. DoD’s built infrastructure and lands encompass a diversity of building types and climate zones in the United States, affording an exceptional opportunity to assess the technical validity, operating costs, and environmental impact of advanced, pre-commercial technologies. The Department is applying the energy test bed concept to improve the energy efficiency of buildings, improve renewable energy technologies on or in proximity to installations, and develop smart microgrids. The test bed approach is key to meeting the Department’s needs, allowing DoD to leverage technology advances from the private sector while benefiting from the lower costs that occur once the private sector commercializes the technologies. In addition, the test bed is an essential element of the national strategy to develop and deploy the next generation of energy technologies needed to support the nation’s infrastructure.

Use of Energy in Operations

Title 10 Section 138 defines “operational energy” as the energy required for training, moving, and sustaining military forces and weapons platforms for military operations. In other words, operational energy includes the liquid fuel consumed by aircraft, ships, tactical vehicles, and contingency bases. In June of 2011, the Department released “Energy for the Warfighter: The Department of Defense Operational Energy Strategy,” which set the overall direction for energy use in the Department: to assure reliable supplies of energy for 21st century military operations. It outlines three ways to meet that goal: reducing the demand for energy, expanding and securing the supply of energy, and building energy security into the future force.

“DoD invests in energy efficiency, new technologies, and renewable energy sources at our installations and all of our operations because it makes us a stronger fighting force and helps us carry out our security mission.”
—Chuck Hagel, Secretary of Defense

By reducing energy demand, the Department is increasing combat effectiveness in current operations through reductions in fuel demand and has made progress, particularly at the tactical edge where fuel logistics cost the most and resupply risks are the greatest. For instance, the Army’s Project Manager Mobile Electric Power, in coordination with U.S. Forces-Afghanistan, recently completed Operation DYNAMO I and II, which assessed the electrical supply and demand footprint at 67 forward operating locations. In a tactical environment, DoD usually has met electrical demand

with multiple diesel-powered generators, sized for peak loads but often operating far from peak capacity and efficiency. Mission-specific advisory teams developed more efficient power generation and distribution plans, replaced older equipment with more than 500 fuel-efficient Advanced Medium Mobile Power System generators and 430 Improved Environmental Control Units, updated distribution systems to improve reliability and safety, and trained local Soldiers to operate and maintain the equipment properly.

To support expanding and securing the energy supply, the Department is evaluating, and, where appropriate, deploying tactical solar technologies to generate electricity on contingency bases or to recharge batteries to increase patrol range and mission duration. The Department is funding research in deployable waste-to-energy systems that could reduce the volume of waste requiring disposal and generate energy.



Photo: U.S. Army

Installing PV panels on generator for use in forward operating bases

Additionally, the Department recognizes that our forces will need fuels derived from various feedstocks that are cost-competitive, widely available around the world, and compatible with existing equipment and storage infrastructure. As a result, the Department is investing around 2% of its operational energy funding over the next five years on alternative fuels. To create clear guidelines on these investments, in July 2012 DoD released the “Department of Defense Alternative Fuels Policy for Operational Platforms,” which establishes Department-wide rules to guide and streamline investments in the development and use of alternative fuels.

Finally, the Department continues to make strides in improving energy security for the future force. The Adaptive Engine Technology Development program focuses on developing a “sixth generation” fighter engine, which could provide better fuel-burn rates. The Improved Turbine Engine Program includes an improved engine for the Apache and Blackhawk helicopter fleets which is expected to deliver a 25% fuel reduction from current engine consumption levels along with improved loiter time, altitude limits, and payload. Hybrid Electric Drives, which will be installed on Arleigh Burke-class destroyers in 2016, allow for an electric propulsion mode that results in improved fuel economy, potentially saving over 5,000 barrels of fuel, per year, per ship. In addition to these specific developments, the Department continues to implement the Energy Key Performance Parameter or energy Key Support Attribute across all acquisition categories.

Together, these efforts – to reduce demand, expand supply, and build energy security into future force development – will enhance combat effectiveness and reduce risk and cost. While a contributor to the Department’s sustainability effort, operational energy is necessarily exempt from the targets of this Plan and Executive Order (EO) [13514](#).

I.1.B Chemicals of Environmental Concern

Chemicals are essential to DoD operations, but the Department faces long-term risks from the use of hazardous and toxic chemicals and materials. Use of these chemicals and materials of environmental concern can result in compliance and cleanup costs, generate health claims, and increase the life cycle costs of weapon systems and facilities. The Department must protect people and readiness by reducing the use of such high-risk chemicals and hazards, both known and emerging. New restrictive laws and regulatory standards have implications for DoD’s readiness, including training and supply chain effects. These restrictions can affect the availability of

chemicals, which can impact the performance, cost, and schedule of acquiring new weapon systems and maintaining existing ones. Proper management of hazardous and toxic chemicals and materials protects the workers who handle them, as well as the range assets (land, air, and water) needed for training, and the ecosystems under DoD's care, ensuring continued military access. Reducing the release of chemicals of environmental concern can also remove reporting burdens and lessen DoD costs associated with the use of these chemicals. The regulatory environment surrounding chemicals of environmental concern is highly complex and represents a significant resource burden on the Department in terms of labor and management of time, as well as direct costs. Through the use of safer and greener chemicals, even if the chemicals have a higher purchase price than those they replace, the Department can realize savings in avoided compliance and other costs, and protect itself from the risk that restricted chemicals will become difficult and expensive to acquire, if not unavailable altogether.

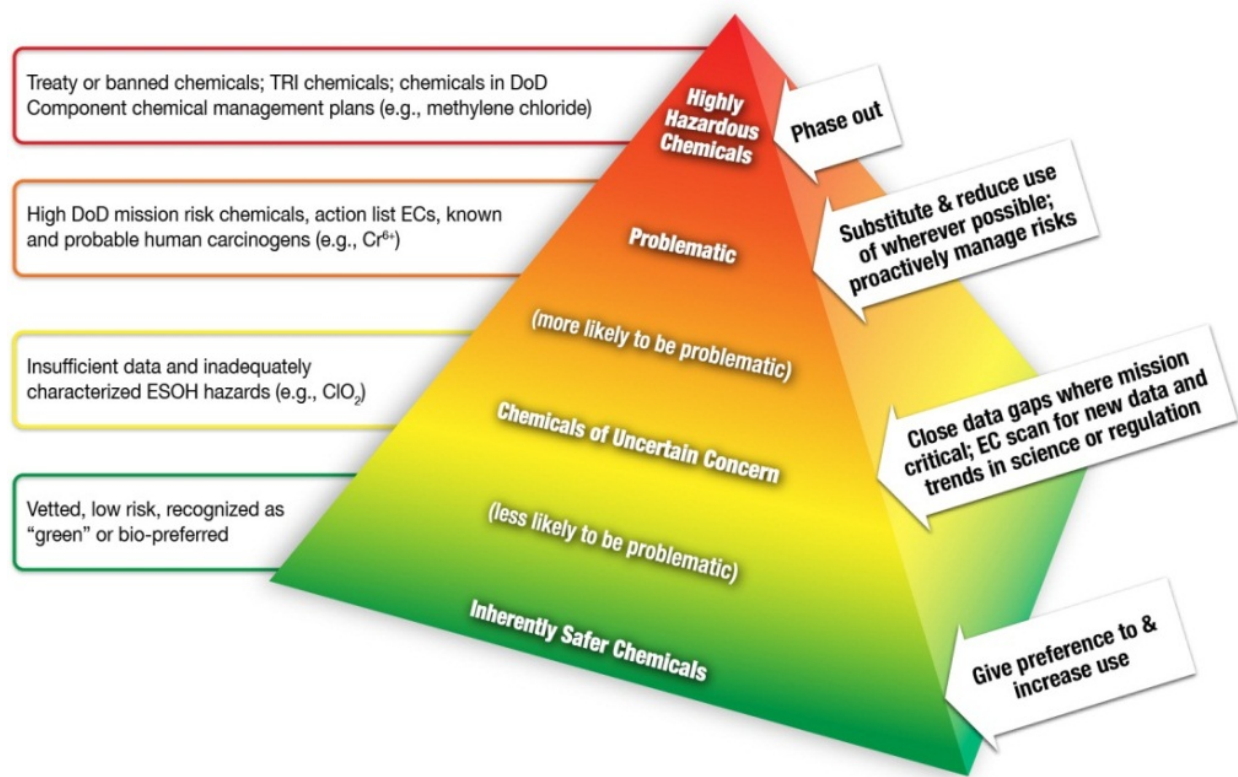


Figure 1. DoD Chemical Risk Management Strategy
(ECs are emerging contaminants)

Figure 1 reflects the premise of the Department's chemical management strategy. The Department's [Toxic and Hazardous Chemicals Reduction Plan](#), released in 2008, describes DoD programs, initiatives, and actions necessary to reduce the procurement, use, release, and disposal of chemicals of environmental concern. The Department is moving toward a life cycle approach that considers the selection, management, use, and disposal of chemicals of environmental concern in all of its operations. Acquisition reform efforts include evaluating environmental, safety, and occupational health considerations earlier in the design phase, including chemical and material selections. Sustainment Plans, which address how a weapon system is maintained to ensure readiness, will also include life cycle risk assessments. For example, the Department must take into account future

regulatory restrictions, because they can affect the availability of materials and the costs of maintaining weapon systems.

The Department has an extensive array of protections against the risks posed by chemicals of environmental concern. One successful approach the Department employs to manage hazardous materials is the [Consolidated Hazardous Material Reutilization and Inventory Management Program](#), also known as the Hazardous Material Pharmacy. The concept is based on a single point of control and accountability over requisitioning, distributing, and issuing hazardous materials, where the amount of material dispensed for a given purpose is specifically matched to the required quantity, drastically reducing hazardous waste. Another important approach is the use of Environmental Management Systems (EMSs). The EMS described in the DoD Toxic and Hazardous Chemicals Reduction Plan enables the Department to align and coordinate relevant programs for the purpose of reducing the procurement, use, and release or disposal of toxic and hazardous chemicals, at all organizational levels and across different functions. DoD also integrates an EMS-based hazardous material business process into key activities at military installations.

The enterprise-wide management of the selection, acquisition, distribution, use, and disposal of chemicals better prepares DoD for potential future regulatory initiatives. This life cycle approach of anticipating developments at the international, national, and state levels informs the chemical usage decisions made by DoD today and promotes military readiness for tomorrow. DoD's emerging



contaminant program exists to minimize operational disruptions through proactive risk management of chemicals expected to be regulated more strictly in the near future. The program has scanned more than 600 chemicals so far, and developed 60 risk management measures that have been or are being implemented by various programs across the Department.

While many of the proactive risk management measures focus on toxic chemicals, DoD is also managing substances that might not be toxic but impact global warming with a potency hundreds to many thousands of times as much as carbon dioxide (CO₂). For example, some hydrofluorocarbons (HFCs) also have high global warming potentials (GWPs). The Department has dedicated significant effort to deploying alternatives to substances that deplete the earth's protective stratospheric ozone layer, but for many applications the only alternatives identified so far are HFCs. While some HFCs have less impact on atmospheric warming than the ozone-depleting substances they replaced, the international community is concerned about their relatively high GWP and expanded use. Therefore, in April 2013, Canada, Mexico, and the United States proposed an amendment to the [Montreal Protocol on Substances That Deplete the Ozone Layer](#) to use a stepped phase-down of production and consumption of HFCs to 15% of the baseline in 20 years. DoD uses HFCs for mission-critical applications in shipboard, aircraft, and ground tactical vehicle air conditioning, refrigeration, fire suppression, and explosion protection systems. For the majority of these applications, there are no known substitutes that meet DoD's unique performance and safety requirements. The commercial sector is working to develop low-GWP alternatives to HFCs, but in the meantime DoD continues to design and build weapon systems – which often have operational lifetimes of 30 to 50 years – using

HFCs, and it is essential that HFCs continue to be available at a reasonable cost. Therefore, the Department continues to conduct research on low-GWP alternatives to HFCs, and coordinates with the Environmental Protection Agency and Department of State on issues of substitution and availability.

Finally, to ensure the availability of chemicals needed for the DoD mission, the Department is promoting the use of more benign chemicals. This will protect the Department from mission risks associated with the removal of substances from the market, or significant increases in their cost. DoD supports research and development on an ongoing basis, searching for safer and more environmentally-friendly products and processes that reduce the use and release of toxic and hazardous substances. The Department looks in particular for alternatives that deliver mission benefits in addition to environmental benefits, since mission benefits help drive the adoption of new products. Another essential approach for increasing the Department's use of safer chemicals and products is DoD's Green Procurement Program. To support its successful implementation, DoD developed a program framework that supports the testing and evaluation of environmentally preferable products, and provides green procurement metrics, a venue for sharing information and best practices, and green procurement education and training.

I.1.C Water Resources Management

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 some 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. To address the issues of water and wastewater in contingency basing, the Services and the DoD Strategic Environmental Research and Development Program are supporting research and development of technologies suitable for contingency bases that can reclaim potable and non-potable water from graywater and blackwater. Reclaiming contingency base wastewater will greatly reduce the amount of water that needs to be delivered to troops, while reducing the volume of wastewater requiring disposal.

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 extraction, treatment, and delivery of water to end users is a highly energy-intensive process. Measures that use and distribute potable water more efficiently and with less leakage also result in significant reductions in energy consumption and, therefore, emissions of CO₂. A low impact development approach to stormwater management reduces runoff from facilities, which reduces the flow of pollutants into water bodies and reduces the volume of stormwater entering the wastewater treatment system. Reducing the volume of storm water in the sanitary sewer prevents wastewater collection sanitary sewer overflows and wastewater treatment overload, while reducing the cost and amount of energy needed to operate wastewater treatment systems.

I.1.D Maintaining Readiness in the Face of Climate Change

The 2010 Quadrennial Defense Review highlighted climate change impacts as an emerging challenge to the Department's installations, roles, and missions. The 2014 Quadrennial Defense Review

Climate Change and DoD

"The Department's operational readiness hinges on unimpeded access to land, air and sea training and testing space. Consequently, we will complete a comprehensive assessment of all installations to assess the potential impacts of climate change on our missions and operational resiliency, and develop and implement plans to adapt as required."

— 2014 Quadrennial Defense Review

continues the emphasis on ensuring the resilience of the Force, and it mandates the use of creative ways to address the continuing impacts of climate change. Climate change creates both needs and opportunities to examine how we operate today and in the future, both in the United States and abroad.

Climate change is predicted to affect the 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 operations, 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 with climate change may limit outdoor training, impair personnel efficiency, and strain electricity supply due to the increased demand on the 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, which is why the most dangerous levels of ozone in urban areas occur during summer. Ozone, one of the primary components of smog, irritates and inflames the lining of the respiratory system. Ozone formation and its attendant health problems will likely 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 will impact DoD installations and activities in the Arctic.

In many areas, warmer temperatures will reduce the amount of snow pack in the mountains, and it is common in the United States and elsewhere for areas to rely on mountain snowmelt for a significant amount of their water supply. Water quality and water supply reliability can be threatened by changes in precipitation patterns, which can cause extended droughts and can reduce surface and groundwater supplies in many areas. These trends are expected to continue, increasing the likelihood of water shortages for many areas. Scientists project that higher temperatures will increase the risk of wildfire by reducing moisture in soil and plant material and, in some areas, by lengthening the fire season. Because a variety of military range activities can start fires, an increased risk of uncontrolled wildfires can have direct mission consequences. Scientists also project that climate change will bring an increased frequency of heavy precipitation events in some areas, raising the threat of flooding.

Climate scientists expect the changing temperature and precipitation regimes accompanying climate change to cause shifts in the composition or geographic range of some species. Among the species shifts anticipated are movement of wildlife to more favorable habitats, expansion 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 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 can 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. Another reason for DoD to prepare for a changing climate is that strategies to make the Department more resilient to climate change can also improve sustainability. For example, by increasing the generation and use of renewable energy, and institutionalizing energy and water efficiency into all DoD operations, the Department can decrease its vulnerability to fluctuations and shortages of these resources.

I.2 Plan Implementation

I.2.A Leadership and Accountability

The Department designated the Under Secretary of Defense for Acquisition, Technology and Logistics as DoD’s Senior Sustainability Officer (SSO) responsible for ensuring the effective and successful implementation of the SSPP across the Department. Reporting directly to the SSO is the Senior Sustainability Council (SSC), led by the Deputy Under Secretary of Defense for Installations and Environment and the Assistant Secretary of Defense for Operational Energy Plans and Programs. The current SSC membership is shown in Table 1.

Table 1. Senior Sustainability Council Membership

Deputy Under Secretary of Defense (Installations and Environment) - Co-Chair
Assistant Secretary of Defense for Operational Energy Plans and Programs - Co-Chair
Under Secretary of Defense (Comptroller)
Under Secretary of Defense for Policy
Under Secretary of Defense for Personnel and Readiness
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 Logistics)
Deputy Department of Defense Chief Information Officer
Assistant Secretary of Defense for Research and Engineering
Director, Defense Procurement and Acquisition Policy
Assistant Secretary of Defense for Logistics and Materiel Readiness
Director, Cost Assessment and Program Evaluation
Deputy Assistant Secretary of Defense for Manufacturing and Industrial Base Policy
Director of Logistics, Joint Staff
Director, Defense Logistics Agency Installation Support
Deputy General Counsel (Environment and Installations)
Assistant Secretary of the Army (Civil Works)

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 13514 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 and the Defense Logistics Agency (DLA) has designated a sustainability officer to ensure accountability for the SSPP's implementation, and annually each develops a plan for how they will implement the DoD SSPP. Additionally, the leadership of the SSO, SSC, Sustainability Implementation Work Group, and a set of relevant committees and other work groups help execute the goals of the SSPP. 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: greenhouse gases (GHGs), energy, transportation and fuels, solid waste and recycling, green procurement, electronic stewardship, and sustainable manufacturing.

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 EMSs used by the Military Service installations and DLA facilities provide a valuable framework to guide sustainability improvements and monitor and evaluate performance. The SSPP has a built-in performance monitoring system in the form of the 20 quantitative metrics for each of the sub-goals.

I.2.B Incorporating Sustainability into Facility Investment Decisions

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 retail destinations 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 mission. Adopting greener chemicals and materials limits potential exposure 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 (e.g., by planting shade trees). Therefore, investment decisions should consider all the costs and benefits of incorporating sustainability. A cost-benefit analysis,

Energy usage was reduced at the Scranton Army Ammunition Plant, PA, through efficiency improvements

Photo: U.S. Army



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 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. The Department recognizes the importance – and the challenge – of ensuring that sustainability is

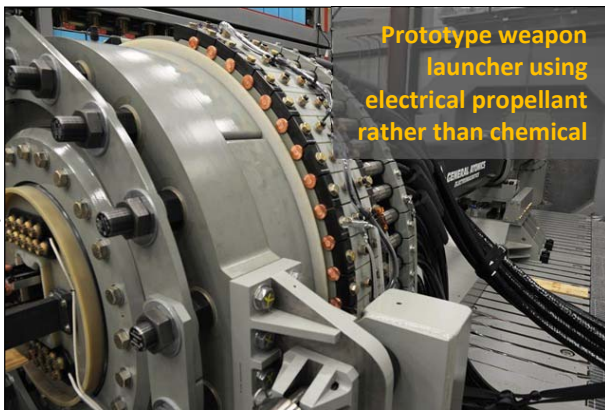
incorporated into decision-making across the organization. Individual Commands and installations – not a central DoD office – make many of the decisions on budgeting and executing DoD projects. In practice, decisions made at the facility level do not always take into consideration the larger objectives of the Department as a whole, including its sustainability objectives. The challenge of incorporating sustainability into investment decisions is exacerbated by the fact that the benefits of many sustainability considerations are difficult to quantify, whether at the installation or Major Command level. The Department needs to find more ways to help Installation Commanders and other decision-makers form an objective basis for making decisions on projects in a way that advances DoD’s sustainability objectives, beyond simple, traditional return on investment calculations. Beyond the project level, the Department has a bigger picture view of promoting sustainability: 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.

DoD owns over 200,000 buildings, a real property inventory that generates a significant maintenance and repair requirement. Recognizing the need to improve the performance of these assets, the Department issued a new Unified Facilities Criteria (UFC) in March 2013, titled [High Performance and Sustainable Building Requirements](#), defining how to improve the performance and sustainability of DoD facilities, both existing and new, owned and leased. Part of the challenge posed by DoD’s existing buildings is that a large fraction of them are not metered, and calculating return on investment requires accurate consumption data. To address this deficiency, DoD issued a metering policy in April 2013 requiring all DoD Components to use advanced metering to capture a minimum of 60% of electricity and natural gas use by the end of fiscal year (FY) 2020, with the goal of capturing 85% of consumption. Apart from straight return on investment considerations, the Department approaches real property asset management in a budget-constrained environment by focusing resources on the facilities with the greatest maintenance and repair needs, balanced by an evaluation of which assets are most crucial to the mission. For example, DoD may not need to maintain a storage facility to the same level of condition as a runway, based on the consequence of the failure of that asset.

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 third-party financing or their own budgets. 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 will award funds based on competitive merit beginning in FY 2014.

Sustainable Acquisition

The Department continues to make progress in developing a methodology to better integrate sustainability thinking into the DoD weapons system acquisition process. DoD personnel have been investigating ways to create a streamlined life cycle assessment approach for the DoD acquisition process and have been meeting with industry, academia, and other government agencies to benchmark best practices. DoD staff have developed a draft Sustainability Analysis Guidance document that presents a framework for how to consider inputs, outputs, and key impact and cost categories to include human health, environment, and mission. A Sustainability Analysis is a method used to compare two or more systems with the same performance requirements on the basis of resource consumption, emissions, associated life cycle impacts and the resulting costs. The Sustainability Analysis Guidance provides guidance to the acquisition community for conducting a streamlined life cycle assessment and life cycle cost assessment at the conceptual, developmental,



and design stages of acquisitions. This guidance supports the Department's goal to lower total ownership costs and acquire more sustainable systems – those that use less energy, water, and toxic chemicals, and that produce fewer emissions.

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 liabilities is one less for warfighter capabilities. Sustainable manufacturing has a place in both the acquisition of systems and in their logistics sustainment.

I.2.C Outreach and Communication

The Department is continually working to increase awareness of the SSPP among personnel, using normal internal channels of communication within the Department and within each individual DoD Component, such as websites, newsletters, and announcements. DoD uses annual updates of the SSPP as opportunities to remind civilian, military, and contractor staff of the SSPP's goals and the Department's expectations. Every year the Deputy Undersecretary of Defense for Installations and Environment and the Assistant Secretary of Defense for Operational Energy Plans and Programs

present the SSPP to senior managers 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 already has two platforms on the internet for communicating to both DoD employees and the public on sustainability performance:

- DENIX (DoD Environment, Safety and Occupational Health Network and Information Exchange, <http://www.denix.osd.mil/sustainability/>); and
- the “DoD Sustainability” website at http://www.defense.gov/home/features/2010/1010_energy/.

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](#), [Green Procurement](#), [Solid Waste and Recycling](#), and [Sustainability](#). The DoD Sustainability site is focused entirely on energy: energy efficiency, renewable energy, and fuels from sources other than petroleum. 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.

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 DOE Federal Energy Management Program (FEMP), and their own award programs. The Services also have their own award programs to recognize excellence in promoting sustainability. The Army has two Secretary of the Army sustainability award programs: Environmental Awards (which includes a Sustainability category), and Energy and Water Management Awards. The Secretary of the Navy annually recognizes outstanding performance by Navy and Marine Corps installations, ships, and squadrons with Energy and Water Management Awards. The Air Force runs the Thomas D. White Environmental Award program, and the Major Commands have Energy Award Programs.

The Navy² makes extensive use of social media platforms, including Facebook and Twitter pages of the Task Force Energy and *Currents Magazine*, the *Currents* Flickr page, and the Navy Energy and Environment YouTube channel. These online tools have allowed the Navy to expand its reach to a diverse audience and to effectively communicate recent news and developments on sustainability. The Navy is also leveraging MilSuite (<https://www.milsuite.mil/>) as a social business tool and developing multimedia campaigns on mobile platforms to engage, inform, and facilitate dialogue about sustainability issues among internal audiences. The interactive framework allows the Navy to embrace the conversational tone of the internet and provide real-time updates and responses to questions. In FY 2013, the Department of the Navy (DON) completed a comprehensive revision of its environmental policy, *Environmental Readiness Program Manual* (Chief of Naval Operations Instruction 5090.1D), which was released in FY 2014. The update specifically addresses

²In this document, the Navy is used to refer to the U.S. Navy, and DON is used to refer to the Department of the Navy (which includes the U.S. Marine Corps as well as the U.S. Navy).

sustainability and the SSPP. In addition to DON activities, Headquarters (HQ) Marine Corps distributes quarterly newsletters across the various environmental programs, highlighting success stories, best practices, performance updates, and future training opportunities.

The Army's four-star level Senior Energy and Sustainability Council continued to oversee and integrate sustainability and energy efforts across the Army enterprise. Secretary of the Army John McHugh renewed the Council's charter on 10 December 2013. The Council is supported by a General Officer Steering Committee and a Council of Colonels, who 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. The FY 2013 Army Campaign Plan includes a campaign-level objective "achieve energy security and sustainability objectives," and it embeds sustainability as a "foundation" concept across the Plan's strategy map. This is the second year the Army tracked and reported sustainability performance metrics under this objective to Army Senior Leaders. Another form of outreach for the Army is its *Army Sustainability Report*, which the Army distributes internally and externally. The Army published the latest version in October 2012, restructured to better align with the DoD SSPP. The Army has expanded its outreach in the areas of sustainability and energy through its public website, which includes pages on energy, sustainability, and environment (<http://www.army.mil/news/energy/> and <http://www.army.mil/news/environment/>). Headquarters Army and Army installations also are utilizing social media to expand sustainability outreach.

The Air Force uses a variety of media to emphasize and communicate its continued commitment to minimize environment, safety, and occupational health risks. In addition to the traditional Air Force Civil Engineer magazine, the Air Force Civil Engineering Center (AFCEC) shares information on energy, environmental and sustainability initiatives across the Air Force by making extensive use of its website, its document management and communications electronic dashboard (eDASH), and social media platforms including Facebook, Flickr, YouTube, and Twitter. Every year the Air Force leverages the federal government Energy Action Month in October to support one of the fundamental elements of the Energy Strategic Plan, "Foster an Energy Aware Culture." Despite the challenges of the 2013 government shutdown, 74 bases participated in the campaign, yielding a sustained increase in followers on the Air Force Energy Facebook page. This annual campaign continues to expand, with additional collaboration across Services and more specific messaging and training that gives Airmen the tools to implement more energy-efficient behaviors in their daily routines. The Air Force is focusing its 2014 Earth Day activities on sustainability. AFCEC produced an Earth Day Toolkit to demonstrate how sustainability supports the Air Force mission. The Toolkit, which contains sustainability tips, success stories and other relevant information, is available at <http://www.afcec.af.mil/news/earthday2014>.

In the National Security Agency (NSA), engaging and communicating with employees in 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 the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) rating system, energy management, and green procurement.

The Missile Defense Agency (MDA) promotes the participation of its employees in sustainability by requiring all new employees (military, civilian, and contractors) 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 Sustainability Integration Product Team meets quarterly to discuss the agency's sustainability progress and target new initiatives to undertake. In FY 2013, MDA established the following six sub-working groups under the Sustainability Integration Product Team to develop and execute focused action plans for pursuing opportunities for improvement: Green Procurement, Teleworking, Sustainable Operations (energy, water, solid waste), Vehicle Fleet Management, Electronics Stewardship, and Environmental Management System.

The National Geospatial-Intelligence Agency (NGA) has promoted sustainability within the agency in two ways: (1) organizationally, by integrating sustainability objectives within and across agency organizational boundaries; and (2) by targeting those who have the greatest potential for making sustainability the norm—employees and contractors. NGA increases awareness among employees and key contractors using electronic messaging (to all employees), briefings, expanded teleconference capabilities, and participation within internal and external integrated sustainability planning teams. In FY 2014, NGA plans to dedicate a week to raising employee awareness about energy and sustainability, and to provide training on energy efficiency management to leadership, mid-level managers, facility engineers, and personnel in charge of information technology (IT) and data center management.

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. The site also has an internal Greening webpage on its classified website that serves as the unofficial repository for many DIA sustainability documents, products, and services, including the DoD SSPP and details on the DIA recycling program. In FY 2014, DIA will prepare and distribute information to all employees on the goals and requirements of the DoD SSPP. DIA is also preparing a mandatory formal online training class on the DoD SSPP, which it expects to be available by mid-2014. DIA plans to install an electronic display board in the HQ building to educate employees on the DIA energy program and other sustainability topics.

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

Part II: DoD Sustainability Objectives, Goals, and Sub-Goals

Objective 1: Ensure the Continued Availability of Resources Critical to the DoD Mission

GOAL 1 The Use of Fossil Fuels Reduced

Goal 1 Responsible OSD Office
AT&L/I&E

Goal 1 Sub-Goals

SUB-GOAL 1.1 Energy Intensity of Facilities Reduced 30% from FY 2003 Levels by FY 2015 and 37.5% by FY 2020

Metric

The percent reduction relative to FY 2003 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	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	15%	18%	21%	24%	27%	30%	31.5%	33%	34.5%	36%	37.5%
RESULTS	11.4%	13.3%	17.7%	17.2%	<i>including renewable energy and source credits</i>						
Btu/GSF	102,929	100,268	96,593	97,149							
billion Btu	210,691	197,212	187,397	182,576							
000 GSF	1,949,734	1,896,352	1,896,111	1,879,339							
FY 2003 Baseline for each FY											
Btu/GSF	116,134	115,647	117,344	117,334							

SUB-GOAL 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

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*

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	10%	11%	12%	10%	11%	12%	13%	14%	15%	16%	18%
RESULTS	9.6%	8.5%	9.6%	11.8%							

**Title 10, U.S.C. §2911(e) (2) requires DoD to establish an interim renewable energy goal in FY 2018, adjusting future DoD renewable energy planning factors.*

SUB-GOAL 1.3 Use of Petroleum Products by Vehicle Fleets Reduced 30% from FY 2005 Levels by FY 2020

Metric

The percent reduction in petroleum product consumption by DoD non-tactical motor vehicle fleets relative to FY 2005.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	10%	12%	14%	16%	18%	20%	22%	24%	26%	28%	30%
RESULTS	3.7%	8.6%	20.4%	26.1%							
million GGE	82.7918	78.6506	68.4603	63.5693							
FY 2005 Baseline	86.0128	million GGE (gallons of gasoline equivalent)									

GOAL 2 Water Resources Management Improved

Goal 2 Responsible OSD Office
AT&L/I&E

Goal 2 Sub-Goals

SUB-GOAL 2.1 Potable Water Consumption Intensity by Facilities Reduced 26% from FY 2007 Levels by FY 2020

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., through leaking or malfunctioning fixtures, such as toilets). A facility is defined as per EISA §432(1)(C).

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
RESULTS	12.6%	10.8%	18.6%	19.8%							

SUB-GOAL 2.2 Industrial and Irrigation Water Consumption Reduced 20% from FY 2010 Levels by FY 2020

Metric

The percent reduction relative to FY 2010 in the amount of water consumed by DoD for agricultural, landscaping, and industrial purposes, which is either potable water or is non-potable water used for space cooling. Sub-goal 2.2 does not track non-potable water used for these purposes (except for space cooling) or water tracked under sub-goal 2.1.

Annual Planning Targets and Results

Fiscal year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%
RESULTS	n/a	n/a	n/a							
million gallons	10,722	13,821	15,723							

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 (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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULTS	n/a	n/a	98%	98.9%							

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

GOAL 3 Greenhouse Gas Emissions Associated with DoD Operations Reduced

Goal 3 Responsible OSD Offices

Sub-Goals 3.1 and 3.2: AT&L/I&E

Sub-Goals 3.3 and 3.4: AT&L/Personnel and Readiness

Goal 3 Sub-Goals

SUB-GOAL 3.1 Greenhouse Gas Emissions from Scope 1 and 2 Sources Reduced 34% from FY 2008 Levels by FY 2020

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 CO₂(e)).

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	...	2019	2020
Targets	3%	5%	7%	10%	13%	16%	19%	...	30%	34%
Results	3.6%	4.4%	9.2%	10.3%						
MMT CO ₂ (e)	27.0123	25.6808	24.3870	24.0985						
Baseline for FY 2011 – FY 2013		26.8551								
Baseline for FY 2010		28.0209								

SUB-GOAL 3.2 Greenhouse Gas Emissions from Scope 3 Sources Reduced from FY 2008 Levels by FY 2020

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	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	0%	0%	1%	2%	3%	4%	5%	7%	9%	11%	13.5%
Results w/Hosted RE*	4.8%	(0.1%)	9.1%	18.5%							
Results without Hosted RE**	(6.0%)	(9.0%)	0.4%	6.6%							
MMT CO ₂ (e)*	6.6072	7.4236	6.9390	6.2242							
MMT CO ₂ (e)**	7.3549	8.0820	7.6045	7.1323							
Baseline for FY 2012, FY 2013		7.6341									<i>without</i>
Baseline for FY 2011		7.4130									<i>Hosted RE</i>
Baseline for FY 2010		6.9399									<i>Credit</i>

*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 2020

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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	-	10%	15%	17%	20%	23%	25%	27%	29%	30%
RESULTS	n/a	n/a	8%	13%							

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.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	0%	0%	1%	2%	2%	3%	4%	5%	6%	7%
RESULTS	n/a	n/a	9.0%	27.5%							
MMT CO ₂ (e)	n/a	2.30*	2.09	1.67							

**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.*

GOAL 4 DoD Climate Change Vulnerability Assessed and Resiliency Improved

Goal 4 Responsible OSD Office

AT&L/I&E

Goal 4 Sub-Goals

There are no sub-goals for Goal 4 at this time

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

GOAL 5 Solid Waste Minimized and Optimally Managed

Goal 5 Responsible OSD Offices

Sub-Goal 5.1: OSD Director of Administration

Sub-Goals 5.2 and 5.3: AT&L/I&E

Goal 5 Sub-Goals

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	2016	2017	2018	2019	2020
Targets	35%	45%	55%	60%	95%	95%	95%	95%	95%	95%
RESULTS	34.3%	57.2%	58.0%							

SUB-GOAL 5.2 50% of Non-Hazardous Solid Waste Diverted from the Waste Stream by FY 2015 and Thereafter Through FY 2020

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 the waste stream, 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%							
Generated*	2.014	2.245	2.144	1.901							
Diverted*	0.777	0.909	1.048	0.872							

*million tons

SUB-GOAL 5.3 60% of Construction and Demolition Debris Diverted from the Waste Stream by FY 2015, and Thereafter Through FY 2020

Metric

The percent of construction and demolition materials and debris generated and collected by DoD facilities (by weight) that is directed away from the waste stream, 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%							
Generated*	4.108	4.140	4.922	3.145							
Diverted*	2.984	3.195	3.645	2.293							

*million tons

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

Goal 6 Responsible OSD Offices

Sub-Goal 6.1: AT&L/I&E

Sub-Goal 6.2 and 6.3: Armed Forces Pest Management Board

Goal 6 Sub-Goals

SUB-GOAL 6.1 On-site Releases and Off-Site Transfers of Toxic Chemicals Reduced 15% from CY 2006 Levels by FY 2020

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 (EPA) is done by calendar year, so fiscal year reporting on this sub-goal corresponds to data for the previous calendar year (e.g., FY 2012 reporting is CY 2011 data).

Annual Planning Targets and Results

FY	2010	2011	2012	2013	2014	2015	2018	2020
Targets	-	-	-	-	-	5%	10%	15%
RESULTS	2.8%	2.5%	(6.6%)	23.4%				
pounds	20,126,484	20,198,710	22,073,843	15,869,588				
CY 2006 Baseline: 20,710,301								

(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%							

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%							

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

Goal 7 Responsible OSD Offices

Sub-Goal 7.1: AT&L/Defense Procurement and Acquisition Policy

Sub-Goal 7.2, 7.3 and 7.4: AT&L/I&E

Goal 7 Sub-Goals

SUB-GOAL 7.1 95% of 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. In the interim before sustainable procurement data can be collected completely and accurately from the Federal Procurement Data System, the results shown are from DoD’s annual review of a subset of contract actions, as explained in Part III.

Annual Planning Targets and Results

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
RESULTS	n/a	82.6%	95.0%	98.0%							

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 in FY 2012 EPEAT Compliant Agency-wide											
Targets	-	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
RESULTS	-	98%	99%	99.9%	<i>estimate</i>						

% of Electronics at end-of-life disposed through GSA Xcess®, CFL, Unicorn, or Certified Recycler (R2, E-Stewards)											
Targets	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULTS	100%	100%	100%	100%							

% 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%							

SUB-GOAL 7.3 15% of Existing Buildings Conform to the Guiding Principles on High Performance and Sustainable Buildings By FY 2015, and Thereafter Through FY 2020

Metric

The percent of existing 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	...	2020
Targets	-	7%	9%	11%	13%	15%	15%	...	15%
RESULTS	0.06%	0.30%	0.61%	0.88%					
# buildings >5,000 GSF	72,663	51,827	51,953	45,614					
# conforming to Principles	43	153	316	401					

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

Metric

Overall DoD status using the DoD EMS Scorecard Metrics. The overall DoD status is a color rating (green, yellow, or red) for all DoD facilities and organizations for which an EMS is appropriate. Status is based on the color ratings for individual facilities determined using the federal EMS Metrics. 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	2016	2017	2018	2019	2020
Targets	-	green	green	green	green	green	green	green	green	green	green
RESULTS	red	red	red	red							

Part III: Progress Update

Results for the 20 SSPP sub-goals, for FY 2010 through FY 2013, are compiled in Table 2.

Cross-Cutting Initiatives

This section highlights the Department’s activities that do not fit neatly under a single sub-goal. One example is the Army’s Net Zero Installations initiative, which spans energy, water and waste, fostering changes in behavior that strive to maximize efficiency, maximize reuse, and reduce demand. The initiative continued to make progress at the 17 pilot installations during FY 2013. The Army issued a progress report in April 2013, summarizing actions to date and recommending five best practices in each Net Zero area of energy, water, and waste. Available at http://www.army.mil/article/103842/Army_releases_2012_Net_Zero_Progress_Report/, the report was distributed throughout the Army. Among the FY 2013 activities was a refinement of the Net Zero hierarchy, based on knowledge gained during the first two years of the initiative. As a result, the Army developed program-specific hierarchies for energy, water, and waste, as shown in Figure 2.

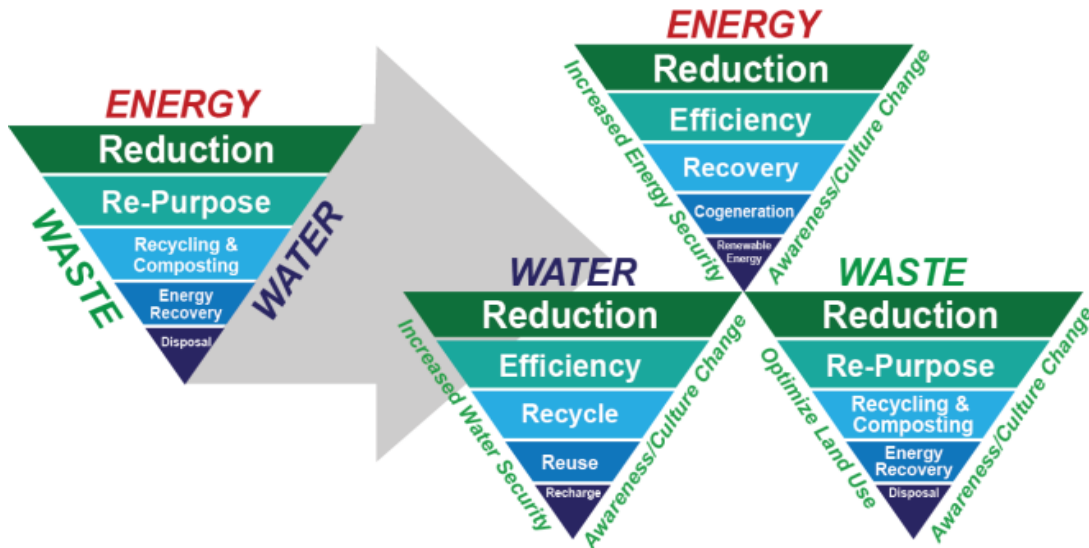


Figure 2. The Hierarchies for the Army Net Zero Program, and for the individual Water, Energy, and Waste Programs

In FY 2013 and FY 2014, the Army is transitioning Net Zero from a pilot initiative to an Army-wide approach to sustainability and EO 13514 implementation. The Army developed Army Directive 2014-02, “Net Zero Installations Policy” in FY 2013, and issued it on 28 Jan 2014. It is available at http://www.apd.army.mil/pdf/files/ad2014_02.pdf. The Army also began updating its sustainable design and development policy in FY 2013, to incorporate new UFC 1-200-02 and 2-100-01, and to integrate Net Zero energy, water, and waste concepts. Issued in December 2013, the updated policy establishes a comprehensive process that makes energy and sustainability considerations a fundamental part of every new facility design. Given the cross-cutting nature of the new policy, details on it are discussed in various sections throughout this document, including Part IV, The Way Ahead.

Table 2. Summary of the DoD Objectives, Goals, and Sub-Goals Comprising the DoD SSPP, and Results for FY 2010 Through 2013

#	Sub-Goal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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%	27%	30%	31.5%	33%	34.5%	36%	37.5%
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%	11%	12%	13%	14%	15%	16%	18%
1.3	Use of Petroleum Products by Vehicle Fleets Reduced 30% from FY 2005 Levels by FY 2020	3.7%	8.6%	20.4%	26.1%	18%	20%	22%	24%	26%	28%	30%
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%	14%	16%	18%	20%	22%	24%	26%
2.2	Potable Industrial and Irrigation Water Consumption Reduced 20% from FY 2010 Levels by FY 2020	not applic	not avail.	not avail.	not avail.	8%	10%	12%	14%	16%	18%	20%
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%	100%	100%	100%	100%	100%	100%	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 34% from FY08 Levels by FY20	3.6%	4.4%	9.2%	10.3%	13%	16%	19%	22%	28%	30%	34%
3.2	Greenhouse Gas Emissions from Scope 3 Sources Reduced 13.5% from FY 2008 Levels by FY 2020 (with hosted renewable energy credit)	4.8%	(0.1%)	9.1%	18.5%	3%	4%	5%	7%	9%	11%	13.5%
3.3	30% of Eligible Employees Teleworking at Least Once Per Bi-Weekly Pay Period, on a Regular, Recurring Basis, by FY 2020	not avail.	not avail.	8%	13.0%	17%	20%	23%	25%	27%	29%	30%
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%	2%	2%	3%	4%	5%	6%	7%
GOAL #4: DoD Climate Change Vulnerability Assessed and Resiliency Improved												

#	Sub-Goal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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%		95%	95%	95%	95%	95%	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%	48%	50%	50%	50%	50%	50%	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%	58%	60%	60%	60%	60%	60%	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%		5%			10%		15%
6.2	100% of DoD Personnel and Contractors Who Apply Pesticides Are Properly Certified	99.4%	99.2%	99.0%	99.6%	100%	100%	100%	100%	100%	100%	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%	100%	100%	100%	100%	100%	100%	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%	95%	95%	95%	95%	95%	95%	95%
7.2	Electronic Stewardship and Data Centers	<i>See table in Part II</i>										
7.3	15% of Existing Buildings Conform to the Guiding Principles on High Performance and Sustainable Buildings By FY 2015, and Thereafter Through FY 2020	0.06%	0.30%	0.61%	0.88%	13%	15%	15%	15%	15%	15%	15%
7.4	All Environmental Management Systems Effectively Implemented and Maintained by FY 2020	red	red	red	red	green	green	green	green	green	green	green

The Air Force FY 2014 Posture Statement recognized the importance of maintaining sustainable installations in order to support the existing and evolving Air Force mission. From aviation operations to installations and ground vehicles within the homeland and abroad, energy and water are essential for Air Force operations and a key to national and economic security. In March 2013, the Air Force released a new Energy Strategic Plan to improve its ability to manage supply and demand in a way that enhances mission capability and readiness. The plan re-focuses the scope of the Air Force's energy posture by incorporating energy security and operational energy into strategic energy priorities, goals, and objectives, and reflects the continuous evolution of the Air Force's energy program. The new plan reinforces three of the four priorities: (1) Improve Resiliency, (2) Reduce Demand, (3) Assure Supply, and (4) Foster an Energy Aware Culture. The priority area on improving resiliency is new and entails improving responsiveness to disruptions to energy and water supplies, and to increase the Air Force's ability to quickly resume normal operations and mitigate impact to the mission. To support these priorities, the Air Force is making changes to flying operations to use less fuel, working with private industry on renewable energy opportunities and technologies, enhancing energy security, and driving energy awareness at all levels of professional development and technical training.

Success stories that span both Goals 1 and 2 are highlighted on the following page.

Sub-Goal 1.1 – Facility Energy Intensity

The energy intensity of DoD facilities was not able to continue the downward trajectory it has taken for the past several years. Energy intensity in FY 2013 was slightly higher than last year (0.6%), for a cumulative 17.2% reduction from the FY 2003 baseline. There were two factors exerting an upward force on the energy intensity of facilities in FY 2013: a continued reduction in DoD's real property inventory, and the return of warfighters from their deployments supporting theater contingency operations. The number of DoD buildings over 5,000 gross square feet (GSF) dropped 12% in the year from FY 2012 to FY 2013, and an impressive 37% in the past three years. Building area declined 0.9% from FY 2012 to FY 2013 and 3.6% in the past three years. While streamlining inventory and returning warfighters are positive factors, they have pushed energy intensity higher in spite of a continued decrease in energy consumption over the past several years. The use of performance-based contracting continues to be a key strategy for the Department to meet its energy intensity goals: during CY 2012 and CY 2013, DoD awarded 32 Energy Savings Performance Contracts (ESPCs) worth \$541 million and 41 Utility Energy Service Contracts (UESCs) worth \$159 million.

Reduced building square footage combined with swelling home base populations in FY 2013 were felt the most by the Army, which had more Soldiers at their home installations than in previous years, while reducing building square footage by 15 million GSF from the previous year. Therefore the Army's energy intensity fell short of the target, with a 14% reduction from the baseline. However, the Army has been making significant investments in efficiency to offset these otherwise positive trends. The Army's investments in performance-based contracting totaled \$185 million in FY 2013: \$160 million for 13 ESPC task orders and \$25 million for 11 UESC projects. This brought the Army total for the Presidential Performance Contracting Challenge to \$384 million between 2 December 2011 and 31 December 2013, amounting to nearly 40% of the total federal government investment under this initiative. In addition, the Army executed \$48.9 million in ECIP funding for 14 projects at 13 installations, estimated to yield annual savings of \$3.4 million and 191 billion Btu. To strengthen the Army's FY 2013 ECIP projects, the Army enlisted support from the DOE Idaho National Laboratory and the U.S. Army Corps of Engineers (USACE) Huntsville Center to validate each project. This resulted in better defined scopes, more accurate cost estimates and more detailed

HIGHLIGHTS

Objective 1: Comprehensive Approaches that Reduce Both Energy and Water Intensity in Facilities

Fort Carson Net Zero Energy and Water Projects Drive Down Consumption

Fort Carson, CO made significant energy efficiency improvements spanning many of its buildings in FY 2013. A lighting upgrade to 22 buildings, including occupancy sensors and timers, is saving an estimated \$60,000 every year. The base expanded its energy management monitoring and control system to cover 35 additional facilities, which is expected to save \$73,000 per year in reduced natural gas and electricity costs. For water, Pacific Northwest National Laboratory assisted Fort Carson in developing a water balance survey and Net Zero roadmap. The USACE conducted a non-potable water system study on using wastewater effluent to expand the base's existing non-potable irrigation system. The base conducted a leak detection and repair program on 16 miles of the water distribution system where the oldest lines were located. Once repairs are complete, 57,000 gallons per day of leakage will be stopped and an estimated \$72,000 in water costs saved. Fort Carson also installed a computerized weather-tracking irrigation system to optimize and minimize water use, which is anticipated to reduce the base's total water use by 20% while saving \$300,000 every year. Fort Carson was awarded an FY 2013 Federal Energy and Water Management award for this and related work.

Geothermal at JB Langley Eustis Saves

Joint Base Langley-Eustis, VA, replaced boilers, a 4,000-gallon cooling tower, and associated pumping system with a geothermal exchange system consisting of pipes buried approximately 400 feet underground. The project is expected to save almost \$190,000 each year in energy, water, and maintenance costs, and reduce annual water consumption by 11%.

Multifaceted Approach Turns Laughlin AFB into Model of Efficiency

Laughlin AFB, TX, went from being one of the highest energy users in the Air Education Training Command to one of the lowest in 2013, through a comprehensive suite of measures. To improve energy efficiency, the base upgraded lighting and installed advanced metering. The metering enables the base to identify and correct anomaly power uses, while also reducing power outages by 29%. Laughlin boosted water efficiency by implementing a base-wide leak detection and repair, upgrading plumbing fixtures, reducing irrigated areas, and making a bioswale out of a pond that had been supplied by the domestic water system. When the roof was replaced, it was topped with a photovoltaic (PV) system. The result: energy use reduced by 24%, water by 27%, and \$1.8 million in utility costs saved. David Morin, PE, Energy Manager at Laughlin AFB, was awarded an FY 2013 Federal Energy and Water Management award for his leadership in this work.

A Comprehensive Strategy Slashed Fossil Fuel Use at Marine Corps Air Station (MCAS) Beaufort

Through a combination of energy efficiency, renewable energy, and alternatives to petroleum-based vehicle fuel, MCAS Beaufort, SC, has reduced fossil fuel consumption by 54% and facility energy intensity by 34% since 2005. The following recent initiatives have contributed:

- A base-wide energy management system, networking 105 buildings, controls building temperatures based on peak-occupancy.
- Efficient chillers have been installed in certain facilities.
- The water used to cool a natural gas electricity generation plant provides space heating and hot water to the barracks, medical and dental facilities, and the mess hall.
- Geothermal heat pumps use the constant underground temperature as a heat exchanger that cools in the summer and as a heat source in the winter.
- 400 kilowatts (kW) of solar PV panels were installed.
- The base uses non-tactical vehicles powered with E85 and electric motors.

life-cycle cost analyses. Also in FY 2013, the Army executed over \$100 million of appropriated funds toward energy efficiency and water conservation projects, which are expected to save 500 billion Btu per year starting in FY 2014. The nine Net Zero Energy pilot installations are beginning to implement projects from their installation-specific Net Zero Energy roadmaps.

The energy efficiency investments made by the Air Force in FY 2010 and FY 2011 bore fruit in FY 2013, helping to drive a decrease in energy intensity of more than 22% from the FY 2003 baseline. Also fueling the improvements were the following four-pronged efforts of both the Major Commands and installation-level Energy Managers:

1. resource efficiency managers at both the base and the Major Command levels;
2. retro-commissioning programs to improve energy consumption by older facilities;
3. replacement of systems for improved energy efficiency;
4. continued awareness by Airmen of energy conservation and its impact on mission and readiness.

The Air Force has found a multiple installation approach to energy management successful. The Air Combat Command facility energy team at Joint Base (JB) Langley-Eustis Air Force Base (AFB) manages a comprehensive program for 16 installations focused on project execution, facility optimization, and energy accounting. In FY 2013, the effort reduced energy intensity by 5.9% from the prior year, saving 539 billion Btu and \$6.7 million. Examples of measures taken, along with their associated savings, include:

- Awarding 39 projects to improve energy efficiency – annual savings: 447 billion Btu and \$5.4 million.
- Retro-commissioning 2.3 million square feet at 78 major facilities, combined with energy management control system repairs and training at 12 bases, to ensure peak performance of energy systems – annual savings: 76.6 billion Btu.
- Installing light-emitting diode taxiway lights at six bases (completing the Air Combat Command's replacement of all incandescent taxiway lights) – annual savings: 2.7 billion Btu.

The team also added 137 advanced meters to its portfolio, bringing the total to 2,264, and revamped its databases and reporting procedures to improve energy reporting accuracy from 94% to 97%. To ensure that all stakeholders fully understand the project execution process and their role in the program's success, the team developed a Facility Energy Audit and Project Development Guide and a Resource Efficiency Manager Program Management Plan. Finally, monthly call-in meetings with team members, base energy managers, and resource efficiency managers keep the program on the front burner and facilitate sharing of best practices between bases.

The Navy's facility energy intensity was 19% lower in FY 2013 than the FY 2003 base year, and the Navy anticipates continued momentum as its energy efficiency investments – more than \$300 million in FY 2012 and FY 2013 – start generating savings. FY 2013 awards of approximately \$40 million in performance contracts will further reduce the energy intensity of Navy facilities.



HIGHLIGHTS

Sub-Goal 1.1: Selected DoD Success Stories on Reducing Facility Energy Intensity

Effective Energy Management Program at Naval Surface Warfare Center Carderock Division

The corporately managed energy program at Naval Surface Warfare Center Carderock Division, MD, implemented more than \$20 million in projects in FY 2012 across nine sites, reducing annual costs by \$4.3 million and energy intensity by more than 22% below the FY 2003 baseline. The corporately managed energy program promotes information and resource sharing and emphasizes best practices. The projects included two MILCON energy enhancement projects, repairs to major heating and cooling systems, steam decentralization, 21 kW of rooftop solar, and building envelope repairs. One of the Military Construction (MILCON) projects was the construction of a LEED Gold-certified facility in West Bethesda, MD. Among the sustainability features of the new building were a solar domestic hot water system, a vegetative (green) roof, and a new Electric Drive Test Site equipped with high-pressure natural gas infrastructure in lieu of liquid petroleum fuel. The energy team at Carderock Division was awarded an FY 2013 Federal Energy and Water Management award for this work.

Photo: U.S. Navy



Fort Bragg Takes Energy by STORM

Fort Bragg, NC, saved more than \$75 million over the course of three years through energy efficiency and conservation using the Energy STORM program:

- Sustains facilities by developing energy-efficient projects
- Trains occupants in energy conservation practices
- Operates facilities at peak efficiency
- Renews facilities through retro-commissioning
- Measures and reports energy consumption.

The program was institutionalized at Fort Bragg by Christine Hull, the Chief of Operations and Maintenance Division, who received a 2013 FEMP Exceptional Service award for her role. By refinancing an ESPC, Ms. Hull obtained \$66 million in investments to improve energy controls and lighting power management, and to upgrade 12 central heating and cooling plants, all while decreasing monthly payments.

Photo: U.S. Army



Energy Intensity Halved at Pease Air National Guard Base

When energy data reports revealed that Pease Air National Guard Base, NH, was one of the most energy intensive bases, the engineering squadron conducted extensive analysis to determine the best course of action. The most cost-effective option was to replace the centralized heating system with a decentralized system. The base also implemented a number of other efficiency measures, including translucent hangar doors, a daylight harvesting digital lighting system, solar hot water evacuated tubes, and energy recovery ventilators. The measures reduced energy intensity by 55% from FY 2010 to FY 2013, from 152 to 68 kBtu/ft².

Energy intensity in Marine Corps facilities was 17.1% below the baseline in FY 2013. The Commandant of the Marine Corps is focused on energy efficiency as the core strategy for reaching energy independence. Installation Commands are required to complete and submit a copy of the “U.S. Marine Corps Energy and Water Management Annual Report,” signed by both the Energy Manager and the Installation Commander to the Marine Corps Installations Command Facilities Directorate. These reports evaluate the overall energy management program; provide commands with current program status, future plans, and funding requirements; and promote achievements and success stories. The reports also serve as a basis for nominating Marine Corps installations for the Secretary of the Navy Energy and Water Management Awards Program.

Efficiency improvement projects in FY 2013 at the Defense Logistics Agency (DLA) reduced energy consumption by 60 billion Btu and saved \$1.3 million, compared to the prior year. The NGA Campus East facility achieved a Gold-level certification from LEED in 2011. FY 2013 was the first complete year this facility was fully operational, which is reflected in the energy intensity of the organization as a whole: down 43% from the FY 2003 baseline. DIA conducted a comprehensive investment grade audit on its HQ facility in FY 2013, in preparation for an ESPC in FY 2014. The National Reconnaissance Office (NRO) implemented a broad range of energy efficiency measures in FY 2013, spanning lighting, heating, ventilation, and cooling (HVAC), and building envelope improvements.

Sub-Goal 1.2 – Renewable Energy

As a percentage of electricity consumed by DoD facilities in FY 2013, DoD produced or procured 11.8% from renewable sources (electric and non-electric), exceeding the target of 10%. The extent to which the Department made use of renewable sources of energy is shown in Figure 3 for DoD as a whole and the Military Services.

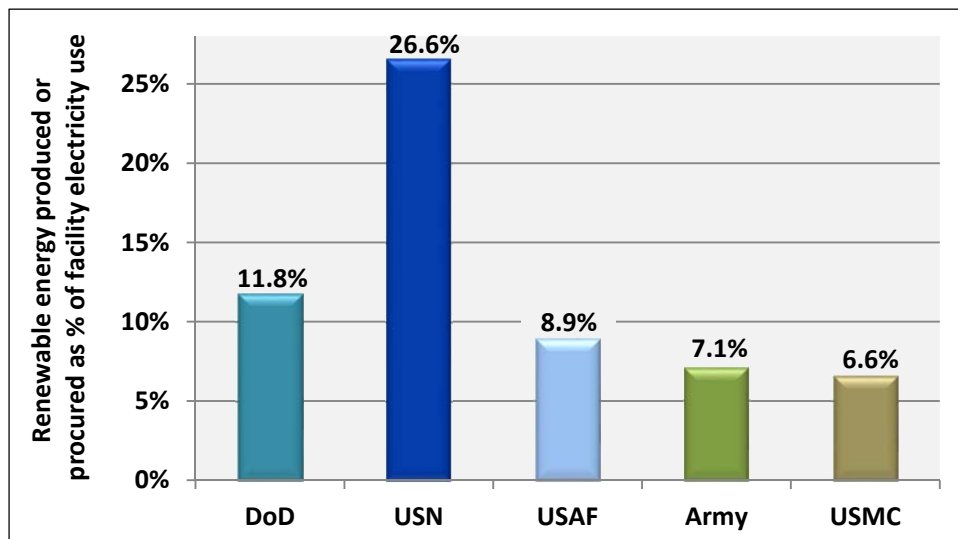


Figure 3. FY 2013 Renewable Energy Use by DoD and the Services (electric and non-electric sources)

The Secretary of the Navy established two goals in the area of renewable energy use: (1) to meet at least 50% of shore-based energy requirements using alternative sources by 2020, and (2) for 50% of installations to be net-zero with regard to energy consumption by 2020. As shown in Figure 3, the

Navy is a leader in installed renewable energy sources. In FY 2013, the Navy produced or procured energy equivalent to 26.6% of electricity consumed by facilities, exceeding the 18% target for FY 2020. This was the first year the Navy also achieved the 25% target established for DoD by 10 USC §2911(e), well ahead of the FY 2025 deadline. The Marine Corps supplied 11.8% of its electricity consumption from renewables, easily surpassing the federal government’s 7.5% target for FY 2013 for the Energy Policy Act of 2005, which counts renewable electric energy only.

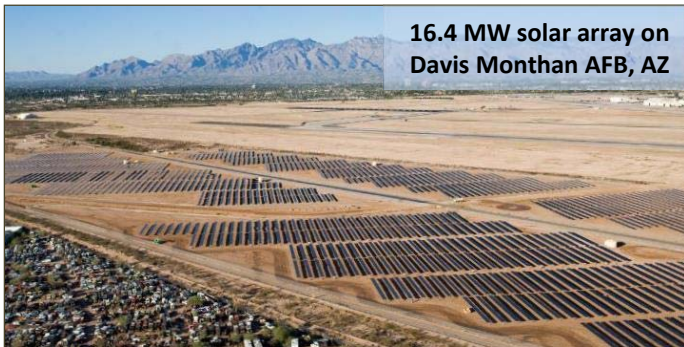


PV on Space and Naval Warfare Systems Command Headquarters, Naval Base San Diego, CA

Photo: U.S. Navy

The Army produced or procured the equivalent of 7.1% of its electrical energy from renewable sources in FY 2013, tapping into combined heat and power, photovoltaic (PV) arrays, wind turbines, biogenic methane production, biomass, ground source heat pumps, solar walls, and solar thermal pre-heat. The Army awarded a total of 8.64 megawatts (MW) of renewable energy generation in FY 2013 via ESPCs, UESCs, and other utility agreements, including major projects at Fort Bliss, TX, Fort Buchanan, PR, Adelphi Labs, MD, and Fort Irwin, CA. At the heart of the Army’s drive on large-scale renewable energy is the Army Energy Initiatives Task Force (EITF). EITF leverages private sector investments to construct large-scale renewable energy plants on Army installations. To date, EITF has screened over 180 active Army and Army National Guard installations to identify sites that have the best potential for large-scale renewable energy development. EITF has evaluated specific potential project opportunities and conducted detailed due diligence reviews (using a structured analytical process) for projects that met baseline viability criteria. In conducting the due diligence reviews, EITF weighs a set of identified risk factors that influence the likelihood of success against the potential contribution of the project to the Army’s energy portfolio. In FY 2013, EITF – with assistance from USACE – awarded three rounds of Multiple Award Task Order Contracts for renewable and alternative energy power production.

By the end of FY 2013, the Air Force had 286 renewable energy projects on 96 sites either installed and in operation or under construction, amounting to 8.9% of FY 2013 facility electricity consumption. The Air Force emphasized on-site renewable energy in FY 2013, increasing on-base electricity production by 53% from the prior year, for a total of 124 gigawatt-hours. The top 50 list of Green Power Partners released by the Environmental Protection Agency (EPA) in April 2013 ranks



16.4 MW solar array on Davis Monthan AFB, AZ

Photo: U.S. Air Force

the Air Force number one in DoD and number two in the federal government for the purchase and on-site production of green power. Since becoming a Green Power Partner in 2003, the Air Force has always appeared near the top of the list among Fortune 500 companies such as Intel, Microsoft and Walmart.

DLA expects its renewable energy production to increase significantly in the upcoming years because the construction of two solar thermal walls were recently completed, and contracts for five more solar walls were awarded at the end of FY 2013.

HIGHLIGHTS

Sub-Goal 1.2: Selected DoD Success Stories on Renewable Energy

Davis-Monthan AFB Making Energy on Underutilized Land

In FY 2013, Davis-Monthan AFB in Tucson, AZ, constructed 16.4 MW of solar PV panels on 170 acres of underutilized land on the base. The 57,000 panels will provide approximately 35% of the base's electricity requirements—enough energy to power the equivalent of 2,900 average homes every year. The array is projected to save the base \$500,000 every year in reduced electricity costs, not only by generating power from the sun but because the base will only have to pay the project developer, Sun Edison, 4.5 cents per kWh, rather than the 8.5-cent rate from the Tucson electricity utility. Sun Edison installed the system and are operating and maintaining the installation under a 25-year lease with the Air Force. The array went online in December 2013, bringing the base's total solar energy production capacity to 20.5 MW.

20-Year Solar Power Purchase Agreement at Naval Air Weapons Station China Lake

FY 2013 was the first full year of operation for the 13.8 MW PV array at Naval Air Weapons Station China Lake, CA. Construction began in January 2012 under a power purchase agreement that will provide the Navy with electricity below the retail utility rate for 20 years. The new plant is performing as expected, providing an estimated 30% of the base's electricity requirements. It was built at no upfront cost to the Navy and is projected to save about \$13 million over the 20-year life of the contract.

Marines' First Power Purchase Agreement at Marine Corps Logistics Base (MCLB) Barstow

MCLB Barstow, CA, installed 1.35 MW of PV arrays on 30 acres of land, financed through the MarinesCorps' first power purchase agreement. Under the agreement, an energy company pays for construction and operation, and sells the power to the base at a lower than normal price over the 20-year term of the contract. The PV system generates an estimated 2.7 million kWh annually. Together with a wind turbine on the base, which currently operates at a 1.0 MW capacity, the base generates 18% of its power on site.

Norfolk Navy Shipyard Converts Waste into Energy

Norfolk Navy Shipyard in Portsmouth, VA, operates a waste-to-energy incinerator, selling the electricity to the local utility and keeping the steam for use by the installation. In FY 2013, the installation made improvements to the plant that boosted steam production by almost 70% and electricity generation by 14%.

Fort Carson's Diverse Renewables Portfolio Supplies 39% of Base Energy Needs

Fort Carson, CO, ranked number four on the Top 10 Federal Government list (January 2014) in EPA's Green Power Partnership. The post gets 39% of its annual electricity use from renewable sources, nearly 82 million kilowatt-hours (kWh). It comes from a mix of on-site solar PV installations, a green power product from the local utility, and a pilot project to purchase electricity from a wood biomass project at Colorado State University.

Wind Powers the Radar System at Cape Cod Air Force Station

The Air Force installed two 1.6 MW wind turbines at Cape Cod Air Force Station in FY 2013. Operational as of early 2014, the turbines are expected to cover about half of the station's electricity consumption, and will help power radar system operations (the Precision Avionics Vectoring Equipment Phased Array Warning System) at the 6th Space Warning Squadron. The turbines will generate more energy than needed at times, which it will sell to the local electric company through a net metering agreement. The estimated annual savings of approximately \$600,000 a year will pay for the project in about 12 years.



BEST PRACTICE: Approach for Widespread Adoption

Combined Heat and Power Turns Waste Heat and Landfill Methane into Energy

A combined heat and power system—also known as cogeneration—is an electricity generation system that also produces useful heat from the same fuel source by capturing heat from the engine exhaust. Marine Corps Logistics Base (MCLB) Albany has such a system, which recovers otherwise-wasted heat from the engine exhaust to produce steam. The steam is used by a 2,000-employee re-manufacturing plant that repairs and rebuilds Marine Corps ground combat and combat support equipment. The 1.9 MW system saves the base approximately \$1.3 million per year in energy costs compared to conventional generation of electricity and steam. The system further reduces the use of fossil fuels and emissions of GHGs because its usual fuel source is the nearby Dougherty County Landfill. The methane from the landfill's biogas powers the system's internal combustion engine, providing the base with reliable energy independent of outside sources. In the event of a grid power outage, the combined heat and power system is capable of starting up and operating independently of the electric grid. Also, if there is a disruption in the landfill gas supply, the system can quickly switch to natural gas. Therefore the system simultaneously reduces operating costs, advances the mission by improving energy security, and improves sustainability.

Recovery of Biogas

As of the end of FY 2013, four DoD installations had new projects to make use of biogas, all from landfills, that came online in FY 2010 or later:

1. Fort Benning, GA;
2. MCLB Albany, GA;
3. MCAS Miramar, CA; and
4. JB Elmendorf-Richardson (JBER), AK.

The JBER project came online in FY 2013 and is described in detail under “Selected DoD Success Stories on Using Landfill Biogas for Facility Energy” on the following page. The Army assessed its on-post wastewater treatment plants for the potential for methane recovery in FY 2013. While none of them are suitable for large-scale generation, several plants might generate sufficient methane to power smaller boilers. The Army will evaluate these further in FY 2014. The Navy is not currently recovering biogas for energy use from its landfills or wastewater treatment plants, primarily because their small size and low gas flows make the economics unfavorable, but it continues to investigate the feasibility of biogas projects.

Sub-Goal 1.3 – Vehicle Fleets

The use of petroleum by the Department's non-tactical fleet of motor vehicles in FY 2013 was 26.9% lower than the FY 2005 baseline, while the vehicle fleet used 153% more alternative fuels than in FY 2005. Both of these achievements easily surpass the FY 2013 federal government targets of 16% and 114%, respectively, and are close to the FY 2020 goals of 30% and 159%, respectively. In addition to an increasing shift from petroleum-based to alternative fuels, the Department's use of fuels of *all* types in its non-tactical fleet has sharply declined since the FY 2005 base year, by more than 21%.

The Air Force vehicle consumption of petroleum was 20.7% lower than the FY 2005 baseline, while its use of alternative fuels increased nearly 76%. The Air Force Element Vehicle and Equipment Management Support Office (VEMSO) implements a number of programs that help green the entire Air Force vehicle fleet while advancing the mission. As a result of its vehicle fleet management

HIGHLIGHTS

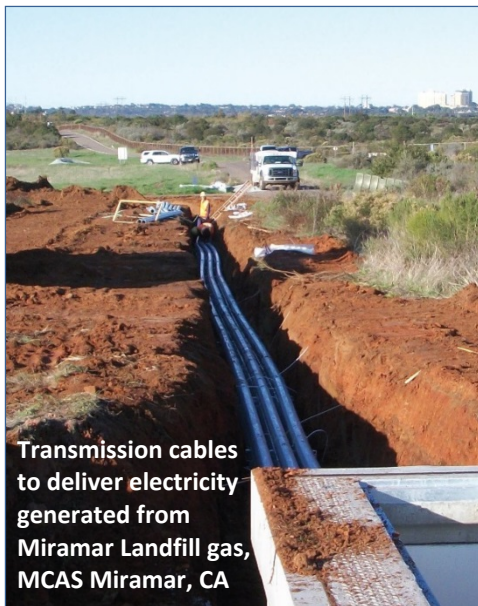
Sub-Goal 1.2: Selected DoD Success Stories on Using Landfill Biogas for Facility Energy

Landfill Biogas Paves the Way for Energy Independence at MCAS Miramar

MCAS Miramar in San Diego, CA, entered into a 15-year power purchase agreement with the City of San Diego and a private clean energy company for the electricity produced from the methane-containing biogas extracted from the base's 476-acre Miramar Landfill. Renewable electricity from the landfill provides about one-quarter of the total energy consumed by the base. The Marine Corps owns the landfill and leases it to the City of San Diego, which is responsible for its operation. Under the power purchase agreement, which was five years in the making with assistance from the Naval Facilities Engineering Command, MCAS Miramar agreed to purchase 3.2 MW of power from the landfill facility. Under a separate project, the installation is laying three miles of transmission lines to carry the electricity to an on-site transformer that distributes the power to select installation facilities. The success of this project was a key factor in DoD's decision to invest MILCON funds in a microgrid that will enable the installation to be entirely independent of the local utility electricity grid. MCAS Miramar aims to be energy independent by 2017. The team of individuals behind this work received an FY 2013 Federal Energy and Water Management award.

Landfill Partnership Provides One-Quarter of Electricity Needs at JB Elmendorf-Richardson

The landfill gas-to-energy project for JBER came online in FY 2013, providing roughly 25% of JBER power needs. The project is the result of a three way partnership between JBER, the JBER Utility Privatization Contractor, and the Municipality of Anchorage Solid Waste Services Department, which owns and operates an 87-acre landfill adjacent to JBER. The landfill operator used to flare the biogas but now collects it via a system of 36 vertical wells and 21 horizontal collector wells. The gas is piped to an adjacent scrubbing facility that removes enough impurities to make the biogas suitable for use in electricity generators. The scrubbed gas is piped to an electricity generating facility located on the installation, currently consisting of five 1.4 MW generators that can operate either on the scrubbed biogas or commercial, pipeline-quality natural gas. The project provides JBER with 7 MW of electricity capacity, making it the single largest producing renewable energy project in the Air Force. It provides 100% of the installation's back-up generation and is expected to continue delivering electricity for 45 years, providing JBER with long-term energy security.



Transmission cables to deliver electricity generated from Miramar Landfill gas, MCAS Miramar, CA

Photo: U.S. Marine Corps



Photo: U.S. Air Force

Landfill Gas Plant, JBER, AK

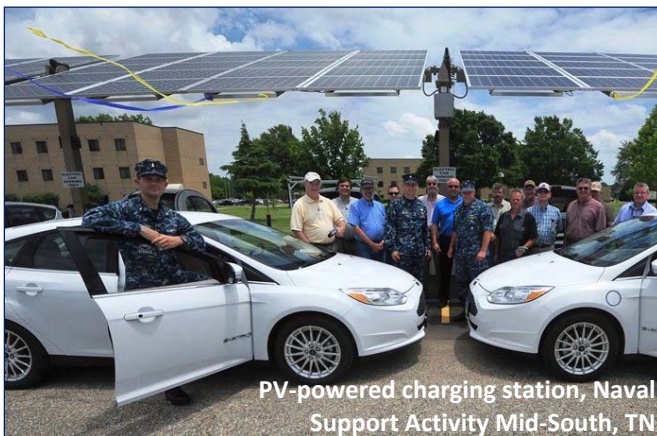
initiatives, VEMSO was named one of the 100 best fleets in North America in 2013 by the *Government Fleet* magazine 100 Best Fleets program. Among the VEMSO initiatives are procurement preferences, plug-in electric vehicle fleets, deployment of radio frequency identification devices, and vehicle validations. VEMSO started executing the radio frequency technology in FY 2013, using a commercial, off-the-shelf product called Automotive Information Module, 2nd Generation. The technology is being installed on 18,300 vehicles at 171 installations based in the contiguous United States. It will enable Air Force leadership at multiple levels to monitor and reduce vehicle idling, restrict operators to alternative fuels if available, identify vehicle trouble codes, and provide concise fuel consumption data.

Another VEMSO initiative is to unify the Vehicle Validation program centrally within the VEMSO office rather than decentralized within each Major Command, and to add virtual visits in addition to on-site visits. In FY 2013, VEMSO completed 11 on-site vehicle validation visits and four virtual visits, putting a combination “hands-on” approach to review 11,149 vehicle authorizations. In doing so, VEMSO was able to identify and reduce 1,145 vehicle authorizations that were no longer required to support changing mission needs, while “right-sizing” an additional 666 vehicles. The Air Force recently updated its Vehicle Fleet Management Plan to include a standard policy to consolidate or pool vehicles that are required for infrequent mission support, and to allow units to sign out or share vehicles. This reduces the number of underutilized vehicles authorized and assigned to individual units.

The Army’s vehicle petroleum consumption was 33.7% lower in FY 2013 than the FY 2005 baseline, exceeding the 30% goal a full seven years ahead of the FY 2020 goal. The Army was similarly successful in ramping up its use of alternative fuels, which reached an increase above FY 2005 of 1,632%. These successes were achieved by the Army’s aggressive three-part strategy: downsizing its non-tactical vehicle fleet, right-sizing its mix of vehicles to match the mission, and aggressively adopting alternative fuels and highly fuel-efficient vehicles. The Army continues to use the annual General Services Administration (GSA) vehicle replacement cycle to downsize and right-size its fleet by eliminating Class IV or larger vehicles and downsizing Class III sport utility vehicles and sedans not required for justified missions (such as law enforcement and fire and emergency services). The

Army eliminated 2,753 vehicles from its inventory in FY 2013, and over 1,200 mid-size and full-size sport utility vehicles were downsized to smaller, more fuel-efficient models.

Photo: U.S. Navy



In FY 2013, the Navy reduced the amount of petroleum used by its non-tactical fleet by 20% based on the 2005 baseline, while the fleet’s use of alternative fuels increased 87%. Four of the 20 alternative fueling stations the Navy awarded in FY 2012 were completed in FY 2013. The Navy has

been proactively investigating the viability of hybrid vehicles (both passenger vehicles and heavy-duty trucks) and plug-in electric vehicles (EVs). The Navy is participating in the GSA Plug-In Electric Vehicle Pilot Program by leasing nine Chevy Volts and two Nissan Leafs through GSA. The demonstration gives GSA and federal fleets a better understanding of plug-in electric vehicle technology, including life cycle costs and payback. The pilot will also help develop proper specifications to ensure that EV charging stations meet the operational and reporting needs of the

agency while minimizing the cost of both the hardware and installation.

The Navy funded a follow-on project to evaluate the benefits of hybrid electric technology, based on the results of the DoD-wide hybrid demonstration project funded by the Strategic Environmental Research and Development Program (SERDP). The follow-on project found the fuel economy benefits exceeded 25%. The Navy has completed a DoD-wide project that demonstrated emerging heavy-duty hybrid electric and hybrid hydraulic technologies. The project involved side-by-side testing of hybrid trucks against their conventional counterparts. The multi-Service project team initially tested the trucks in a controlled track environment (Aberdeen Proving Grounds, MD), followed with real-world testing at Naval Station San Diego and Naval Base Kitsap Bangor. The team completed testing early in FY 2013, collecting data on fuel economy, noise, maintenance, reliability, and in-use performance, and the Navy is currently reviewing the draft report.



The Marine Corps reduced the use of petroleum fuel by its non-tactical fleet 26% from the baseline established in FY 2005, while increasing the use of alternative fuels by 68%. The Marine Corps reduced its fleet by 647 vehicles in FY 2013, a 4.8% decrease, while adding to its alternative fuel fleet, which now represents 37% of the total inventory. The Marine Corps has a policy to replace conventional vehicles with low-speed EVs, and it now has 782 such vehicles.

DLA has been successful in driving down its use of petroleum-based vehicle fuel in part by including the topic in the DLA Director's Annual Operating Plan review. It has also reduced the number of vehicles in the fleet and greatly increased the amount of alternative fuel consumed in fleet vehicles (particularly E85, a blend of 85% ethanol and 15% gasoline). The latter was made possible by educating field activities on the mandated increase of alternative fuel consumption, conveying the good experience users have had with E85, and increasing the numbers of alternative fuel vehicles (AFVs) in the DLA fleet.

NGA reduced vehicle petroleum use by 65% in FY 2013 compared to the 2005 baseline. In FY 2013, NGA executed a policy to lease only GSA hybrid alternative fueled vehicles, and it exchanged two 15-passenger vans early in FY 2014 for two mid-size hybrid electric vehicles. DIA began two major initiatives to reduce fleet vehicle petroleum during FY 2013, reducing its vehicle fleet by 15% and requesting only suitable hybrid electric vehicles, if available, in the GSA replacement cycle. The agency replaced three standard gasoline vehicles with hybrids in FY 2013, and expects more in FY 2014. In NSA, the vehicle purchasing policy places a preference on all-electric and hybrid-electric vehicles.

Sub-Goal 2.1 - Facility Water Intensity

The Department again excelled at driving down the potable water intensity of its facilities, with intensity in FY 2013 falling 19.8% below the FY 2007 baseline level (Figure 4). This far surpasses the FY 2013 reduction target of 12%. Figure 5 shows the progress being made by the Department towards the FY 2020 goal of a 26% reduction in intensity.

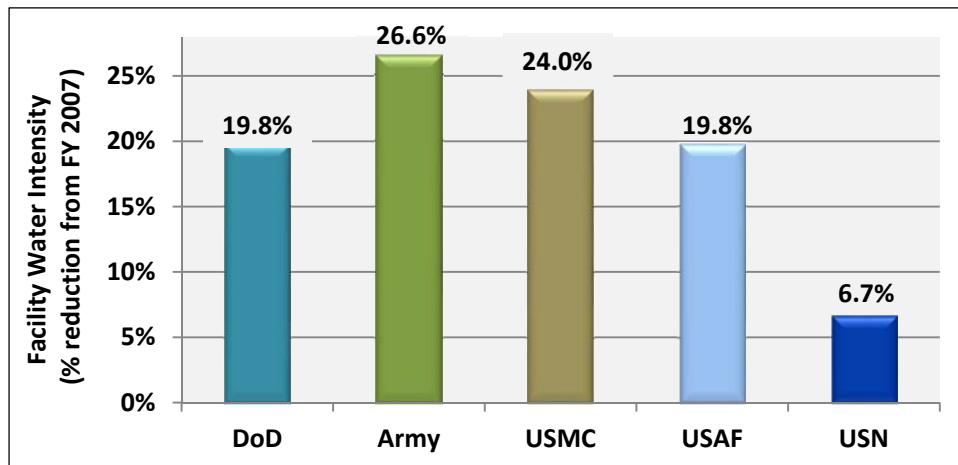


Figure 4. FY 2013 Water Intensity Reduction for DoD and the Services

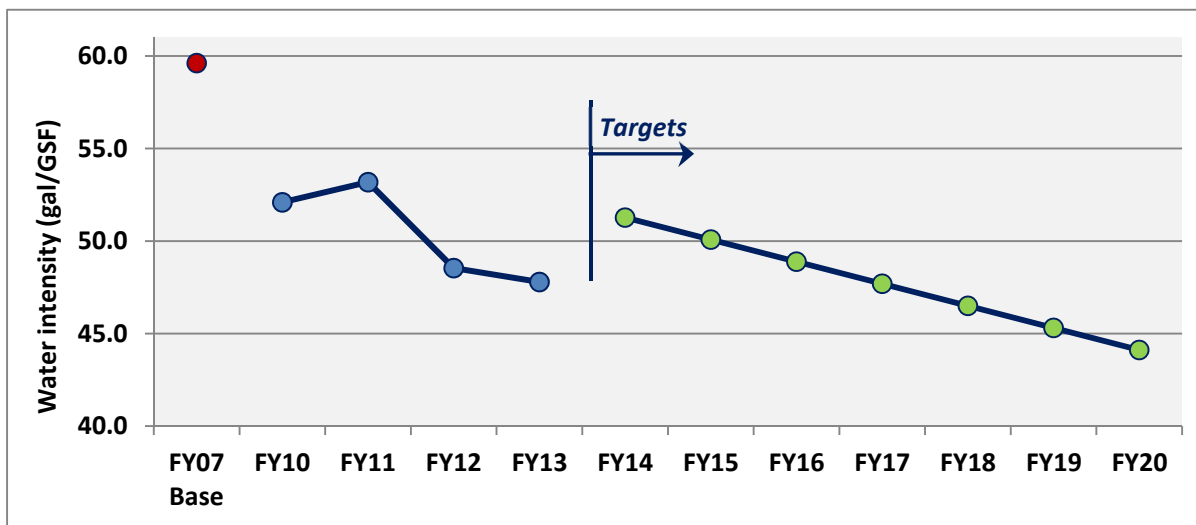


Figure 5. DoD's Path Towards the FY 2020 Facility Water Intensity Goal

The Army reduced the potable water intensity of its facilities by 26.6% in FY 2013 relative to the FY 2007 baseline. This achievement reflects the Army's view of water as a critical resource to be conserved and used as efficiently as possible to insure mission readiness, demonstrated by the inclusion of water use and water security as a major objective in the Army Campaign Plan. In FY 2013, under the Army's Net Zero Water initiative, the Army developed Net Zero Water Roadmaps for each of the eight water pilot installations. The roadmaps are based on data from the water balance assessments conducted by the Army in FY 2012, and the installations will use them to identify and prioritize potential projects to achieve Net Zero Water status by 2020. Apart from the Net Zero pilots, there are multiple contributors to the Army's FY 2013 water reduction achievements, spanning water-saving plumbing fixtures (e.g., low-flow faucets, motion-sensing faucets, waterless urinals, dual-flush toilets), leak repairs, xeriscaping, water reuse and – when needed – restrictions on water use. One of the largest contributors to reducing water intensity in the Army is detecting and repairing leaks in the potable water distribution system. As a result of the new Army sustainable design and development policy, the Army expects to significantly reduce overall water use at the building level.

By FY 2013, Air Force facilities consumed almost 20% less potable water per GSF than in FY 2007. This success was possible due to water efficiency and conservation improvements. These included leak detection and infrastructure repair, fixture replacement and upgrade, irrigation system disconnection, separately metering privatized systems, and using non-potable water sources for industrial, landscaping, and agricultural uses.

The water intensity of Marine Corps facilities was 24.0% lower than the baseline in FY 2013. As with energy efficiency, this excellent performance reflects the Marine Corps commitment to water efficiency, evidenced by the requirement for Installation Commands to complete and submit a “U.S. Marine Corps Energy and Water Management Annual Report.”

The Navy’s potable water intensity in FY 2013 was 6.7% below the FY 2007 baseline. The Navy continues to use return on investment as a criterion for selecting water efficiency projects such as installing low flow sink aerators, showerheads, toilets, and urinals.



Photo: U.S. Navy

DLA’s FY 2013 potable water intensity shows a continuing year to year improvement due to ongoing water conservation projects, awareness campaigns, and implementation of DLA water conservation guidance. In FY 2013, DLA installed smart water meters at Columbus, Richmond, and Susquehanna, which will facilitate further reductions by identifying where water waste is occurring and providing more immediate notification of changes in consumption rate. DIA conducted an ESPC audit in FY 2013, identifying significant opportunities for improving water efficiency, which DIA will implement in FY 2014. NRO was proactive in reducing its consumption of potable water in FY 2013, installing dual flush toilets and smart irrigation systems, expanding xeriscaping, and reducing loss from cooling towers.

Sub-Goal 2.2 - Irrigation, Landscaping, and Agricultural Water

Although issues are still being resolved to ensure high-quality data on the consumption of irrigation, landscaping and agricultural (ILA) water, the Services and other Components continue to make reductions, through xeriscaping and drought-tolerant landscaping, reclaiming wastewater for use in irrigation and industrial applications, and more efficient irrigation systems. Some examples of successes are highlighted on the next page.

In FY 2013, the Air Force reduced its use of potable water for ILA purposes through xeriscaping, policies that promote more efficient irrigation or prohibit new irrigation systems, and recycling water for irrigation purposes. The Army has been working to improve its ability to accurately track water used for industrial, landscaping, and irrigation purposes. One step the Army is taking is to work with DOE’s Pacific Northwest National Laboratory to develop a tool to estimate an FY 2010 baseline in lieu of meters and past water use data. The Army also modified its Energy and Water Reporting System to include ILA data fields, and Army installations have begun to report this data. DON is also working to improve its ILA reporting, and to establish a baseline for the Navy and Marine Corps.

HIGHLIGHTS

Sub-Goals 2.1 and 2.2: Selected DoD Success Stories on Reducing Facility Potable Water Intensity

Non-Potable Water for Cannon AFB Construction

Cannon AFB increased the volume of reclaimed wastewater available for non-potable uses from 0.2 to 9 million gallons. All construction on the base requires water to compact the soil before laying the foundation, and the base has the largest military construction program in the Air Force. The soil is so dry, engineers have to spray water on it in order to compact it. Instead of potable water, the base now taps into two basins constructed to hold treated but non-potable water from the base wastewater treatment plant. The water also irrigates the base golf course. In addition, the base combines drought tolerant plants with rocks and mulch around the dormitories, avoiding the need for grass and its associated water and maintenance.

Scranton Army Ammunition Plant Diverts Treated Wastewater to Cooling Towers

Scranton Army Ammunition Plant, PA, is treating oily wastewater with an ultra-filtration treatment system and reusing that water in the Forge Shop cooling towers. The project was funded by the operating contractor and has reduced potable water use by about 1.0 million gallons per year.

Simple Modifications Save Big at Tinker AFB

Tinker AFB reduced FY 2013 water consumption at its industrial wastewater treatment plant by 104 million gallons, which is expected to yield annual cost savings of \$1.7 million. This resulted from two simple steps: base engineers installed shut-off valves on a chemical cleaning discharge line at the plant, and asked operators to ensure the valves are closed at the end of each shift.

Naval Base Coronado Wins EPA Award

Naval Base Coronado reduced their use of potable water in FY 2013 by 20% from the prior year, saving more than 101 million gallons. The base irrigated less frequently, allowing some lawn areas to go dormant; installed one-pint urinals; adjusted the chemical treatment of the cooling tower valves so they use less water; and took measures to minimize the amount of water used in the galley. EPA presented the base with a prestigious Federal Green Challenge award for these accomplishments.

Water Savings at Naval Support Activity Crane with One Year Payback

In FY 2013, Naval Support Activity Crane, IN reconfigured its wastewater treatment system to recycle the water used for the system's filter backwash function. The change reduces the water drawn from the watershed and the sewage water needing to be processed, while also eliminating the costs to pump, treat and dispose of the filter backwash water. The installation also switched from chlorine disinfection to ultraviolet (UV) light, which avoids the need to flush chlorine byproducts from the system to assure water quality, and the potential hazards of using chlorine gas. The \$640,000 ECIP project is expected to save more than 28 million gallons of water annually, or 10% of annual usage, and \$494,000 per year in costs, for a payback period of just over one year. The project saves water and money, aids water quality regulatory compliance, enhances safety, and upgrades the plant technology.

Marine Corps Recruiting Depot San Diego

Through a variety of projects, Marine Corps Recruiting Depot San Diego reduced water consumption in FY 2013 by more than 41 million gallons, for a reduction in intensity of 30%, from the prior year. One path was to reclaim water from wastewater for irrigation and toilet flushing, using a tertiary water treatment system and artificial wetland, saving 365,000 gallons of potable water annually. A combination of drought-tolerant plants and artificial turf is saving another 357,000 gallons of water every year.

Fort Hood Finds Sources of Non-Potable Water

Instead of using potable water to irrigate its golf course, Fort Hood installed pumps and piping to draw non-potable water from a small on-post lake, saving an estimated 117 million gallons of potable water to date. The base also uses closed loop systems to recycle water from a mobile kitchen trailer/compact kitchen wash bay and tanker purge facility. In FY 2012 and FY 2013, the wash bay was used 178 times, saving an estimated 1.25 million gallons of water, while the tanker purge facility was used 192 times, saving an estimated 1,200 Soldier hours and 2.88 million gallons of water.

Sub-Goal 2.3 – Stormwater Runoff

In FY 2013, 98.9% of DoD development and redevelopment projects of 5,000 square feet or greater (175 out of 177) maintained the pre-development hydrology of the sites to the maximum extent technically feasible, as per the requirements of EISA section 438 and the subsequent December 2009 technical guidance issued by EPA³ and the January 2010 DoD policy memorandum.

The Army sustainable design and development policy already required compliance with DoD's policy on low impact development (LID) and stormwater management prior to FY 2013, as well as Section 5 (Site Sustainability) of Standard 189.1 of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). When the Army updated its sustainable design and development policy in FY 2013 (signed in December 2013), it strengthened the LID component by adding the November 2010 [UFC 3-210-10](#) on *Low Impact Development* and more specific requirements to maintain pre-development site hydrology. Also in FY 2013, the Army issued an automated LID design application planning tool called "Army Stormwater Management Using Low Impact Development," and a guide titled "[Army Low Impact Development Technical User Guide](#)", for use by installation Master Planners and LID project designers as well as Departments of Public Works. These resources help installation personnel incorporate LID into the initial stages of project planning. The LID documents and planning and design application can be accessed via the Hydrology and Low Impact Development Center of Excellence link on the USACE Sustainability and Energy website.



Photo: U.S. Army

All 18 Navy projects in FY 2013 complied with the stormwater runoff requirements. The Naval Facilities Engineering Command (NAVFAC) continued to improve its electronic LID reporting tool, "eProjects" in FY 2013, to capture, analyze, and report data from field components, both Navy and Marine Corps. To improve data quality and consistency, NAVFAC continued to provide web-based training for project managers to ensure that they are uploading data for relevant design and construction projects. Since deploying the web-based training module, the Navy has continued to see an improvement in the quality of the data entered into eProjects. In the Marine Corps, 15 out of 17 projects complied with the stormwater requirements.

As it has since 2008, 100% of Air Force projects in FY 2013 were in compliance with the stormwater runoff requirements. The Air Force attributes its continued compliance to the mandatory guidance in the June 2011 Air Force Sustainable Design and Development Guidance, and to ongoing outreach activities and briefings to Air Force Major Commands, military construction (MILCON) project managers, and water program personnel.

³ *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*, available at http://www.epa.gov/oaintrnt/documents/epa_swm_guidance.pdf.

Goal 3 – GHG Emissions Associated with DoD Operations Reduced

The Department has been steadily reducing its target subject GHG emissions every year since the FY 2008 baseline, with FY 2013 emissions 12.1% below the baseline, as shown in Table 3. Total DoD GHG emissions for FY 2013 for all categories (subject to the reduction target) were 30.3 million metric tons of CO₂-equivalent emissions, when third-party operated renewable energy generation is included.⁴

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

DoD continued to ratchet down its GHG emissions from Scope 1 and 2 sources in FY 2013, pushing the quantity to 10.3% below the FY 2008 baseline, surpassing the 10% target (Figure 6). The success was driven by a 10% decline in emissions from facility stationary combustion and an 11% reduction in emissions from facility purchased electricity.

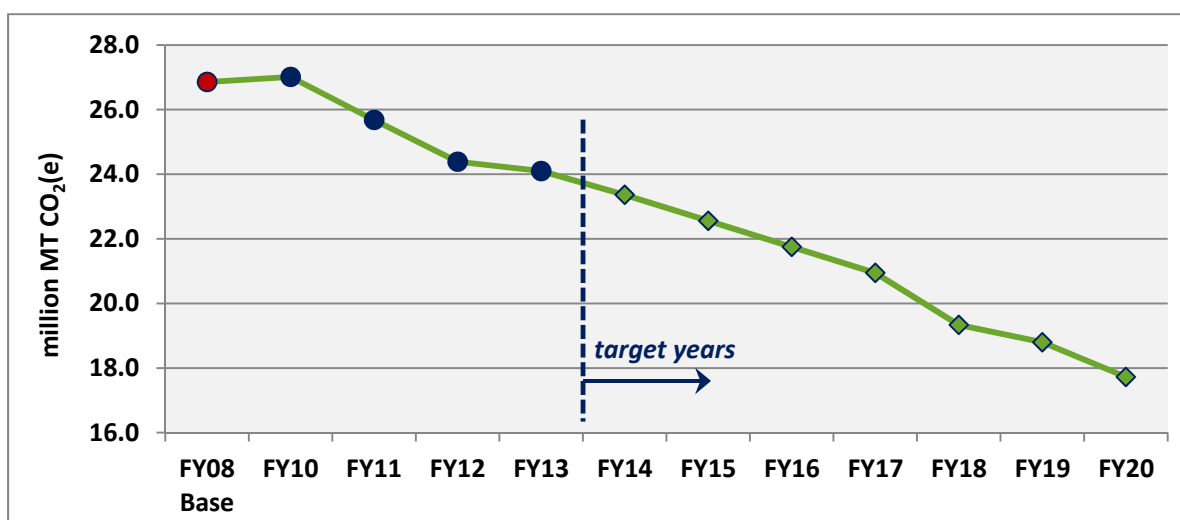


Figure 6. DoD Scope 1 & 2 Target Subject GHG Emissions from the FY 2008 Baseline to FY 2013, with the Target Out-Years

Sub-Goal 3.2 – Scope 3 Greenhouse Gas Emissions

The Department’s Scope 3 GHG emissions were 18.5% lower in FY 2013 than the FY 2008 base year, driven largely by reductions in employee business travel and a continued increase in credit for hosting renewable energy facilities. The 18.5% reduction in Scope 3 emissions easily surpassed DoD’s 13.5% target for FY 2020.

Sub-Goal 3.3 – Telework

In FY 2013, the DoD Defense Civilian Personnel Advisory Service continued its efforts to fully document employee eligibility data in the Defense Civilian Personnel Data System, and more accurately capture the actual amount of time teleworked in the automated time and attendance systems. The Department expects both refinements to increase the percentage of routine telework

⁴This amount reflects the inclusion of Scope 3 renewable energy credit DoD receives for third-party operated renewable energy generation hosted on DoD land, for which DoD does not retain the renewable energy certificates. Without this credit, target subject emissions totaled 31.2 million metric tons of CO₂-equivalent.

Table 3. Change in DoD GHG Emissions (Subject to Target) From FY 2008 to FY 2013

Scope and Category		million metric tonnes CO ₂ (e)					% Decrease (FY 2008 - 2013)
		FY 2008 <i>(for FY 2013)</i>	FY 2010	FY 2011	FY 2012	FY 2013	
Scope 1	Stationary Combustion	6.73	6.68	6.40	6.08	6.06	
	Non-highway Vehicles, Aircraft, Ships, Equipment	1.74	0.99	1.56	1.46	1.44	
	Passenger Fleet Vehicles	0.73	0.68	0.64	0.62	0.53	
	Fugitive, Fluorinated Gases, Other	0.22	0.30	0.23	0.20	0.28	
	Fugitive, On-site Wastewater Treatment	0.01	0.01	0.01	0.01	0.01	
	Fugitive, On-site Landfills	0.22	1.10	0.26	0.25	0.24	
	Industrial Process Emissions	0.00	0.00	0.00	0.00	0.00	
Scope 2	Purchased Electricity	16.35	15.91	15.74	15.05	14.56	
	Purchased Biomass Energy	0.00	0.01	0.01	0.01	0.01	
	Purchased Steam and Hot Water	0.86	1.76	1.02	0.95	1.26	
	Purchased Chilled Water	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	
	Reductions for Renewable Energy Use	0.00	-0.42	-0.21	-0.23	-0.29	
Scopes 1 and 2		26.86	27.01	25.68	24.39	24.10	10.3%
Scope 3	Transmission & Distribution (T&D) Losses	1.05	1.04	1.01	0.98	0.96	
	T&D Losses REC Adjustment	n/a	n/a	n/a	-0.01	-0.02	
	Employee Business Air Travel	2.30	1.89	2.39	2.09	1.67	
	Employee Business Ground Travel	0.24	0.33	0.24	0.26	0.21	
	Employee Commuting	3.40	3.47	3.84	3.82	3.74	
	Off-site Wastewater Treatment	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	
	Credit for Hosting Renewable Energy Facilities	n/a	-0.75	-0.66	-0.67	-0.91	
Scope 3		7.63	6.61	7.42	6.94	6.22	18.5%
Total Emissions		34.49	33.62	33.10	31.33	30.32	12.1%

accomplished in DoD. Of those DoD employees eligible for regular, recurring telework in FY 2013, 13% did so at least once per bi-weekly pay period. Figure 7 shows the teleworking rates for those DoD Components with at least 2,000 employees eligible to participate (not counting the National Guard Bureau).

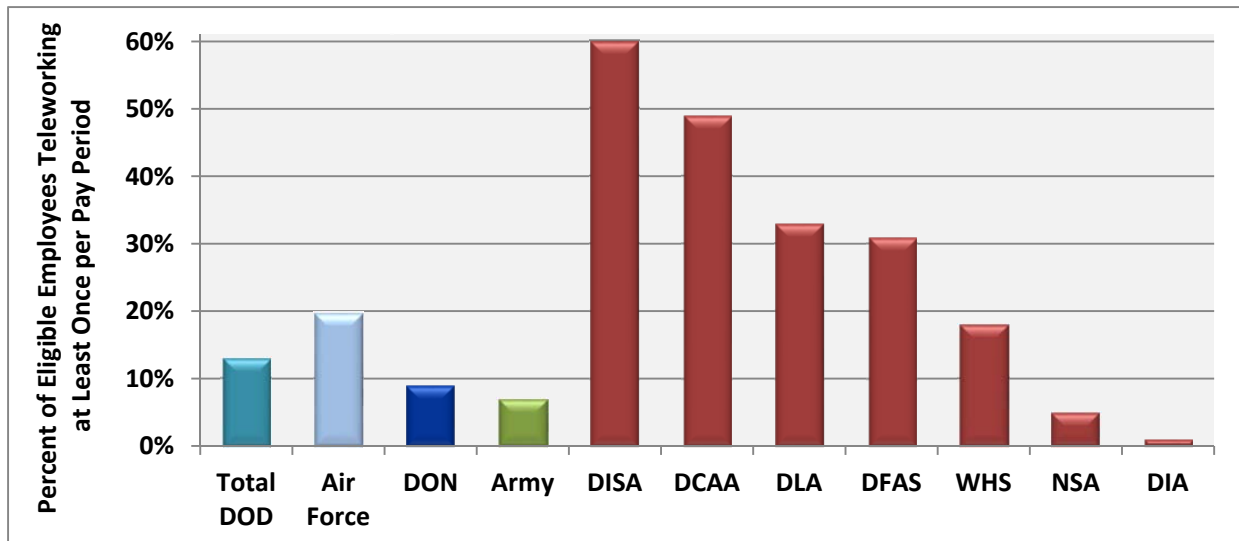


Figure 7. FY 2013 Teleworking Participation in DoD, Shown for the MILDEPs and Those Components with at Least 2,000 Eligible Employees

The Navy maintains a strong commitment to maximize participation in telework to the extent that the mission is not disrupted or jeopardized. The Navy has training and information available to managers and supervisors on telework eligibility determination, development of telework agreements for employees, and the benefits of telework. Likewise, the Marine Corps continues to train managers and supervisors on telework eligibility determination, developing telework agreements for employees, and the benefits of telework.

In FY 2013, the Air Force developed a new Air Force Instruction (AFI) 36-816, [Civilian Telework Program](#), issued in November 2013. The new Instruction implements the provisions of three documents pertaining to telework:

1. Air Force Policy Directive 36-8, *Employee Benefits and Entitlements and Work/Life Programs*;
2. AFI 36-807, *Weekly and Daily Scheduling of Work and Holiday Observances*; and
3. DoDI 1035.01, *Telework Policy*

The new Instruction more clearly defines telework eligibility requirements, roles and responsibilities, and applies to civilian employees administered under Title 5, including Air Force Reserve personnel, U.S. citizens assigned to foreign overseas areas, and civilian employees at joint service organizations where Air Force is the executive agent.

The Army completed its migration to an Enterprise Email system and the establishment of a webmail option, both important steps for making teleworking a viable option for employees.

DIA has seen a significant increase in telework agreements from 2012 to 2013, and expects that number to grow in 2014. MDA completed supervisor-employee discussions of job duties and expectations, which enabled the agency to more accurately determine the number of civilian employees realistically able to telework on a regular, recurring basis.

Sub-Goal 3.4 – Employee Air Travel

Greenhouse gas emissions due to business air travel by DoD employees declined by 27.5% from the FY 2011 baseline. In addition to Component-specific policies, the Services and other DoD Components are reducing emissions in part by following the Track Four Efficiency Initiatives Decisions issued on 14 March 2011 by the Secretary of Defense. The directive mandates that all travel requests justify why alternate means, such as video teleconferencing or other web-based communication, are not sufficient to accomplish the objectives of the proposed travel. Continued fiscal restrictions also contributed to the decline.

GOAL 4 – DoD Climate Change Vulnerability Assessed and Resiliency Improved

As required by EO 13653, DoD completed a review of the 2012 DoD Climate Change Adaptation Roadmap and concluded that a full re-write was in order, to address both the additional requirements of the EO and the evolving status of climate change adaptation efforts across the Department. The new Roadmap is provided in Appendix C.

DoD has developed a web-based survey tool for installations to establish a screening-level baseline of current vulnerabilities to impacts associated with climate change. In the fall of 2013, DoD pilot tested the survey tool at ten installations selected by the Services. After evaluating the results and making minor corrections to the survey tool and the web-based process used for distribution, the second phase of the survey was sent by the Services to approximately 700 sites located in coastal or tidally influenced areas. The Department expects the results of this phase to be complete in June 2014, and it will initiate surveys of the remaining 6,000+ sites in late FY 2014. (DoD identified the sites by their Real Property Identification Number, and the set includes some that are infrequently staffed or unattended.) Information gleaned from these surveys will be provided to the Services for their use in identifying additional, more detailed requirements for assessing vulnerabilities to climate change.

To assist in fully integrating the considerations of a changing climate throughout the policies, programs, and activities of the Department, DoD conducted a review of all DoD-level publications and issuances. Of these, DoD identified 58 documents for thorough review, and 29 of these were identified for updating with language that incorporates climate change considerations. The Department will incorporate the updates as part of its routine review and updating of publications, and it expects the updates to be completed by 2018. In addition to existing documentation, DoD has identified gaps in guidance where new policy should be created to address climate change related impacts. In November 2013, DoD issued [DoD Manual 4715.03](#),

Army Climate Change Vulnerability Assessment

The Army completed an Army-wide High-Level Climate Change Vulnerability Assessment in 2013, and publically released the assessment in January 2014. The assessment identified potential regional vulnerabilities to mission activities, infrastructure, and training lands and ranges, and was compiled using the regional climate scenarios from the draft National Climate Assessment. The Army continued developing a framework in FY 2013 to address climate change vulnerabilities and potential adaptation needs at Army installations. The framework is designed to incorporate climate change considerations into existing Army plans and planning processes, rather than creating a separate climate change adaptation plan. The Army mapped the draft framework for four primary installation-level plans: Installation Strategic Plans, Real Property Master Plans, Range Complex Master Plans, and Integrated Natural Resource Management Plans. The Army piloted the framework at two installations in FY 2013 (Fort Huachuca, AZ, and Fort Benning, GA), and it will use the pilot results to refine and finalize the framework in FY 2014.

Integrated Natural Resources Management Plan Implementation Manual, that specifies how climate change will be considered and documented for natural resources. In January 2014, DoD issued a Floodplain Management Policy Memorandum to ensure that adequate measures to plan and prepare for flooding and inundation are taken.

Sub-Goal 5.1 - The Use of Paper

As of the end of FY 2013, DON (covering the Navy and Marine Corps) and the Air Force had issued and are implementing policy to reduce the use of printing paper, along with six other DoD Components: DLA, DIA, MDA, NGA, NRO, and the Defense Health Agency (formerly the Tricare Management Activity). These Components comprise 58% of all DoD employees, exceeding the 55% target for FY 2013.

DLA Document Services remains committed to reducing the use of printing paper throughout the Department, continuing its aggressive promotion of proven approaches that shift DoD employees away from wasteful printing practices: duplex printing, scanning and conversion, electronic document management, print on demand, and distribute and print. As shown in Figure 8, DLA Document Services has continued to drive down the number of hard copy impressions it has made, with a 22% decrease in FY 2013 compared to FY 2012, and more than 42% from FY 2010.

Benefits of Paper Reduction Quickly Pay for the Transition

DLA Document Services has repeatedly found that the upfront costs to shift to new document handling processes should not be the deterrent they often are. Implementing a digital conversion and storage capability generates significant savings that readily surpass the initial costs to make the transition.

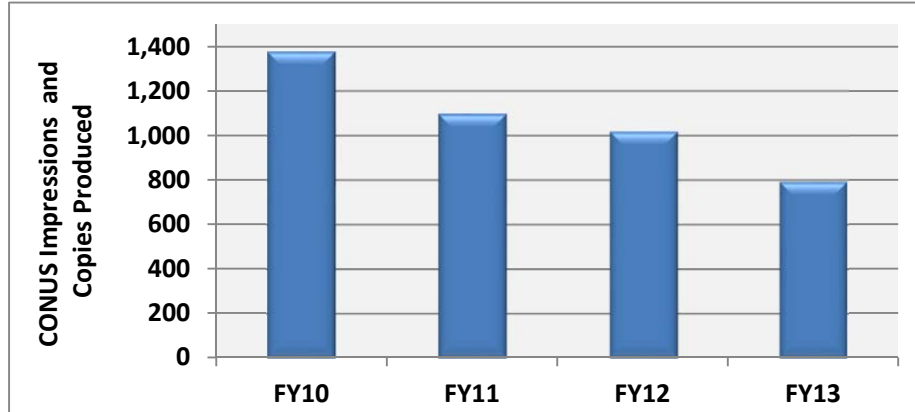


Figure 8. Number of Copies and Impressions Produced by DLA Document Services Since FY 2010 (contiguous United States)

The specific practices put into place by DLA Document Services are as follows:

1. **Duplex Printing.** DLA Document Services increased the number of multi-functional devices it maintains by 3,000 in FY 2013 compared to FY 2012, and it directs that all devices are set to default to duplex printing. DLA estimates that this default saves approximately 1 billion sheets of paper annually across DoD.
2. **Print on Demand.** Print on Demand is “print what you need, as you need it” output. Print on Demand output totaled 794 million pages in FY 2013, printing 226 million fewer pages than in FY 2012. The approach also saves warehousing costs.

3. **Scanning and Conversion.** DLA Document Services converted an additional 25.1 million of hard copy images to digital form in FY 2013.
4. **Electronic Document Management.** DLA Document Services provides digital storage of original digital documents and the storage of documents scanned and converted at its field locations. In FY 2013, the service added 18 million pages to digital storage, bringing the total number of stored digital pages to 430 million. Assuming all pages would have been printed double-sided, this prevented 215 million sheets of paper from being printed and stored.
5. **Distribute and Print.** The Distribute and Print approach prints exactly what is required at a given time by distributing document files electronically and printing to the DLA Document Services at locations closest to the end user, which virtually eliminates the historical over-ordering of publications, estimated at approximately 10%. This approach saves DoD shipping costs, warehousing costs, and millions of sheets of paper, as un-needed publications originally ordered to ensure sufficient quantities are disposed.

The largest Distribute and Print program is for the Air Force Materiel Command, to shift from paper manuals to electronic technical orders. The Air Force and DLA worked together on the transition, with DLA Document Services centralizing, standardizing, and simplifying the paper reproduction and distribution process, and the Air Force Materiel Command focusing on the transition to electronic technical orders. In FY 2013, 1.4 million fewer images were printed compared to FY 2012.



Photo: U.S. Air Force

Computerized Air Force technical orders replace bulky paper manuals at Edwards AFB, CA

In FY 2013, the Air Force continued its efforts to move away from a traditional paper-based flight publication system to an electronically-based system by evaluating the business case for the switch. The electronic flight bag is an electronic information management device that helps flight crews perform flight management tasks more effectively and efficiently with less paper. The approach is intended to:

- reduce or replace reams of paper-based reference material found in the aircrew's carry-on flight bag, which will significantly reduce weight carried onto the aircraft;
- facilitate access to information; and
- host software applications to automate functions normally conducted by hand, such as performance take-off calculations.

The Air Force estimated that the electronic flight bag will generate annual savings of \$772,000 in fuel costs due to weight reduction, \$1.77 million in the costs to print AFIs and flight manuals, and \$3.28 million to print NGA navigational charts.

In April 2009, DON had issued policy that included a requirement that double-sided printing be the default setting on all duplication equipment with that capability. In FY 2013, the DON Chief Information Officer strengthened DON policy on paper reduction by instituting a department-wide [policy](#) on 25 January 2013 titled "Mandatory Guidance Regarding Management of Department of the Navy Copiers, Printers, Fax Machines, Scanners, and Multifunction Devices" to comprehensively manage print devices and paper usage. The initiative was developed with a business case analysis vetted by stakeholders for over eight months, and it was tested with a pilot program run by the DON Secretariat. The pilot reduced the number of print devices (copiers, printers, fax machines,

scanners and multifunction devices) by 68% and is projected to save \$1.64 million per year. The Navy expects the new policy to translate into significant savings. It estimates that simply managing the settings on multi-function devices properly – such as printing on both sides of the paper, using black/grey scale ink and draft print quality, and optimizing power management – is estimated to save \$29 per employee per year. This policy is the cornerstone of the DON Print Management Initiative, and is expected to achieve savings of \$60 million per year when fully implemented in FY 2019.

Army Hospitals Save Money by Replacing Outdated Printers

The U.S. Army Medical Command set its newer printers to default to duplex printing and replaced its older printers with new duplex-capable printers at its hospitals. At the smaller hospitals, the estimated cost for the replacement is \$38,500, with a payback period of only six months. At each large hospital, the replacements are estimated to total \$350,000, with a payback period of two years.

The Army has not yet issued department-wide policy to reduce the use of printing paper. However, it has implemented digital staff action systems and electronic filing systems to improve the control of records and reduce the use of paper. The Army worked with DLA Document Services on plans to convert 11.5 million pages of hardcopy detainee records into digital documents. DLA expects the process to take over two years to complete, but once done it will save the Army millions of square feet of

warehouse space while streamlining record-keeping and saving thousands of labor hours each year performing search and retrieval. Additionally, most Army organizations have replaced their older printers with newer energy-efficient models capable of setting duplex printing as the default. Some Army organizations are also following the GSA PrintWise guidelines.

MDA issued policy in 2010 in the form of MDA Directive 8400.1, *Sustainable Electronics Management Program*, which included a mandate for all printer and copiers to be set to duplex printing by default. Since then, the agency's toner costs have dropped from \$6 million in FY 2011 to \$4 million in FY 2013, and the agency purchased 27% less paper in FY 2013 than it did in FY 2011. NRO now requires that all print jobs be double-sided unless otherwise approved, and its Sustainability Working Group recommended the use of the Century Gothic font to reduce the use of toner cartridges by 25%. DIA implemented an electronic timekeeping system in FY 2013, eliminating the need for printed timesheets and leave forms, saving an estimated 500,000 sheets of paper per year, as well as the electricity, printer toner, storage and other labor requirements needed to print and store these forms. NGA implemented policies on duplex printing and toner recycling in FY 2013, and built electronic faxing capability into employee workstations, reducing the use of fax paper and the electrical loads created by independent fax machines. Also in FY 2013, NGA used an Enterprise Print Management Software program to track the magnitude and frequency of printing and copying throughout the building. This enables NGA to pin point locations in the building with the greatest activity. The software can also deny print jobs for various reasons, such as job size.

Sub-Goals 5.2 and 5.3 – Solid Waste Diversion

The Department met its 46% FY 2013 target for diverting non-hazardous solid waste from disposal. For construction and demolition (C&D) debris, the 73% diversion from disposal well exceeded the 56% target. The extent to which the Military Services and DLA diverted solid waste from disposal is compiled in Table 4. For non-hazardous waste, all of these Components achieved or exceeded the target diversion rate of 46% except the Army. Compared to FY 2012, however, the Army did reduce the total amount of solid waste generated in FY 2013 by more than 11%, while reducing its per capita waste generation by 12.5%. All Components surpassed even the FY 2015 target for the diversion of C&D debris from disposal.

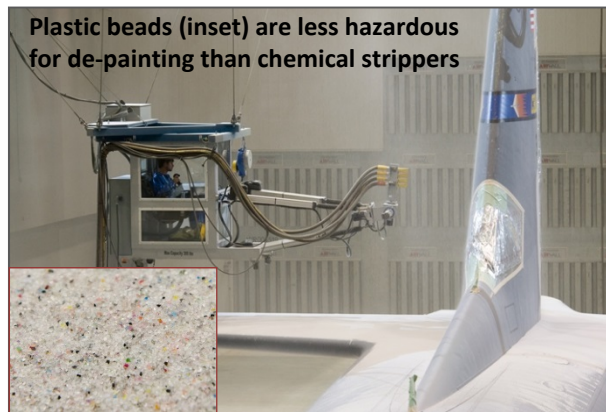
Table 4. Percent Solid Waste Diverted from Disposal in FY 2013

Component	Non-Hazardous Municipal	C&D Debris
USN	48%	75%
USMC	49%	72%
USAF	46%	67%
Army	43%	75%
DLA	55%	91%
DoD-wide	46%	73%
FY 13 Target	46%	56%
FY15 Target	50%	60%

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

For the CY 2012 reporting year under the Toxics Release Inventory (TRI), DoD reduced the quantity of toxic chemicals released into the environment and transferred off-site by 23.4% relative to the CY 2006 base year. In FY 2013, the Department amended the hexavalent chromium rule in the Defense Federal Acquisition Regulation Supplement to better capture its application to legacy systems. DoD also updated and re-issued the 2009 DoDI on [Emerging Contaminants](#).

In FY 2013, DoD completed its development of an alternative corrosion-resistant coating for the F-35 Joint Strike Fighter that replaces the traditional two-layer system that contained hexavalent chromium. The successful testing and evaluation of the coating system was spearheaded in FY 2013 by the Air Force Life Cycle Management Center F-35 environment, safety, and occupational health support team. The new coating, called the Alternative Outer Mold Line, significantly decreases overall aircraft weight, translating to reduced fuel consumption and lower aircraft emissions during flight. It is also more durable than the traditional coating system. The traditional aircraft coating system could require scuff sanding and repaint after two to three years of use. The new coating is projected to extend the refresh cycle to approximately every seven years, which will cut the paint/de-paint waste stream by over 50% and result in vastly reduced hazardous waste, volatile organic compounds (VOCs), hazardous air pollutants, maintenance crew labor hours, and aircraft downtime over the aircraft's life cycle. It also reduces reliance on personal protective equipment and lessens environmental, safety, and occupational health impacts. The F35 Environment, Safety, and Occupational Health Support Team won the 2014 Secretary of Defense Acquisition Environmental Award for this work.



HIGHLIGHTS

Sub-Goals 5.2 and 5.3: Selected DoD Success Stories on Diverting Solid Waste from Disposal

Recycling Revenue at Marine Corps Base (MCB) Camp Lejeune

Solid waste management by the Qualified Recycling Program at MCB Camp Lejeune diverted almost 58% of the waste stream from disposal. The program included a recycling pilot at the French Creek Barracks, which collected 23.8 tons of recyclables in the first eight months of implementation. FY 2013 benefits included:

- \$2.7 million in revenue;
- more than \$1.5 million avoided in landfilling fees, despite a 46% increase in population; and
- over 17,600 pounds of electronics collected in FY 2012 and FY 2013.

Reusing Concrete and Asphalt Saves Money at JB Lewis-McChord

The Army's most successful C&D diversion program, called Earthworks, is at JB Lewis-McChord, WA. The base collects and stockpiles waste concrete and asphalt generated from in-house projects, and then reclaims the material to provide high-quality aggregate that meets the specifications of the Washington Department of Transportation. Concrete and asphalt accounted for 57% of Earthwork's total recycling stream in FY 2013. The aggregate is used for on-post projects, eliminating the cost of transporting and disposing of the material off-site, and it reduces the need to purchase new crushed rock and aggregate, which is generally more than twice the cost of recycled material.

NGA Generates Revenue from Classified Waste

NGA destroys its classified paper waste using a disintegrator that creates recyclable paper products similar to an oval hockey puck, which the agency sells for revenue. The disintegrator is emissions-free and eliminates the need to pay for the destruction of classified waste.

Camp Lejeune Sells Crushed Demolition Concrete

Faced with a large quantity of concrete generated by demolition projects, MCB Camp Lejeune hired a contractor to crush the concrete at the Base's Transfer and Treatment Facility. The project recycled 21,977 tons of crushed concrete and generated \$29,000 in revenue for the product.

Naval Weapon Station Earle Recycles Hurricane-Damaged Pipes at No Cost

When Hurricane Sandy caused extensive damage to Naval Weapon Station Earle's waterfront, including three to four miles of 10-inch sewer pipe and three to four miles of 14-inch water pipe, NAVFAC Mid-Atlantic worked with a local recycling vendor to remove the foam from the pipes and recycle the remaining plastic and metal. The project was conducted at no cost to the Navy and 81% of the total material was diverted from disposal.

Recycling and Reuse Generates Revenue at MCAS Cherry Point

Solid waste management at MCAS Cherry Point yielded \$2.83 million during FY 2012 and 2013:

- The Qualified Recycling Program recycled 7,138,284 pounds and earned over \$487,000.
- Reusing 90,000 gallons of used oil avoided the expenditure of \$337,500 in virgin fuel for the Central Heating Plant.
- Reissuing hazardous materials avoided \$548,211 in costs.
- 182 tons of sensitive Personally Identifiable Information documents were shredded on-site, with all material recycled, avoiding \$27,285 in disposal costs.

Eglin AFB Recycling Saves Money While Reducing Waste

Eglin AFB, FL, diverted 65% of its potential solid waste from disposal in FY 2013. Eglin's Qualified Recycling Program achieved this using no appropriated funds while earning proceeds of over \$100,000 and reducing the installation's waste disposal costs by more than \$3 million. This was possible through reuse, recycling and mulching initiatives that included:

- collecting more than 2,000 tons of recyclable material from the 1,055 collection points in Eglin's 387 facilities to return \$83,000 to the installation;
- converting 40 tons of waste cooking oil into a usable fuel source; and
- using 200,000 tons of invasive vegetation as a biofuel source.

In the CY 2012 reporting period, Navy releases under TRI were 37% higher than the CY 2006 baseline. However, the Navy reduced its total releases under TRI by 24% in the CY 2012 reporting period from the prior CY, a success made possible by a number of initiatives the Navy has

Marine Corps Base Recycles Toluene

MCLB Albany reduced its release and off-site transfer of toluene in FY 2013 below the TRI reporting threshold. This was possible because the installation began cleaning used toluene after use, via distillation, so it can repeatedly reuse the solvent.

implemented in recent years. These include pollution prevention technologies, process changes in production shops, and the reduced use of hazardous materials. The Navy continually invests in new, environmentally friendly processes and materials. Nitrate compounds remain the largest single source of Navy releases, approximately 58% of the annual total, due to the byproducts of secondary treatment processes at wastewater treatment plants that remove

ammonia from the wastewater. The Navy is continuing to upgrade its wastewater treatment plants to meet increasingly stringent National Pollutant Discharge Elimination System permit requirements nationwide, which will have a positive effect on nitrate releases. 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. This greatly reduces the amount of hazardous waste generated due to shelf-life expiration, as well as simplifying Navy operations by reducing the amount of hazardous materials owned by the Navy.

The Marine Corps has continued the downward trend of its TRI releases and off-site transfers, which have continued to decline every year since the CY 2006 baseline. In FY 2013, the Marines reduced the amount of toxic chemicals reported under TRI by almost 40% since the base year, and 5.7% since FY 2012.

The Army made substantial progress in the CY 2012 reporting period. Some of this accomplishment came from the Army's continued success in all but eliminating the use of methylene chloride (for stripping paint) and trichloroethylene (for cleaning gun tubes and other system components). Anniston Army Depot, which accounts for the vast majority of the Army's total use of these chemicals, has made tremendous progress identifying less harmful alternatives. In CY 2012, Anniston reduced its use of methylene chloride to below EPA's TRI reporting threshold of 10,000 pounds, for a cumulative 96% reduction, by replacing over time paint strippers containing methylene chloride with an approved alternative containing none of the chemical. Anniston's cumulative use of trichloroethylene had been reduced 91.3% by the end of CY 2012, by modifying processes and identifying and

Air Force partners with U.S. Fish and Wildlife Service to Eliminate Rats on Wake Island

Wake Island, an Air Force airfield in the central tropical Pacific Ocean, has two species of invasive rats—*Rattus exulans* and *Rattus tanezumi*—that have directly impacted the mission by twice chewing through belts attached to the runway's barrier cable required for safe operation of fighter aircraft. They have also been devastating populations of migratory ground nesting birds on the island, and posing hazards to human health by entering cooking facilities and living areas.

When long attempts at traditional baiting and trapping proved ineffective, DoD-certified Air Force entomologists visited Wake Island in March 2013, to develop Integrated Pest Management strategies for long-term rodent control on the island. Working with the U.S. Fish and Wildlife Service, the solution selected was the aerial application of a rodenticide, a specific Island Conservation formulation of brodifacoum. This formulation has been used successfully on other islands, including the Galapagos Islands with their fragile and unique ecosystem. The team went to great lengths to prevent accidental poisoning of wildlife, verifying their safety through initial surveys followed by post-application monitoring. The effort worked as planned, with the population of *Rattus exulans* decreased up to 99% from the previous year and *Rattus tanezumi* possibly eradicated.

adopting alternative cleaning technologies and substances.

The majority of Air Force releases under TRI (80%) come from three sources: two coal-fired heat plants (28%), the maintenance of aircraft depots (39%), and fuel transfer operations (14%). In FY 2013, the Air Force initiated the process of replacing a coal-fired boiler at Wright-Patterson AFB, which it expects will reduce TRI releases by approximately 90,000 pounds. The Air Force continues to use its hazardous material management process to minimize the use of toxic chemicals to the least hazardous material capable of meeting mission requirements. It is also in the process of implementing activities to reduce the use of dichloromethane and chromium at depot industrial operations.

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 by EPA in FY 2013 was 99.6%. Due to constant turnover in personnel, the Department is unlikely to achieve a 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 federal, state, and local laws. The percentage of installations having approved and updated IPMPs was 90.9% in FY 2013.

Sub-Goal 7.1 – Procuring Sustainable Goods and Services

The Department continued its work to develop a DoD Instruction on Sustainable Procurement in FY 2013. Sufficient automated systems are not yet in place to enable DoD to accurately report the extent of sustainable procurement. Meanwhile, the Department manually reviewed 2,193 contract actions from FY 2013 with values over \$3,000 for their compliance with sustainable procurement requirements. The review found 98% of them to be in compliance. The review process included contracts from the Military Services, DLA, MDA, the Defense Commissary Agency, Defense Contract Management Agency, Defense Finance and Accounting Services, NGA, NSA, Defense Health Agency, and Washington Headquarters Service. The applicable sustainability categories examined were: EPA Designated Recycled Content; ENERGY STAR- or FEMP-designated energy-efficient products; products designated by the U.S. Department of Agriculture as biobased; products that are environmentally preferable, registered with the Electronic Product Environmental Assessment Tool (EPEAT), comply with WaterSense® or are otherwise water-efficient; reduced ozone-depleting substances; and non- or low-toxic or hazardous constituents.

The Department developed the DoD Sustainable Products Center in FY 2013, and launched it in March 2014 on <https://www.denix.osd.mil/spc/>. The web site is a repository of information on sustainable products and their performance, and serves as a forum for DoD personnel to submit questions regarding sustainable procurement and to share success stories. The Sustainable Products Center also posts the results of pilot demonstrations DoD conducted at military installations in FY 2013, to demonstrate and field test alternative green products and services. DoD used the demonstrations to collect field-level user requirements on military installations for sustainable products, and to plan subsequent demonstrations. An example is a several week demonstration of compostable food service items in troop dining facilities and on-post hospital cafeterias. Diners were asked to provide feedback on the items, and were given promotional material highlighting their sustainable aspects.

Also in FY 2013, DoD updated language in Military Standard 961, "Defense and Program-Unique Specifications Format and Content," to incorporate sustainable procurement requirements and put greater emphasis on requirements for environmentally preferable and biobased products in Military Specifications. DoD issued the update in January 2014. Under the Defense Standardization Program coverage document review program, in which documents must be reviewed every five years, DoD reviewed 5,436 military and federal specifications, standards, handbooks, and commercial item descriptions in CY 2013. Part of this process was to evaluate whether revisions need to be made to incorporate sustainability considerations. For example, the CY 2013 review identified 170 documents as having the potential for revisions pertaining to biobased materials, and so far DoD has revised 16 of these. One example of such a revision occurred in July 2013, when the Department revised the requirements for the military specification for jet fuel, using the expertise of the Naval Air Systems Command Fuels and Lubricants team. JP-5 is a unique jet propellant fuel consisting of a complex mixture of hydrocarbons that – due to shipboard safety requirements – is required to have a substantially higher flash point than commercial aviation turbine fuels. The revised specification now allows the JP-5 fuel mixture to include hydrocarbons synthesized from vegetable oils and animal fats. The new fuel has been tested and approved for use on Navy aircraft.

In FY 2013, DLA continued to research the possibility of modifying the EProcurement contract writing system used by the agency to give it the ability to track or measure compliance with environmental regulations. Also, the DLA Procurement Management Review Program Manager decided to add green procurement as a special interest area or focus area for procurement reviews, including changes to sustainability reporting and documentation requirements. During the FY, DLA researched possible replacement products for various non-green products being procured by DLA. Examples included nickel cadmium batteries, biodegradable cutlery, non-mercury thermometers for the medical supply chain, and items free of hexavalent chromium.

The Navy continues to actively integrate sustainability considerations into purchasing by keeping the "Buy It Green" Guide up to date. The "Buy it Green" Guide is focused on the needs of purchasing card holders and contains Green Procurement requirements, customized ordering instructions for DLA and GSA purchasing sites, and an updated consolidated list of products that meet the goals of the Green Procurement initiatives. The Navy updated the guide in 2013 to incorporate user feedback and update product listings. The "Buy it Green" guide and related materials are available via this web site: https://www.navsup.navy.mil/ccpmd/purchase_card/buy_green, which also includes training tutorials called "Knowledge Nuggets" that the Navy developed targeting purchase card holders. New in FY 2013, the Navy developed the "Contract It Green" Guide to support the specialized needs of the Navy contracting community. "Contract It Green" contains green contracting requirements, examples of applicable contracts with the relevant Federal Acquisition Regulation (FAR) clauses, and example Statement of Work language to meet the goals of sustainable procurement.

The Weapon Systems Support activity of the Naval Supply Systems Command, in partnership with the Defense Packaging Policy Group, continued to lead a joint working group focused on incorporating sustainability into military and commercial packaging, and standardizing it. This includes increasing recyclable and biobased content of boxes, wrapping, and paper materials used for packaging, as well as visually marking materials suitable for curbside recycling. Packaging materials account for a significant portion of ashore and afloat solid waste. Once finalized, these requirements will be incorporated into contractual requirements and the packaging material specifications of DoD and the American Society for Testing and Materials.

The Air Force is vigilant in ensuring that sustainability principles are put into practice in contract actions. Some examples of this during FY 2013 were:

- including a contract requirement for the repair of an installation parking lot for all of the existing asphalt to either be reused as part of the base project, or be sent to the asphalt batching plant to be recycled into new asphalt;
- ensuring that requirements for environmentally preferred products flow down to prime and sub-contractors;
- requiring minimum recycled material content in a steel ceiling suspension system;
- requiring the use of composite decking produced from recycled material; and
- retro-re-commissioning HVAC units in remodeled buildings to ensure the system is “right-sized” and operates efficiently.

The Army completed the development of two-page Quick Guides in FY 2013, which summarize applicable sustainable procurement requirements for several common installation-level activities (such as food service, motor pools, building operation and maintenance, and administrative offices). The Quick Guides also include sources for ordering relevant sustainable products, such as [EMALL](#) and [GSA Advantage](#). The Guides are intended for use by the requirements generator as well as the purchasing and contracting offices. The FY 2013 update of the Army’s sustainable design and development policy includes a new paragraph that requires all new construction and major renovation contracts to include clauses requiring compliance with applicable sustainable procurement requirements (e.g., biobased, energy efficient, water efficient, recycled content). The paragraph also requires contracting officers to report these clauses in the Federal Procurement Data System.

MDA issued a Green Procurement and Sustainable Acquisition Instruction in FY 2013 that requires MDA personnel to integrate sustainability in all procurement actions, to the maximum extent feasible. The Instruction also requires all personnel involved in acquisition and procurement, including holders of government purchase cards, to complete MDA’s Green Procurement training class. MDA reinvigorated the Green Procurement sub-working group under its Sustainability Integrated Project Team, and is planning to integrate and implement sustainable procurement requirements throughout the acquisition process. DIA implemented its Contract Management System Release 8.12 in FY 2013. The system has the capability to indicate procurement of sustainable products or services on award contract line item numbers.

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

Of all covered DoD electronics acquisitions in FY 2013, an estimated 99.9% were registered with EPEAT. The Department handles the disposition of all of its excess or surplus electronic products in an environmentally sound manner. The vast majority of DoD electronics equipment at the end of its useful life passes through DLA Disposition Services, which has long had a rigorous system in place to ensure the environmentally sound disposition of electronics.

Power management on computing equipment is a high priority for the Army because IT is the second largest



Photo: U.S. Army

Electronic waste recycling event at Fort Rucker, AL

consumer of energy in the Army office environment. Therefore, the Army Chief Information Officer conducted a systematic review and update in FY 2013 for all relevant Army IT regulations, policies, and directives to clearly define Army-wide IT energy savings standards. This effort culminated in the establishment of prescribed times for IT devices to enter power savings mode: 30 minutes for computers, laptops, and peripheral equipment, and 15 minutes for monitors. These standards were adopted and published in updates to Army Regulation 25-1, *Army Information Technology*, and Department of Army Pamphlet 25-1-1, *Army Information Technology Implementation Instructions*, which were both published on 25 June 2013. The Army's Network Enterprise Technology Command developed a power management solution application for workstations that intelligently coordinates the timing of workstation patching to minimize both its impact on users, and powered-on time required to support patching. The solution also extends the inactivity "sleep" timer during work hours, minimizes Network Enterprise Center support requirements for low power mode capability, and prevents the waste of energy that occurs when workstations get stuck at the BitLocker pre-boot prompt for a personal identification number.

Efforts continue across the Department to improve the energy efficiency of data centers. The Marine Corps completed its effort on the Federal Data Center Consolidation Initiative by reducing the number of its data centers from 33 to 11, and the remaining data centers are lean due to the Marine Corps reorganizational approach. DIA improved the power use efficiency of several data centers in its inventory in FY 2013, including the addition of a floor to ceiling containment in its main data center to prevent air from mixing between the hot and cold aisles. So far, DIA has reduced its data center servers by almost 4000 through virtualization and consolidation, reducing the agency's power requirements by approximately 2.4 MW. NRO increased the efficiency of its data centers in FY 2013 by: raising the set point for its computer room air conditioners by two degrees; shutting down half of the computer room air conditioners in some data centers; renovating an older data center, including curtained hot-cold aisles; and reducing under-floor pressure in four data centers, cutting in half the cost to run air handling units in those facilities. NGA has adopted server virtualization and largely completed a migration from desktop computers to thin clients.

Sub-Goal 7.3 – High Performance, Sustainable Buildings

Of the 45,614 buildings in the DoD inventory with areas greater than 5,000 GSF, 401 of them (or 0.9%) met the criteria of the [Guiding Principles of Federal Leadership in High Performance and Sustainable Buildings](#) (hereafter referred to as the Guiding Principles) as of FY 2013. In terms of building area, 1.1% of total area conformed to the Guiding Principles. While the portion meeting the Guiding Principles criteria is still small, Figure 9 illustrates a nearly ten-fold increase in just three years, while at the same time DoD has been increasing the efficiency of its facility operations by shrinking the square footage of its inventory.

In November 2013, AT&L(I&E) issued a policy memorandum titled "[Department of Defense Sustainable Buildings Policy](#)", an update to the October 2010 version. The document states that it is DoD policy to site, design, build, operate, maintain, re-use, and demolish facilities in a sustainable manner that minimizes the resources they consume, maximizes the benefits they provide, and minimizes the wastes they generate. It further cites the March 2013 UFC 1-200-02, [High Performance and Sustainable Building Requirements](#), as the minimum requirements for the planning, design, construction, renovation, repair, maintenance, and operation of new and existing DoD facilities. The UFC states that the minimum requirements for new construction and major renovations are to comply with the Guiding Principles and to achieve at least a LEED Silver rating or its equivalent.

HIGHLIGHTS

Sub-Goal 7.3: Selected DoD Success Stories with High Performance Sustainable Buildings: Reducing Fossil Fuel Intensity

Marine Corps Support Facility Blount Island Decreases Energy by 58%

Marine Corps Support Facility Blount Island, FL, implemented a suite of measures in FY 2012 and FY 2013 that slashed fossil fuel consumption to an energy intensity of 21.6 kBtu/ft², 58% less than the FY 2003 baseline. The savings were generated by:

- installing efficient lighting with photo sensors in the base's largest industrial building;
- upgrading the energy management system, including demand-controlled ventilation;
- adding insulation to the spring shelter buildings;
- installing light colored roofs that reduce cooling loads; and
- installing PV panels and domestic hot water.

Energy Intensity Halved at New Air Force Building

Seymour Johnson AFB, NC, consolidated four buildings into one new LEED Gold facility that has half the energy intensity, just 43 kBtu/ft². The project is saving the base 2,862 million Btu and \$55,000 every year. At the heart of the efficiency is a Variable Refrigerant Flow HVAC system that precisely regulates refrigerant flow to various zones, maximizing system efficiency regardless of building load and climate. The building also has an efficient thermal envelope and high efficiency interior and exterior lighting. Overall energy use and lighting power density are 30.9% and 20% below ASHRAE 90.1-2004, respectively. On the water side, potable water use has been halved thanks to low-flow sinks, urinals and toilets, and dual flush toilets. The site was previously a wastewater treatment plant. The Consolidated Support Center is 43,100 square feet and accommodates 13,000 people.



LEED Gold Consolidated Support Center,
Seymour Johnson AFB, NC

Energy Reduced 44% with New Goodfellow AFB Roofing System

A roofing retrofit for the Security Force building at Goodfellow AFB reduced energy use by an estimated 44%. Informed by an evaluation of the roof system and potential retrofit options by the Environmental Security Technology Certification Program (ESTCP), the base implemented a metal-over-metal retrofit that integrates cool roofing, solar power generation, solar thermal, above sheathing ventilation, and rainwater catchment. The roofing technology consists of:

- purlins installed over the existing metal roof to configure the solar thermal system tubing in a way that allows for convective cooling to take place from the eave to the roof ridge;
- an integrated solar thermal system using a closed-loop tubing array with a water/glycol mix heat exchange medium over the radiant barrier to optimize heat transfer;
- rigid insulation board;
- a waterproof roof underlayment and radiant barrier over the insulation board;
- panels of metal roofing, painted with a cooling coating, laminated with a thin-film PV system and installed over the solar thermal system;
- a rainwater catchment system that drains into a 10,000 gallon tank that is completely filled by two inches of rainfall, available for irrigation purposes.



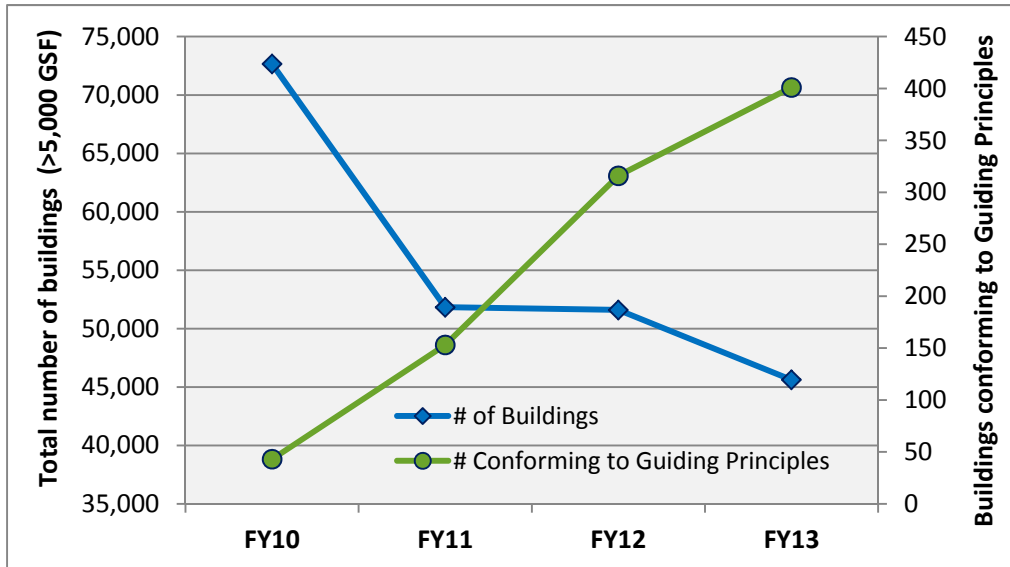


Figure 9. DoD Building Inventory Shrinking while Number Conforming to the Guiding Principles Grows

Also, to emphasize the importance of energy and water resources, no fewer than 40% of the certification points must be related to energy and water conservation.

After UFC 1-200-02 was issued, the Army updated its Sustainable Design and Development policy to incorporate the new UFC as well as the May 2012 UFC 2-100-01 ([Installation Master Planning](#)) and the updated ASHRAE 189.1-2011. The Army issued the updated policy in December 2013. It requires total building commissioning, which the Army will use to benchmark whether high performance milestones from capital investments are realized. In April 2013, the Army issued policy guidance to update its installation real property master plans in accordance with UFC 2-100-01. Also in FY 2013, the Army developed guidance on how to code all LEED-accredited new construction and major renovation projects into the DoD Real Property Assets Database. The Army continued its collaboration with GSA's high-performance sustainable buildings programs in FY 2013. GSA is working with Fort Carson, CO on a multi-year effort to document energy and water use at conventional buildings versus high-performance buildings, and to assess methods for changing the behavior of building occupants.

The Air Force updated its MILCON Sustainability Requirements Scorecard in FY 2013 to include the requirements of UFC 1-200-02, and provided training for program managers on the application of UFC 1-200-02 to new MILCON construction projects. NSA added an expansive new green roof to its existing one in FY 2013. The roof spans the courtyard in between the NSA HQ and Operations buildings.

Another useful indicator of high performance sustainable buildings in DoD is the LEED rating system of the U.S. Green Building Council. All new DoD construction and major renovations projects are required to be certified to at least a LEED Silver level, and DoD is increasingly attaining higher levels of certification. During FY 2013, 21 new Navy buildings were certified by LEED at a

HIGHLIGHTS

Sub-Goal 7.3: Selected DoD Success Stories with High Performance Sustainable Buildings: LEED Platinum Buildings

LEED Platinum Facility at the Colorado Army National Guard

The Colorado Army National Guard's new Windsor Readiness Center received a LEED-Platinum rating in FY 2013. Home to the 1157th Forward Support Company of the 1st Battalion, 157th Infantry Regiment, the 30,715 square foot facility boasts a host of sustainability features:

- a building orientation to minimize energy consumption;
- day-lighting and views throughout the building;
- high-performance building envelope;
- an HVAC system with ground-source heat exchange;
- materials that are recycled, reclaimed and/or regional, low in VOCs, and (for wood) certified by the Forest Stewardship Council;
- operable windows and individual control of lighting and HVAC;
- low and ultra-low flow plumbing fixtures estimated to use 43% less water;
- landscape design to reduce irrigation by 50%;
- PV arrays that produce 63,000 kWh annually

The facility was designed to use 70% less energy compared to ASHRAE 90.1 standards. The Army had five LEED Platinum buildings as of the first quarter of 2014.

LEED Platinum Facility at the Joint Expeditionary Base, Little Creek

In October 2013, the Navy earned its 20th LEED Platinum certification, the first east of the Mississippi: Building P851 at the Joint Expeditionary Base, Little Creek, VA. The facility earned 96 out of 100 points based on sustainable development features including:

- geothermal heating and cooling system
- solar PV
- rainwater harvesting
- parking lot made of permeable pavers
- exterior light-emitting diode lighting
- recycling programs

Photo: Noah Enterprises, Inc.



LEED Platinum Facility at Fort Carson

The Fort Carson Brigade and Battalion Headquarters for the 1st Brigade Combat Team of the 4th Infantry Division was certified Platinum by the LEED rating system in early FY 2014, Fort Carson's second and the Army's fourth. The grounds have 482 kW of ground-mounted solar PV power and an efficient irrigation system. The building is equipped with a highly efficient HVAC system, water-efficient fixtures, and solar-powered hot water.



LEED Platinum Building at Fort Carson, CO

Photo: U.S. Army

level of Silver or higher: 7 Silver, 12 Gold and 2 Platinum. The Marine Corps has also been rapidly adding LEED-certified buildings, with 5 Silver and 14 Gold added to the list in FY 2013. The Army added 118 buildings certified as LEED-Silver or higher to its inventory of high-performance sustainable buildings in FY 2013: 76 Silver, 41 Gold, and one Platinum. The Air Force had three buildings certified as LEED Silver and three as LEED Gold in FY 2013. Selected success stories with LEED facilities are highlighted on the next page.

Sub-Goal 7.4 – Environmental Management Systems

The overall EMS rating for the Department was red for FY 2013, with 57% of the 351 DoD EMSs earning a green rating, 33% yellow, and 10% red. This is a significant improvement over FY 2012, which had far fewer EMSs scoring green (42%) and more scoring red (14%).

The Navy led the Services and DLA in its portion of green EMSs, with 73%. This achievement represents an appreciable improvement over FY 2012, when only 45% of the Navy's EMSs scored green. The increase was the result of a renewed effort by the Navy to re-declare conformance with International Organization for Standardization 14001, *Environmental Management Systems*, and to resolve any major findings of external audits to meet this goal on a three-year cycle. EMS integrated audits are a primary means to improving management systems and compliance oversight, and for tracking corrective actions to address the root cause of any deficiencies and prevent future occurrences. In the Marine Corps, of 22 EMSs, 59% scored green. HQ Marine Corps completed four EMS Lead Auditing Training courses across their Installation Commands in FY 2013. It also incorporated into the auditing tool an automatic linkage between compliance findings and their EMS element root cause, allowing HQ Marine Corps to identify systemic EMS issues, both within installations and across the Marine Corps.

The Air Force had 55% of its EMSs score green in FY 2013. Combined with the low percentage of red EMSs (8%), the Air Force earned a department-wide score of yellow. In FY 2013, the AFCEC Environmental Center of Excellence developed and fielded a single, standardized Air Force EMS and EMS document control system. This laid the foundation for transforming the processes used by the Center of Excellence to manage the centralized Environmental Portfolio. The Center reviewed each installation-specific EMS to select best practices, and modified or developed remaining EMS elements. It also developed a system for documenting and reviewing EMSs.

Half of the Army EMSs scored green in FY 2013, up from previous years. However, the number of fully implemented EMSs fell significantly in FY 2013 because the Army curtailed or reduced discretionary activities, including EMS audits, in accordance with the Budget Guidance memorandum issued by the Assistant Secretary of the Army for Installations, Energy and Environment on 23 January 2013. On a positive note, the percentage of appropriate Army facilities that had established a procedure to identify appropriate contracts to include EMS requirements rose considerably in FY 2013, to 82% from 54% in FY 2012.

Of DLA's 11 EMS, 45% scored green and none were rated red. Headquarters focused in FY 2013 on improving those facilities that previously were scored red. The smaller DoD Components also have EMSs, as required by DoDI 4715.17, [*Environmental Management Systems*](#). For example, MDA has an EMS that receives a Second Party Conformance Audit every three years by the Air Force Institute of Technology and AFCEC. The EMS has passed its audit every time.

HIGHLIGHTS

Sub-Goal 7.4: Selected DoD Success Stories on Installation Environmental Management Systems

Fort Hood EMS Supports Mission Priorities

The EMS at Fort Hood, TX, is an integrated, systematic approach to supporting mission priorities, including managing any significant environmental impacts that could occur as a result of the installation's operations tempo. The EMS strives for continual improvement, with documented procedures to ensure that all personnel—Soldiers, civilians, and contractors—are able to identify any environmental vulnerabilities and evaluate approaches for improving environmental processes on the base. After becoming a Net Zero Waste pilot installation, Fort Hood updated its EMS objectives and set a stretch goal of 85% solid waste diversion by FY 2018—FY 2020.

Fort Hood's EMS achievements in FY 2013 include:

- A 20% increase in the diversion of solid waste from disposal, to a current diversion rate of 48%
- Qualified Recycling Program proceeds of over \$1.4 million, from recycling 8,448 tons
- Recycled and reissued 17,459 pounds of electronic waste and household hazardous waste
- Trained 1,109 employees via on-line EMS training
- Reduced energy consumption by 3%, resulting in a cumulative energy reduction that is 11% below the established glide path.

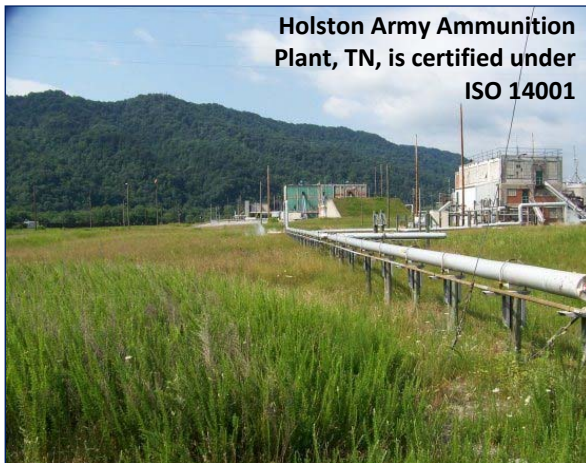
This work contributed to Fort Hood's recognition with a 2014 Secretary of Defense Environmental Award.

Award-Winning Environmental Excellence at Altus AFB

The EMS at Altus AFB is a valuable tool to help it successfully manage the full range of environmental and sustainability issues. In September 2013, Altus AFB received the Oklahoma Department of Environmental Quality Oklahoma Star Platinum award for protecting the environment and having zero compliance discrepancies. Factors for the award include energy and water consumption, solid waste management, and air emissions generated from stationary and mobile sources. This was the second time the base received the award. Additionally, the hazardous waste program at Altus AFB was recognized as the best managed federal program in the state in June 2013. The base has 17 years of inspections by state regulators with zero negative findings.

Integration Key to the Successful Island EMS at Marine Corps Support Facility (MCSF)

The foundation of the EMS approach is integration. The EMS at MCSF Blount Island, FL addresses energy and water consumption, stormwater, waste and material management, pest management, and sustainable procurement. The EMS identifies as significant the range of environmental aspects that impact sustainability, and these are included in the EMS objectives, targets and action plans. Actions in the EMS ensure that plans, procedures, training, and communication tools that address sustainability goals are updated and distributed to installation personnel. This includes a Green Procurement Plan with a user's guide for contracting and procurement, general environmental awareness training on a variety of topics, and a pamphlet on EO 13514 to raise awareness about sustainability-associated goals and how these are important for MCSF Blount Island to continue to do more with less. Audits conducted in 2012 included positive assessment concerning operations, and identified no EMS-related non-conformances. The audits cited many examples where MCSF Blount Island went above and beyond requirements applicable to conformance and compliance.



Holston Army Ammunition Plant, TN, is certified under ISO 14001

Photo: U.S. Army

Part IV: The Way Ahead

Cross-Cutting Initiatives

A number of DoD Components have policies and strategies that embrace all sub-goals of Goal 1, and sometimes of Goals 2 and 5 as well. The Army began developing a single integrated sustainability and energy strategy in FY 2014 to replace separate strategies issued in FY 2010, an effort being overseen by the Army's Senior Energy and Sustainability Council. To further integrate sustainability concepts into Army operations, the Army issued a Net Zero directive in January 2014 directing installations to strive to achieve Net Zero energy, water, and solid waste goals where fiscally responsible. The Army is now working to institutionalize the top five best practices in each category of energy, water, and waste, and it is integrating Net Zero approaches into the Army contingency basing strategy where the practices can enhance resilience and security.

The December 2013 update to the Army's sustainable design and development policy spans all elements of Goal 1: metering, Net Zero, sustainable design and development, renewable energy, and new technologies. The policy is discussed in more detail under individual sub-goals. The Army's transition of Net Zero from a pilot initiative to an Army-wide approach will continue in FY 2014, in partnership with the National Renewable Energy Laboratory and Pacific Northwest National Laboratory. The DOE laboratories will continue to support the Army's energy efficiency, renewable energy, energy security, and Net Zero Energy efforts, including support to the Army's Energy Initiatives Task Force, and technical support to implement the Net Zero Energy roadmaps at nine pilot installations.

The Marine Corp objectives around energy are to better support the mission through increased energy security and reduced energy costs. Its strategy for doing so is to make smart efficiency improvements to existing facilities, invest in energy efficient new construction, partner with private industry to develop renewable resources, and leverage the power of individual Marines. To provide a framework and direction for installation leaders and personnel to accomplish this, the Marine Corps issued its Installations Energy Strategy on 25 June 2013, which establishes the following Lines of Operation that provide a synergistic approach for effective energy management: Energy Ethos, Energy Information, Energy Efficiency, Renewable Energy and Alternative Fuels, and Energy Security. The Marine Corps will use these guiding principles going forward, directed at cost avoidance, energy security, and environmental stewardship.

The Defense Contract Management Agency (DCMA) will finalize and implement an Energy Management Policy in FY 2014 to help the agency further reduce the intensity of both its energy and water consumption.

Sub-Goal 1.1 – Facility Energy Intensity

The Military Services

Energy Efficiency Funding and Financing

The Army will aggressively pursue appropriated funds as well as alternative financing options such as ESPCs and UESCs in FY 2014. The Army anticipates the following funding levels for FY 2014:

- Utilities Modernization Funding: \$344 million for energy security and energy efficiency projects, including replacement and/or repair of power stations, installation of ground source heat pumps, and upgrades to exterior and interior lighting systems.

- ECIP: 11 projects totaling \$43.3 million.
- ESPCs: Over \$400 million is under development.
- UESCs: Approximately \$100 million is under development.

The Navy plans to invest \$1.2 billion in energy efficiency and renewable energy projects over the course of the next five years (FY 2014 – FY 2018). The investments are projected to yield 23 billion



Keeping HVAC equipment running optimally (air base in Southwest Asia)

Photo: U.S. Air Force

Btu per year in savings. To support the Secretary of the Navy goal to reduce consumption 50% by 2020, the Navy will continue to invest in facility energy management systems such as Navy Shore Geospatial Energy Module, Shore Energy Implementation Portfolio, audits, and personnel to provide leaders greater visibility of 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 individual, installation, and regional command levels.

The Air Force will continue to use the following funding sources for cost-effective capital investments in energy efficiency: regular MILCON and Sustainment, Restoration, and Modernization funds, and ECIP funds. The Air Force Major Commands determine the best method of executing centrally funded energy projects and contracts. In FY 2014, the Air Force will proactively advocate for

ECIP projects that provide large energy savings, and it will increase the use of third-party ESPCs and UESCs for opportunities requiring large investments and longer payback periods. The Air Force will balance these various sources to achieve the best synergy between direct and third-party investments, while assessing energy efficiency opportunities from a whole-facility or whole-campus perspective.

Metering, Assessments, and Other Facility Energy Management Strategies

The primary tool the Air Force uses to improve efficiency is to conduct energy and water audits on installations, and evaluate the potential energy and water efficiency opportunities identified for cost effectiveness and energy savings. Another key efficiency strategy is metering. In FY 2014, the Air Force will continue implementing a programmatic approach for the standard, enterprise-wide advanced meter reading system, which it began installing in FY 2011. Advanced metering enables measurement and verification; provides transparent consumption data for electricity, water, steam, and natural gas; facilitates operational decisions; supports accurate cost capture and billing; and influences individual behavior. The Air Force completed their Meter Data Management Plan, which includes an enterprise-wide approach for meter installation, deployment of an Automated Meter Reading System, and using meter data to inform management decisions. The Air Force will complete planning over the next 12 months, with a focus on the higher energy consuming bases first, for deployment in FY 2015. The HQ Air Force Energy Management Steering Group will continue to manage the enterprise-wide energy conservation program in FY 2014, serving as the focal point for identifying savings opportunities, building energy awareness, and driving policy efforts to influence real cultural change. The Air Force will prioritize energy projects in FY 2014 based on economics and energy savings, and the ability to compete with other requirements on the Facility Sustainment, Restoration, and Modernization Integrated Priority List. The Air Force Capital Investment Plan targets capital investments that will help the Air Force attain required performance improvements.

The updated Army sustainable design and development policy states that energy efficiency is a mission objective to the Army and will compete equally with other mission requirements within a given project. Provisions of the policy specific to facility energy efficiency include adding plug and process loads to the energy calculations and requiring projects with exterior lighting to consider the use of highly efficient lighting technologies and associated control systems. The Army will continue to implement an enterprise-wide utility metering program in FY 2014. The advanced meters will report utility data to an enterprise Meter Data Management System, helping installations pinpoint energy savings and cost avoidance opportunities, as well as improving cost accounting for large



tenants. In FY 2014, the Army will expand Net Zero Energy beyond the nine pilot installations, under the new Army Net Zero Installations directive that requires all installations to pursue Net Zero strategies where fiscally responsible. Finally, the Army will continue to work with DOE's industrial assessment teams, which conduct energy audits and identify opportunities to improve productivity, reduce waste, and save energy at the Army industrial installations consuming the largest amounts of energy.

By FY 2020, the Navy projects that it will achieve a reduction in shore energy intensity of 41%, surpassing the DoD goal of 37.5%. Its strategy for accomplishing this is through a phased approach to dedicate funds towards proven energy efficiency technologies to first lower total energy demand, then focus on renewable energy sources to decrease GHG emissions and increase energy security, once the viability of these sources improves. By increasing energy efficiency of current facilities and utility systems and instilling a culture of conservation through data transparency, the Navy will achieve the most cost-effective way to reduce energy consumption, protect critical assets, and enable renewable technology implementation. To implement the Navy "smart energy/smart grid," the Navy will accomplish the initial phase by continuing to install advanced metering infrastructure and integrate it with the Navy's Centralized and Integrated Reporting for the Comprehensive Utilities Information Tracking System (CIRCUITS) and Public Safety Net. The Navy might follow this initial phase by integrating with other industrial control systems, such as Direct Digital Controls and Supervisory Control and Data Acquisition Systems.

Other DoD Components

The main approach of NGA to improving facility energy efficiency is through support for internal IT customer needs. The agency plans to explore energy efficient data center design, adding storage equipment such as solid state storage that takes up less space and uses less energy, and the adoption of cloud computing. NGA planners will also evaluate opportunities such as: maintaining optimum performance of data storage systems; conducting trade studies on IT equipment scheduled for refresh cycles; and using automated storage provisioning, data compression, deduplication, tiered storage based on frequency of use, and water side economizers. NGA also plans to limit the IT load through right-size power distribution, energy efficient power equipment such as variable speed drives on computer room air conditioning units, decommissioning unused servers, and improved airflow management.

Working with DLA Energy, in FY 2014 DIA will award an ESPC for its HQ building, which is expected to save almost \$900,000 every year. DIA is in a multiyear process, to be completed in FY 2015, of renovating all of the 25,000 square foot modules in the original HQ building, including

efficient lighting, increased insulation and upgraded HVAC systems. For its facilities outside of the Washington, D.C. area, DIA is in the process of identifying suitable efficiency projects. For the two sites where DCMA is responsible for energy performance, DCMA partnered with DLA Energy to award an ESPC at one site and a UESC at the other during FY 2014. NRO plans for the near future include lighting controls, desktop virtualization and sleep mode at workstations, HVAC upgrades, and employee outreach.

Sub-Goal 1.2 – Renewable Energy

In FY 2014, the Navy will continue its Shore Energy Strategy by optimizing third party financing projects to achieve even greater energy savings and renewable energy. The Navy will also revise its model for processing ESPCs and UESCs to execute projects more quickly. To integrate viable renewable energy technology in the right place at the right time, the Navy will continue to use its “Watch, Partner, Lead” approach:

- “Watch” a technology that is cost-prohibitive, not mature, or not currently advantageous to the Navy.
- “Partner” in the investment and development of a technology when government and industry partners are available.
- “Lead” the investment and development of a technology when it is directly advantageous to the Navy.

The Army set a goal to deploy one gigawatt of renewable energy by 2025. Its efforts to achieve this will continue on two fronts in FY 2014: large-scale projects developed by EITF and smaller-scale projects initiated at installations. EITF will continue moving renewable energy opportunities forward as the Army is able to mitigate risks, enabling a win-win posture for both the Army and private sector. In addition to eight projects to date for which EITF is pursuing contracts or agreements, EITF has additional projects in the pre-award stage. The Army is also ensuring that smaller-scale opportunities are captured, by incorporating renewable energy into applicable MILCON-funded projects where cost-effective, and using ESPC and UESC mechanisms to finance projects. The Army’s updated sustainable design and development policy requires all projects to evaluate the feasibility of including renewable energy, and maximize the use of solar hot water heating where lifecycle cost-effective. The Army’s Net Zero Energy strategy also accelerates the adoption of renewable energy. Based on the renewable energy assessments completed by the nine Net Zero Energy pilot installations in FY 2012–2013, these installations are in the process of

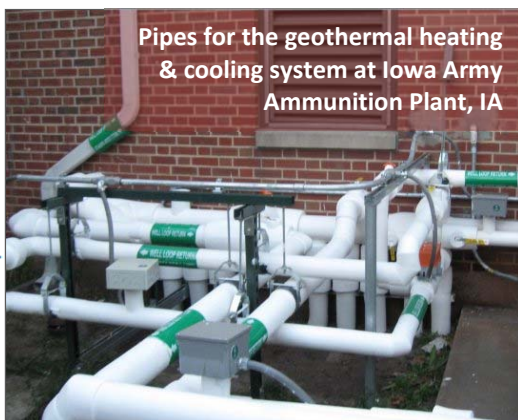


Photo: U.S. Army

implementing the renewable energy projects identified in their Net Zero Energy roadmaps. Finally, the Army is leveraging technical support from DOE’s Office of Energy Efficiency and Renewable Energy to screen installations for combined heat and power opportunities.

Under the Air Force Renewable Energy Game Plan, the Air Force has 36 specific renewable energy projects planned so far for its installations between FY 2014 and FY 2018, totaling about 500 MW in capacity. Nine projects are currently under construction, with approximately 30 MW planned for FY 2014 and 95

MW for FY 2015. During FY 2014, the Air Force Renewable Energy Project Development Subpanel will continue to facilitate the identification of viable renewable energy projects that are compatible

with the local Air Force mission, by providing a forum, process, and tools for evaluation and decision-making. The Air Force will continue to use a two-tier approach for prioritizing renewable energy projects. The first tier is to develop renewable energy in place on Air Force property (or adjacent federal property), using either:

- a. a power purchase agreement developed with third parties under a utility purchase contract or enhanced use lease, where third party developers pay to build the project and recover their costs through a long term utility purchase agreement;
- b. enter into an agreement financed by either a utility or other third party to provide renewable energy; or
- c. direct Air Force investment through MILCON or other funding source.

The second tier, procure renewable energy available from the commercial power grid from local providers.

DLA's Renewable Project Implementation team will review potential renewable energy projects that will pay for themselves in 25 years or less. The DLA facility in Susquehanna, PA will be awarding an additional four solar walls under the FY 2013 ECIP. The DLA facility in Richmond, VA submitted a project for three solar thermal roofs for consideration under FY 2014 ECIP. The Defense Finance and Accounting Service Limestone facility in Maine plans to install solar lights in a parking lot in FY 2016. NSA will double the existing solar PV capacity at its headquarters campus on Fort Meade, with the installation of two new PV arrays on the roofs of new generator plants. The agency is also evaluating the installation of a ground mounted PV solar array at one of its Cryptologic Centers in Hawaii. DIA will award an ESPC in 2014 that will include a 500 kW PV array on the HQ roof, expected to yield 700,000 kWh annually starting in FY 2015. The project will be conducted under a power purchase agreement that will provide the electricity to DIA at a rate competitive with the grid.

Recovery of Biogas

The Army is completing its evaluation of its on-post wastewater treatment plants to determine the feasibility of methane recovery. No large-scale methane recovery options have been identified, but in FY 2014 the Army will focus on determining whether smaller-scale methane recovery is suitable at selected sites. Between FY 2014 and FY 2018, the Air Force is planning 14.5 MW of renewable energy capacity from landfill gas projects, at Travis AFB (CA), JBER (AK), Tinker AFB (OK), and Ramstein Air Base in Germany.

Sub-Goal 1.3 – Vehicle Fleets

SERDP is sponsoring a research project led by Lawrence Berkeley National Laboratory to optimize the vehicle-grid interactions of a test fleet of electric vehicles at Los Angeles AFB. The project is designing and implementing the system to optimize bi-directional charging and market participation of the electric vehicle fleet in the context of the regulatory market for California independent system operators. It is the first at-scale vehicle-to-grid demonstration in California. In May 2014, the project installed on the base the first electric vehicles and charging stations capable of bi-directional charge/discharge, at which point systems testing began. SERDP expects the project to be completed in March 2015.

The Garrison Mobile Equipment Branch of HQ, U.S. Marine Corps is piloting an automated fuel tracking and dispensing technology that allows the fuel infrastructure to communicate with each vehicle and with the Marine Corps Fleet Management Information System. The Marine Corps plans

to incorporate this technology to make data collection more accurate and allow Fleet Managers to spend more time managing fleets and less time tracking fueling records. Also in FY 2014, the Marine Corps is partnering with GSA to place an additional 200 hybrid electric vehicles in the fleet.

The Navy is well on its way to meeting the 30% petroleum reduction by FY 2020. Following its Vehicle Allocation Methodology, the Navy will continue its successful strategy of purchasing more fuel-efficient vehicles and AFVs and optimizing the size of the fleet. In CY 2014, the Navy will finish installing the 20 alternative fueling stations it awarded in FY 2012. In a continuation of its

Photo: U.S. Navy



Electric cargo van, JB Pearl Harbor-Hickam, HI

participation in a pilot of EVs with GSA, the Navy will receive additional EVs in the Northwest region. The Navy will also continue to improve driver behavior with policies such as banning idling and mandating the use of alternative fuel. The Navy will conduct a pilot demonstration of a plug-in truck at JB Pearl Harbor Hickam, HI. In addition to fuel economy, the project team will monitor noise level, brake wear, and unscheduled maintenance issues, vehicle reliability and drivability, compared to a similar conventional truck.

The Air Force will continue executing its Vehicle Fleet Management Plan in FY 2014, procuring the most fuel-efficient and cost-effective vehicles that meet mission requirements, subject to availability. The Air Force aims to have all vehicle acquisitions be AFVs by 31 December 2015. It will continue deploying Automotive Information Module 2 Radio Frequency Identification devices on all fleet vehicles based in the contiguous United States during FY 2014, resulting in more effective tracking and reporting of fuel consumption. The devices also enable the Air Force to monitor and reduce vehicle idling. In FY 2014, the Air Force will continue evaluating the logistical aspects of relocating AFVs to areas where the Air Force already has access to alternative fuels, and to install new alternative fuel infrastructure on-base where there is a demand-based business case to do so. The Air Force will also continue to populate and refine an enterprise-wide, web-based energy dashboard that provides increased visibility of energy consumption and metrics to every Airman, including metrics on fuel consumption by ground vehicles.

The Army will continue its strategy for reducing the use of petroleum fuel by its non-tactical fleet, using the annual vehicle review process to evaluate opportunities for replacing vehicles with more fuel-efficient models and reducing the size of the fleet. When leasing vehicles through GSA, the Army will continue its policy of selecting vehicles with the best fuel economy. To promote the use of alternative fuels, the Army will continue to locate E85 vehicles only where E85 fuel is available, and it will require all E85 vehicles to utilize the fuel exclusively. The Army will also continue pursuing opportunities to install pumps for E85 and B20 (blend of 20% biodiesel and 80% regular diesel) on installations that dispense over 100,000 gallons of fuel annually. In FY 2014, the Army began working with DOE's Vehicle Technology Office to conduct a cost-benefit analysis of replacing the Army's conventional bus fleet with buses fueled by compressed natural gas.

DLA will continue replacing vehicles with more efficient models and those using alternative fuels, and providing guidance to drivers on the use of alternative fuels and methods to reduce the fuel intensity of their driving. NSA continues to add hybrid and electric vehicles to its fleet, and plans to install a bank of EV charging stations and switch the agency's bus fleet to ethanol and biodiesel fuels. DIA plans to replace ten more standard gasoline vehicles with hybrids in FY 2014, and install

an EV charging station to support its first GSA-leased EV. NRO plans to acquire more alternative fuel and EVs, and is working with GSA to eventually convert the entire fleet to hybrids. NGA is implementing a Green Fleet strategy that focuses on replacing existing fleet vehicles with more efficient models, including hybrids, and expanding the use of alternative fuels. The strategy includes enhancing logistics systems to improve their selection of vehicles through GSA.

Sub-Goals 2.1 and 2.2 – Potable Water Consumption

Water use and water security remain objectives in the FY 2014 Army Campaign Plan, along with the following sub-objectives targets: reducing potable water consumption, increasing use of alternative water sources, and reducing industrial, landscaping, and irrigation water consumption. The Army tracks and reports these sub-objectives quarterly to Senior Army Leaders. The eight Army Net Zero Water pilot installations are beginning to implement projects from their installation-specific Net Zero Water roadmaps. Fort Riley, KS, is the pilot site for two technology demonstration projects in a continuation of the Army's partnership with EPA on the Net Zero Water initiative. To spread the strategy and lessons learned from the pilot installations, in FY 2014 the Army will issue a publically-available summary of the Net Zero Water Roadmaps developed for the eight pilot installations, for



use by other Army installations to plan and implement Net Zero Water efforts. In addition to water efficiency and conservation measures to reduce water demand, the Army's updated sustainable design and development policy requires that: (1) water be reclaimed or reused where life-cycle cost-effective, (2) non-potable water be used in place of potable water whenever possible, and (3) landscaping projects consider using native plant species and dry-scape alternatives. Net Zero Water also focuses on using closed-loop systems to recycle water where cost-effective and appropriate.

In FY 2014, the Air Force will continue its practice of implementing proven water efficiency approaches that yield a high return on investment in terms of water and cost savings, and following up with periodic measurement and verification. As with energy efficiency projects, the Air Force will fund and implement water projects based on favorable economics and energy savings, and their ability to compete with other requirements on the Facility Sustainment, Restoration, and Modernization Integrated Priority List. Typical water efficiency improvements made by the Air Force include: leak detection and repair, low-flow bathroom fixtures, low-water landscaping, irrigating with reclaimed water and captured rainwater and grey water, incorporating separate metering into housing privatization, and incorporating LEED design principles into new MILCON projects. The Air Force will continue to implement lessons learned and share best management practices across the enterprise using a variety of communications media.

The Navy will continue reducing the consumption of facility water – both indoor and outdoor – through a broad range of approaches, including the FEMP Water Best Management Practices. Six projects the Navy will implement from FY 2014 to FY 2016 will account for much of the planned progress, with savings of 1.32 million gallons anticipated. The Navy will continue its practice of conducting energy and water evaluations every four years on those facilities covered by EISA. Opportunities identified through that process are submitted for funding and vetted based on return on investment, legal requirements, and impact to critical infrastructure. The Navy implements those that rank well, and follows up with periodic measurement and verification.

The Marine Corps approach to water efficiency is to complete a comprehensive water evaluation of facilities every four years, update water metering systems with advanced meters, increase the water efficiency of new construction, procure products that use water efficiently, and use landscaping with low-water requirements, especially in desert areas.

DLA has a broad-based approach to reducing the consumption of potable water in existing buildings: leak detection and repair, replacing plumbing fixtures with more efficient models when the payback is ten years or less, installing meters, and considering the use of reclaimed or recycled water for irrigation. The agency set a goal to reduce the area of grounds requiring landscaping to 50% of 2010 levels by 2020, through the use of native plants and xeriscaping, and all installations consider rainwater harvesting. For future construction, DLA will use non-potable water for flushing toilets and urinals.

NGA's strategy for reducing potable water intensity is to calibrate agency meters, improve its evaluation of metered data, install WaterSense® bathroom fixtures, capture and use stormwater runoff to irrigate native plants, and update its cooling towers. In FY 2014, DIA will implement water efficiency projects identified under their ESPC, including the installation of next generation low-flow fixtures and commissioning a non-potable well for use in cooling towers and irrigation. The well will begin operating in FY 2014, once approved by EPA. DIA expects the measures to save over 10 million gallons of water annually. NSA plans to continue updating restrooms with more water-efficient fixtures, and to use reclaimed water at the NSA Texas Cryptologic Center. At its headquarters campus, NSA plans to pipe reclaimed water from a local municipal wastewater treatment plant for use in its cooling towers. The agency expects this project to reduce its water intensity enough to meet the 26% goal for FY 2020. The ESPC and UESC being awarded in FY 2014 for the two sites where DCMA is responsible for energy and water performance will consider water reduction opportunities as well as those for energy. Water reduction strategies of NRO include low-flow plumbing fixtures as replacements where needed, xeriscaping, HVAC modifications to reduce the load on cooling towers, and using more recycled water for fire suppression.

Sub-Goal 2.3 – Stormwater Runoff

By virtue of Air Force and DoD policy, augmented by outreach activities and briefings to Air Force construction and water managers, the Air Force expects to achieve full compliance with the requirements of this sub-goal in FY 2014 and beyond.

The Army's updated sustainable design and development policy aligns Army policy with UFC 1-200-02 (*High Performance and Sustainable Building Requirements*) and UFC 3-210-10 (*Low Impact Development*), and establishes tracking and reporting requirements to improve reporting under Sub-Goal 2.3. The Army is in the process of developing implementation guidance that will finalize the methodology to track and report goal performance.

The Navy developed the Public Works Business Management System titled "Stormwater Feature Best Management Practice Design, Monitoring, Maintenance, and Cost Tracking," and is now implementing it in the field to ensure that new LID features are captured in the installation level operation and maintenance program. The Navy will continue to emphasize the requirements and



Photo: U.S. Navy

importance of stormwater management, including the accurate reporting of LID data, through training and by integrating LID into planning, design, and construction work. The NAVFAC Stormwater Cross-Functional Team continues to discuss and initiate processes to improve the management, operation, and assessment of the LID program through best management practices.

Sub-Goal 3.1 – Scopes 1 and 2 GHG 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: a reduced consumption of fossil fuels by facilities and vehicles, and an increased use of renewable energy.

Sub-Goal 3.2 – Scope 3 GHG 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 will be dependent on the continued recognition of third party renewable energy projects on DoD managed lands (hosted RE credits).

Sub-Goal 3.3 – Telework

The Marine Corps will continue to train managers and supervisors on the benefits of telework, determining telework eligibility, and developing telework agreements for employees using the formal Marine Corps telework plan. All eligible employees can access DoD Telework Form 2946 online and submit the form for approval electronically.

The Office of the Assistant Secretary of the Army for Manpower and Reserve Affairs is responsible for promoting teleworking across the Army, which it does by highlighting the benefits of teleworking, including increased continuity of operations and employee satisfaction. On the logistical side, the Army Chief Information Officer continues to improve the Army's IT infrastructure to better support teleworking.

The Air Force issued AFI 36-816, [*Civilian Telework Program*](#), on 13 November 2013, to more clearly define telework eligibility requirements, roles, and responsibilities. Later in FY 2014, the Air Force will 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 increase.

DLA will continue to actively support its telework program by procuring effective communication technology, setting and constantly improving clear employee registration goals and accountability standards, as well as utilizing proven marketing tools such as DLA Telework Week to encourage employees to try teleworking.

In FY 2014 and FY 2015, the MDA Human Resources Directorate will monitor and audit the number of executed teleworking agreements and personnel actually teleworking. The Sustainability Integration Product Team will continue working with Human Resources to promote teleworking, and the Team will analyze telework metrics provided on a quarterly basis by Human Resources to determine if additional measures are necessary to increase teleworking participation. MDA will also update its General Environmental Awareness Training to more fully explain the benefits of scheduling non-classified work activities to a standard day of the week in an effort to increase participation in teleworking.

NGA's work and intelligence mission is inherently classified, and therefore not ideally situated for teleworking, but the agency's FY 2014 goal is to increase the number of employee teleworkers to 10%. During FY 2014, NGA plans to increase employee awareness of the benefits of teleworking and specific jobs that might be appropriate for it, using electronic messages and teleworking brochures. DCMA is implementing Microsoft Sharepoint360 in FY 2014, which will improve the virtual office by allowing better collaboration and sharing of files.

Sub-Goal 3.4 – Employee Air Travel

Air travel is getting increased scrutiny across the Department, with all employees required to justify that travel is necessary to meet objectives, as per the 2011 DoD Track Four Initiatives Decision. 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. DIA, for example, ensures that video teleconferencing is a viable option for employees by making secure desktop video teleconference monitors readily available throughout HQ, as well as other DIA locations and the Combatant Command Directorates for intelligence. DoD continues to implement an education and communication campaign to increase employee awareness of virtual tools and facilities, and it provides online training on these tools and facilities. This outreach and training is used throughout the Department, and some Components also incorporate reduced air travel into their own training. MDA, for example, plans to update its General Environmental Awareness Training to more fully explain the need to reduce air travel by employees and promote meetings using video teleconferencing technologies.

GOAL 4 – DoD Climate Change Vulnerability Assessed and Resiliency Improved

The Department is in the process of drafting a new policy to address impacts relating to climate change, *Water Rights and Water Resource Management on DoD Installations and Ranges in the United States and Territories*, to be issued later in 2014. DoD will continue to review and update publications, policies, and programs to incorporate consideration of potential impacts of future climate change, filling identified gaps in guidance with new policies where appropriate. DoD

participation in the two councils and four working groups under EO 13653 will continue to provide opportunities to collaborate with and learn from other Federal agencies as well as local, state and tribal leaders. Through SERDP and ESTCP, DoD will continue to pursue the best available science to support decision makers across the Department in managing the risks associated with adapting to a changing climate.

Photo: U.S. Navy



Army Climate Change Planning Framework

The Army has been actively engaging its Senior Leaders on the potential effects of climate change on the Army's missions and operations. The Army released its High-Level Climate Change Vulnerability Assessment in January 2014, based on the climate scenarios from the National Climate Assessment. The Army is in the process of conducting a similar high-level vulnerability assessment for installations in Europe and the Pacific. The Army will continue to develop its planning framework to integrate climate change considerations into existing installation-level plans, and will develop implementation guidance to roll out the framework Army-wide. So far, the Army has mapped the planning processes to integrate climate change considerations into four types of plans: Real Property Master Plans, Integrated Natural Resources Master Plans (INRMPs), Range Complex Master Plans, and Installation Strategic Plans. In FY 2014 – FY 2015, the Army plans to expand the planning framework to include Emergency Contingency Planning and Potable Water System Master Plans, and it plans to develop more detailed guidance to integrate climate change considerations into INRMPs.

Sub-Goal 5.1 – DoD Employees Covered by Policies to Reduce the Use of Printing Paper

In the coming years, the cornerstone of the DON Print Management Initiative, covering both the Navy and Marine Corps, will be the January 2013 department-wide [policy](#) described in the Progress Update section. The initiative will be successful because it is grounded in senior leadership commitment from all relevant parts of the organization, on the DON commitment to achieve cost savings through IT efficiency, and a strong strategic relationship with DLA Document Services.

The Air Force will continue to implement a number of measures to minimize the use of printing paper, including: printing documents double-sided; printing presentation slides as handouts, with two slides per page; scanning and converting hard copy to digital format; implementing electronic document management; requiring all new copying and printing devices to have duplexing capability and providing training opportunities via electronic media; use of electronic communications as the primary means of maintaining information on policies and procedures; maintaining or submitting information for most reports, plans, checklists, and other documents in electronic format unless prohibited by other regulations; use of electronic staff workflow and coordination processes; and implementation of the electronic flight bag initiative.

Organizations and installations within the Army will continue to pursue strategies to reduce the use of printing paper, such as the use of digital staff actions, electronic filing systems, and GSA's [PrintWise](#) guidelines. Net Zero Waste pilot installations are implementing "go paperless" campaigns, and the Army's IT organizations are working with Army organizations and installations to set printer defaults to duplex printing where feasible.

DLA is actively involved in converting over 11.5 million documents from paper to digital files for the Army, as well as a two-year conversion project for the Navy that will extend into FY 2015. These conversions will significantly reduce warehousing space. NRO plans to conduct more paperless meetings and emphasize double-sided printing to employees. DIA plans to issue and implement a DIA Paper Reduction Policy in FY 2015.

Sub-Goals 5.2 and 5.3 – Solid Waste Diversion

OSD is finalizing a DoDI on integrated solid waste management that will focus on policy, responsibilities, and procedures for implementing a solid waste diversion program. The Department expects to issue the DoDI in CY 2014.

Solid waste management by the Air Force will continue to be guided by AFI 32-7042, *Waste Management*, issued in 2009. The basis for maximizing diversion of its waste stream is to implement the Air Force Asset Management Program, which has Waste Management as one of its five primary mission lines, and to develop Waste Activity Management Plans to guide solid waste management investment strategies and approaches. The Air Force's approach to C&D will continue to be in accordance with the 2010 AFI 32-1023, *Designing and Constructing Military Construction Projects*, which requires that structures be manually disassembled in a deliberate, systematic manner to save as many of the components as economically feasible for reuse or recycling.



Photo: U.S. Navy

Recycling center at JB Pearl Harbor-Hickam, HI

After DoD issues the new integrated solid waste management DoDI, the Army will issue updated solid waste management guidance, including Qualified Recycling Program guidance. The updates will include clarifications to solid waste, recycling, and diversion reporting categories, and require monthly reporting. The Army will move the Net Zero Waste program beyond the pilot phase in FY 2014. Meanwhile, the eight Net Zero Waste pilot installations will continue to serve as test beds to identify best practices for waste minimization and recycling. The updated Army sustainable design and development policy requires each new construction and major renovation project to provide building occupants with conveniently located and appropriately sized space for reuse and recycling. The policy also requires that the removal of existing structures compare the deconstruction and salvage approach to conventional demolition, and implement deconstruction wherever reuse opportunities exist or are anticipated.

The Army will continue its focus on organic waste in FY 2014, driven by the fact that 25–40% of the solid waste generated on Army installations consists of food and other organic waste. Based on the

Photo: U.S. Army



The composting program at JB Lewis-McChord, WA, helps preserve the habitat of an endangered butterfly

success of the Defense Commissary Agency with food waste dehydration systems, the Army is piloting a dehydration system at two facilities representative of Army dining facilities and field kitchens. When the pilot is complete at the end of FY 2014, the Army will analyze the results to determine whether food waste dehydration is advantageous for Army installations. Another approach to reducing food waste is to donate excess food. The Army is in the process of developing food donation procedures that address food safety and provide guidelines for identifying and working with recipient organizations. The Army is also drafting procedures for installations to use in donating end-of-life furnishings. The effort was inspired by the success of Fort Carson, CO, a Net Zero Waste pilot installation, in donating thousands of items from a barracks furnishings replacement project. In FY 2014, the Army Installation Management Command will continue its waste characterization studies at select installations, and its Staff Assistance Visits to evaluate installation-level integrated solid waste management.

In FY 2014, the Navy will conduct a study of options for handling galley food waste, an area the Navy identified as having significant potential for increased diversion from disposal. The Navy will continue its revisions to the Qualified Recycling Program guide, which will help these programs operate more effectively and improve their diversion rates. The Navy will issue a new policy manual in FY 2014, Chief of Naval Operations Instruction 5090.1D 5090.1 *Environmental Readiness Program Manual*, which includes updated solid waste policies to foster increased diversion rates and address C&D diversion requirements. Finally, the Navy will continue to include diversion requirements in its C&D contracts.

Marine Corps plans for the near future to increase diversion of solid waste from the waste stream include:

1. conducting a review of installation solid waste management plans to identify areas for improvement, as well as initiatives that can be shared across Marine Corps installations;
2. periodically publishing a newsletter to increase awareness in the installation pollution prevention community of solid waste diversion goals, current and future initiatives, and installation success stories; and
3. surveying a representative set of installations—likely the largest generators of waste—to identify areas where policy or guidance would help improve diversion.

DLA met the DoD target for diversion in FY 2013, but to continue improving performance the agency will increase its emphasis on training, communication, and collaboration. DLA will form a work group in FY 2014 that will meet periodically to discuss ways to increase the diversion of non-hazardous solid waste from disposal. The work group will monitor the performance of each DLA installation, address performance, policy and best practices, and increase awareness. The new group will work with the existing DLA Recycling Program Work Group. NRO plans to replace the current document destruction system, which disposes of paper waste with the regular solid waste stream, with a briquette system that allows the waste to be recycled.

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

In FY 2014, the Department will update *Managing Chemicals, Materials and Impacts to Readiness from REACH: a Strategic Plan*, which it first issued in 2010. The purpose of the plan is to safeguard military readiness in the face of potential changes to DoD's global supply chains caused by the European Union regulation titled Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

The Army has focused its chemical reduction efforts on three toxic chemicals:

trichloroethylene, methylene chloride, and hexavalent chromium. Following on its recent success nearly eliminating the use of the first two chemicals, in FY 2014 the Army will focus on reducing the use of hexavalent chromium-containing epoxy primers. The Army also continually conducts projects at installations to identify new ways of reducing chemicals in its processes. In FY 2014, these projects will be: (1) working with Oak Ridge National Laboratory to identify chemical



substitutions or production process changes at four Army Materiel Command installations to reduce the use of toxic and hazardous chemicals; (2) an assessment of whether waste energetics from the Iowa Army Ammunition Plant production processes can be used as a fuel source in a fuel cell; and (3) an evaluation of Chemical Agent Resistant Coatings paint to reduce VOCs in the paint.

In FY 2014, as it does every year, the Navy will reviews its chemical releases to identify potential chemicals and processes where opportunities exist to reduce the use and release of chemicals of concern. The Navy uses the results of the review to guide research and development efforts of the Navy Environmental Sustainability Development to Integration program, in cooperation with ESTCP and the Joint Services Solvents Substitution team. The Navy is also continuing to upgrade its several wastewater treatment plants to meet increasingly stringent National Pollutant Discharge Elimination System permit requirements nationwide, which may have a positive effect on nitrate releases.

The Marine Corps will reduce the use and release of chemicals of environmental concern by continuing to purchase sustainable materials and implement its Authorized Use List policy, which prohibits installations from purchasing or using hazardous materials not found on an approved list.

The Air Force will continue to use its hazardous material management process to minimize the use of toxic chemicals to the least hazardous material capable of meeting mission requirements. The Air Force's replacement of coal-fired boilers at Wright-Patterson AFB will continue in FY 2014, which will eliminate approximately 90,000 pounds of TRI-reportable emissions annually. The Air Force EMS framework described under sub-goal 7.4 will also help reduce the use and release of chemicals of concern, as Commanders will continue using the EMS framework to identify and manage daily operations that generate waste and pollution.



Sub-Goals 6.2 and 6.3 – Pesticides

Installation IPMPs are valid for five years and 100% of DoD installations have them. However, the requirement that all plans must be updated and reviewed annually continues to present difficulties due to local personnel shortages and the support of overseas contingency operations. Also, the portion of approvals can be less than complete in any given fiscal year due to plans waiting in the queue for review and approval. Because of these circumstances, the likelihood of DoD achieving its goal of 100% over the course of the next several years is low.

For those Navy and Marine Corps installations having IPMPs, the NAVFAC Applied Biology Center conducts pest management program reviews every three years. During these reviews, NAVFAC ensures that all pesticide applicators (DoD or contract) are appropriately certified. NAVFAC reports any lack of appropriate certification as a compliance finding. The re-write of installation IPMPs must occur every five years, and in DON this is done by the NAVFAC Applied Biology Center at the expense of the installations. Therefore, the occasional failure of an installation to fund an IPMP re-write harms the ability of the Navy and Marine Corps to have 100% of their IPMPs comply. The best way to avoid this situation is for installations to make the re-write a high priority and plan for it in the Program Objective Memorandum process well in advance of the IPMP's expiration date.

During FY 2014, the Air Force will continue to ensure that pest management personnel receive appropriate training and that certified individuals apply pesticides in a manner consistent with their intended use. The Air Force will continue to evaluate opportunities to minimize the use of pesticides while maintaining mission support requirements, and it will continue to update and implement IPMPs, as required by the 2009 AFI 32-1053, *Integrated Pest Management Program*.

The Army anticipates that 100% of its pesticide applicators – Army and contractor – will again be certified in FY 2014. The maintenance of Army IPMPs is governed by Army Regulation 200-1 and DoDI 4150.7. As integrated pest management continues to evolve to less toxic practices, the Army will continue to use the most cost-effective and least toxic means to control pests. At the Army's request, the Armed Forces Pest Management Board has listed several "green" products on its contingency use lists.

Sub-Goal 7.1 - Procuring Sustainable Goods and Services

The DoDI on Sustainable Procurement that the Department developed in FY 2013 is currently undergoing formal coordination, for planned issuance by the end of CY 2014. 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.

In FY 2014, the Office of the Deputy Assistant Secretary of the Army for Procurement expanded the Army's internal sustainable procurement web page, with model contract clauses, training resources, and links to other federal sustainable procurement websites such as FedCenter.gov and those of GSA. This office will expand their dissemination of lessons learned and opportunities for improvement in FY 2014, garnered from the review of contracts it conducts for sustainability attributes. The Army Contracting Command will participate in this effort, to help identify and disseminate best practices to contracting and procurement personnel. Also in FY 2014, the Army will disseminate the sustainable procurement Quick Guides it prepared in FY 2013 (see Progress Update section) across all Army installations. Once OSD issues the Sustainable Procurement DoDI, the Army will issue an updated Sustainable Procurement Policy.

The Air Force will review relevant Air Force policies and instructions after the Department issues its sustainable procurement DoDI, and update them as needed. Meanwhile, the Air Force will continue to educate contracting personnel on sustainable procurement requirements and responsibilities, and to partner with GSA and DLA on ways to make environmentally preferable products more visible and accessible through GSA and DLA procurement tools.

In 2014, the Navy will begin distributing its "Contract It Green" guide (see Progress Update section) to contracting specialists, and it will post it on the Navy web site for the Supply Systems Command Consolidated Card Program at https://www.navsup.navy.mil/ccpmd/purchase_card/buy_green. The Marine Corps will continue to work with GSA and DLA to procure sustainable products at all installations, while educating contract writers, vendors, and product purchasers about sustainability requirements and mandates.

DLA plans to maintain its excellence in ensuring that all applicable contract actions adhere to the principals of sustainability by advising the acquisition workforce of sustainability changes to the Federal Acquisition Regulation, Defense Federal Acquisition Regulation Supplement, and DLA Directive acquisition regulations. DLA will also continue to emphasize bio-based products. In FY 2014, DIA will continue to improve the Contract Management System Release 8.12 it implemented in FY 2013, to develop sustainable procurement requirements for a new version of the system to be implemented in FY 2015. NRO is taking a number of steps to improve the sustainability of its procurement: upgrading the procurement system to improve tracking and remind employees to look for green products; training; developing language for contracts and scopes of work regarding green products; improving the sustainability of office and janitorial supplies; and implementing an affirmative procurement policy in accordance with NRO Instruction 120-1-5.

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

During FY 2014, DLA Disposition Services will continue its ongoing practices for the disposition of 100% of excess electronics through certified recyclers. For commercial electronics, where practical, this means disposition through the full reutilization, transfer, donation, and sales cycle. DLA Disposition Services makes electronics unique to the military available only to reutilization customers, and all remaining items are destroyed and the resultant residues recycled. Ultimate disposition processes include demanufacturing through a service contract and a Memorandum of Agreement with Federal Prison Industries. Any components containing precious metals are recovered and refined via a service contract.

To continue improving the operation of its data centers, DoD is developing an enterprise-wide Joint Information Environment to provide full-spectrum support in the operation, procurement and maintenance of IT systems. The approach will greatly reduce the number of DoD data centers and promote



Photo: U.S. Navy

efficiency through server virtualization and application rationalization. The Department expects the system to reach full capacity between 2016 and 2020. The Air Force is continuing its efforts to reduce the number of its data centers by 75%, with the majority of closings anticipated in the FY 2015 to FY 2017 timeframe. In the short-term, the Air Force is focusing on IT consolidation and efficiency initiatives that can deliver early successes. In the long-term, the Air Force strategy is to align with the DoD-wide Joint Information Environment, a transition in the operation, procurement and maintenance of IT systems that will greatly reduce the number of DoD data centers and promote efficiency through server virtualization and application rationalization.

In FY 2014, the Army is developing an implementation plan to institute Army-wide power management settings for IT devices, working with a broad range of stakeholders across the Army. The plan lays out organizational roles, responsibilities, and authorities, with specific tasks, actions, and performance metrics, including auditing, accountability, and reporting processes. It also provides recommendations on resource savings, avoiding costs, compliance reporting, and implementation milestones. The Army is currently in the process of pilot testing the power management solution described in the Progress Update section on approximately 100 workstations.

The results are expected in the third quarter of FY 2014, and if successful, the solution will be incrementally deployed.

DLA Disposition Services is the Navy's primary means of disposal for excess or surplus electronics. When not eligible for DLA Disposition Services, the Navy handles used or excess electronics as hazardous waste, to prevent potentially toxic constituents from being released into the environment. The Navy's Environmental Readiness Program Manual released in January 2014 prohibits electronic waste from being disposed in landfills or via incineration, while maximizing re-use, donation, transfer, sale, and recycling. NRO is developing an energy efficiency checklist to grade all applicable equipment, and it is programming all new NRO workstations to enter a sleep mode after two hours of inactivity.

Sub-Goal 7.3 - High Performance, Sustainable Buildings

The Department recently issued two critical documents that will accelerate the improved sustainability of DoD's building inventory: The March 2013 UFC 1-200-02, *High Performance and Sustainable Building Requirements*, and the November 2013 policy memorandum, *Department of Defense Sustainable Buildings Policy*.

The Army's updated sustainable design and development policy has a number of provisions aimed at improving the sustainability of its building inventory. In addition to incorporating the new requirements of UFC 1-200-02 (*High Performance and Sustainable Building Requirements*), it adopts ASHRAE Standard 189.1-2011 and requires total building commissioning to enable the Army to benchmark that high performance milestones from capital investments are realized. The policy also requires each project to achieve a minimum LEED Silver certification. After its updated sustainable design and development policy was issued, the Army began working with DOE's Lawrence Berkley National Laboratory to integrate proven new technologies into the Army's standard designs and specifications. The Army will also use the scorecard developed by USACE to track compliance of new construction and major renovations with each element of the policy. Finally, in FY 2014 the Army will conclude the multi-year collaboration between Fort Carson and GSA's high performance sustainable buildings program. One of the two integrated Net Zero Energy-Water-Waste pilot installations, the Fort Carson collaboration focused on documenting the difference in energy and water use at conventional buildings versus high-performance buildings, and assessed methods of affecting behavior change in building occupants.

The Navy will continue to increase the number of buildings complying with the Guiding Principles in the upcoming year by increasing the number of facilities that meet water consumption reduction requirements, renewable energy requirements, and Building Energy Monitor guidelines.

Based on UFC 1-200-02 and the November 2013 *DoD Sustainable Buildings Policy*, the Air Force expects all new construction and major renovations to comply with the Guiding Principles. 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' lifecycle return on investment. Under its Sustainable Infrastructure Assessments Project, the Air Force will strive to assess the sustainability status of 25% of buildings annually, on a square footage basis, and provide investment-grade project documentation of the results. The documentation will be entered into the Air Force Asset Management Plan, from which the Air Force will program an Integrated Priority List of projects, to ensure existing facilities will achieve the required performance levels.

NSA will be decommissioning and replacing a number of aging facilities with LEED-certified facilities beginning in FY 2014.

Sub-Goal 7.4 – Environmental Management Systems

The Marine Corps will focus on equipping installations to more accurately identify EMS requirements and track progress toward meeting them. Headquarters Marine Corps is in the process of developing a comprehensive Environmental Management data collection portal online in the Web Compliance Assessment and Sustainment System, an effort that has been ongoing since FY 2012. Once complete, Marine Corps installations will have on-hand access to current and historical environmental management data, which will assist in identifying trends and tracking progress towards goals and requirements. Headquarters Marine Corps will conduct EMS Lead Auditing Training courses across their Installation Commands in summer 2014.

During FY 2014, the Navy will issue updated environmental readiness policy, which will include lessons learned through EMS. The Navy will further refine its performance-based strategy for scoping integrated EMS and compliance audits to consider factors such as environmental performance, internal and external audit findings, successful follow-up to corrective actions, stakeholder interests, and operational tempo. Other strategies the Navy will employ to optimize resources include cross-training more media managers in EMS for a more cohesive sustainable system, improving the facility pre-audit questionnaire, and improving data management using Navy's EMSWeb audit and compliance tracking software suite.

The Army is developing an Enterprise Environmental System with an improved module for conducting external and internal EMS audits. The system will provide greater visibility of installation-level audit results (both internal and external), thus providing better analysis and oversight capabilities at the Command and HQ levels. This enables HQ Army and its Commands to address systemic issues, implement enterprise-level corrective actions where appropriate, and identify opportunities for improvement. The Army plans to deploy the system, including the audit module, in late FY2014.

In FY 2014, Air Force Commanders will use the Air Force EMS framework to manage daily operations that generate waste and pollution. The framework directs that the first preference is to eliminate or reduce pollution at its source by adopting less hazardous alternatives and reengineering processes, packages, systems and facilities. On an enterprise level, the Air Force will manage EMS-generated information via AFCEC's electronic dashboard (eDASH) web site. This will enable the Air Force 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 facilitate the sharing of lessons learned and best practices with



Airfield ditch cover to reduce bird strikes, Fairfield AFB, WA

Photo: U.S. Air Force

users from across the Air Force.

DLA is developing new EMS policy in the form of a directive-type memorandum, instruction, and manual to provide detailed EMS requirements for all levels and sectors of the agency. These documents will define the EMS roles, responsibilities, and requirements for both DLA Headquarters and field activities, and serve as an umbrella over DLA environmental policies.

Appendix A. Acronyms and Units

AFB	Air Force Base
AFCEC	Air Force Civil Engineering Center
AFI	Air Force Instruction
AFV	alternative fuel vehicle
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
AT&L	Acquisition, Technology and Logistics
Btu	British thermal unit(s)
C&D	construction and demolition
CO ₂	carbon dioxide
CY	calendar year
DCMA	Defense Contract Management Agency
DENIX	DoD Environment, Safety and Occupational Health Network and Information Exchange
DIA	Defense Intelligence Agency
DLA	Defense Logistics Agency
DoD	Department of Defense
DOE	Department of Energy
DoDI	Department of Defense Instruction
DON	Department of the Navy
ECIP	Energy Conservation Investment Program
EITF	Energy Initiatives Task Force
EISA	Energy Independence and Security Act of 2007
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
ESPC	Energy Savings Performance Contract
ESTCP	Environmental Security Technology Certification Program
EV	electric vehicle
FEMP	Federal Energy Management Program
FY	fiscal year
GGE	gallon(s) of gasoline equivalent
GHG	greenhouse gas
GSA	General Services Administration
GSF	gross square foot/feet
GWP	global warming potential
HFC	hydrofluorocarbon
HQ	Headquarters

HVAC	heating, ventilation, and cooling
I&E	Installations and Environment
ILA	irrigation, landscaping, and agricultural
INRMP	Integrated Natural Resource Management Plan
IPMP	Integrated Pest Management Plan
IT	information technology
JB	Joint Base
JBER	Joint Base Elmendorf-Richardson
kBtu/ft ²	1,000 British thermal units per square foot
kW	kilowatt(s)
kWh	kilowatt-hour(s)
LEED	Leadership in Energy and Environmental Design
LID	low impact development
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCLB	Marine Corps Logistics Base
MCSF	Marine Corps Support Facility
MDA	Missile Defense Agency
MILCON	Military Construction
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
OSD	Office of the Secretary of Defense
PV	photovoltaic
RE	renewable energy
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SERDP	Strategic Environmental Research and Development Program
SSC	Senior Sustainability Council
SSO	Senior Sustainability Officer
SSPP	Strategic Sustainability Performance Plan
TRI	Toxics Release Inventory
UESC	Utility Energy Services Contract
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
VEMSO	Vehicle and Equipment Management Support Office
VOC	volatile organic compound

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**Appendix C. Department of Defense FY 2014 Climate Change Adaptation
Roadmap**



DEPARTMENT OF DEFENSE

2014 CLIMATE CHANGE
ADAPTATION ROADMAP



FOREWORD

The responsibility of the Department of Defense is the security of our country. That requires thinking ahead and planning for a wide range of contingencies.

Among the future trends that will impact our national security is climate change. Rising global temperatures, changing precipitation patterns, climbing sea levels, and more extreme weather events will intensify the challenges of global instability, hunger, poverty, and conflict. They will likely lead to food and water shortages, pandemic disease, disputes over refugees and resources, and destruction by natural disasters in regions across the globe.

In our defense strategy, we refer to climate change as a “threat multiplier” because it has the potential to exacerbate many of the challenges we are dealing with today – from infectious disease to terrorism. We are already beginning to see some of these impacts.

A changing climate will have real impacts on our military and the way it executes its missions. The military could be called upon more often to support civil authorities, and provide humanitarian assistance and disaster relief in the face of more frequent and more intense natural disasters. Our coastal installations are vulnerable to rising sea levels and increased flooding, while droughts, wildfires, and more extreme temperatures could threaten many of our training activities. Our supply chains could be impacted, and we will need to ensure our critical equipment works under more extreme weather conditions. Weather has always affected military operations, and as the climate changes, the way we execute operations may be altered or constrained.

While scientists are converging toward consensus on future climate projections, uncertainty remains. But this cannot be an excuse for delaying action. Every day, our military deals with global uncertainty. Our planners know that, as military strategist Carl von Clausewitz wrote, “all action must, to a certain extent, be planned in a mere twilight.”

It is in this context that DoD is releasing a Climate Change Adaptation Roadmap. Climate change is a long-term trend, but with wise planning and risk mitigation now, we can reduce adverse impacts downrange.

Our first step in planning for these challenges is to identify the effects of climate change on the Department with tangible and specific metrics, using the best available science. We are almost done with a baseline survey to assess the vulnerability of our military’s more than 7,000 bases, installations, and other facilities. In places like the Hampton Roads region in Virginia, which houses the largest concentration of US military sites in the world, we see recurrent flooding today, and we are beginning work to address a projected sea-level rise of 1.5 feet over the next 20 to 50 years.

Drawing on these assessments, we are integrating climate change considerations into our plans, operations, and training across the Department so that we can manage associated risks. We are considering the impacts of climate change in our war games and defense planning scenarios, and are working with our Combatant Commands to address impacts in their areas of responsibility.

At home, we are studying the implications of increased demand for our National Guard in the aftermath of extreme weather events. We are also assessing impacts on our global operations – for instance, how climate change may factor into our rebalance to the Asia-Pacific. Last year, I released the Department of Defense’s Arctic Strategy, which addresses the potential security implications of increased human activity in the Arctic – a consequence of rapidly melting sea ice.

We are also collaborating with relevant partners on climate change challenges. Domestically, this means working across our federal and local agencies and institutions to develop a comprehensive, whole-of-government approach to a challenge that reaches across traditional portfolios and jurisdictions. Within the U.S. Government, DoD stands ready to support other agencies that will take the lead in preparing for these challenges – such as the State Department, US Agency for International Development, and the Federal Emergency Management Agency.

We must also work with other nations to share tools for assessing and managing climate change impacts, and help build their capacity to respond. Climate change is a global problem. Its impacts do not respect national borders. No nation can deal with it alone. We must work together, building joint capabilities to deal with these emerging threats.

Politics or ideology must not get in the way of sound planning. Our armed forces must prepare for a future with a wide spectrum of possible threats, weighing risks and probabilities to ensure that we will continue to keep our country secure. By taking a proactive, flexible approach to assessment, analysis, and adaptation, the Defense Department will keep pace with a changing climate, minimize its impacts on our missions, and continue to protect our national security.



CHUCK HAGEL

Department of Defense FY 2014 Climate Change Adaptation Roadmap

Climate change will affect the Department of Defense's ability to defend the Nation and poses immediate risks to U.S. national security. The Department is responding to climate change in two ways: adaptation, or efforts to plan for the changes that are occurring or expected to occur; and mitigation, or efforts that reduce greenhouse gas emissions. This Climate Change Adaptation Roadmap (Roadmap) focuses on the Department's climate change adaptation activities¹.

The Strategic Sustainability Performance Plan (SSPP) articulates the Department's sustainability vision to maintain our ability to operate into the future without decline in the mission or the supporting natural and man-made systems. The actions set forth in this Roadmap will increase the Department's resilience to the impacts of climate change, which is a key part of fulfilling this vision.

The Department has established three broad adaptation goals:

Goal 1: Identify and assess the effects of climate change on the Department.

Goal 2: Integrate climate change considerations across the Department and manage associated risks.

Goal 3: Collaborate with internal and external stakeholders on climate change challenges.

These goals are supported by four lines of effort:

- **Plans and Operations** include the activities dedicated to preparing for and carrying out the full range of military operations. Also included are the operating environments in the air, on land, and at sea, at home and abroad, that shape the development of plans and execution of operations.
- **Training and Testing** are critical to maintaining a capable and ready Force in the face of a rapidly changing strategic setting. Access to land, air, and sea space that replicate the operational environment for training and testing is essential to readiness.
- **Built and Natural Infrastructure** are both necessary for successful mission preparedness and readiness. While built infrastructure serves as the staging platform for the Department's national defense and humanitarian missions, natural infrastructure also supports military combat readiness by providing realistic combat conditions and vital resources to personnel.

"But the challenge of global climate change, while not new to history, is new to the modern world. Climate change does not directly cause conflict, but it can significantly add to the challenges of global instability, hunger, poverty, and conflict. Food and water shortages, pandemic disease, disputes over refugees and resources, more severe natural disasters – all place additional burdens on economies, societies, and institutions around the world."

- Secretary Hagel

Halifax International Security Forum
(DoD Arctic Strategy) Nov 2013

¹ The Department's progress and strategies towards climate change mitigation, mainly through changes in our energy use, can be found in the main body of Strategic Sustainability Performance Plan (SSPP), Goals 1, 2, 3, 5 and 6.

- **Acquisition and Supply Chain** include the full range of developing, acquiring, fielding, and sustaining equipment and services and leveraging technologies and capabilities to meet the Department's current and future needs, including requirements analysis.

The Roadmap is divided into four sections: the policy framework for climate change adaptation planning and three goal sections. For each goal, the Roadmap provides an overview, and specific details on how the Department's adaptation will occur across the four lines of effort, as well as a description of ongoing efforts (where applicable).

POLICY FRAMEWORK FOR CLIMATE CHANGE ADAPTATION PLANNING

The foundation for the Department's strategic policy on climate change adaptation began with the publication of the Quadrennial Defense Review (QDR) in 2010 by the Secretary of Defense. The QDR articulates the United States' national defense strategy and seeks to adapt, shape and rebalance our military to prepare for the strategic challenges and opportunities we face in the years ahead.

The 2010 QDR recognized that climate change was a threat to national security and the 2014 QDR reaffirms the Department's position: "The impacts of climate change may increase the frequency, scale, and complexity of future missions, including Defense Support to Civil Authorities (DSCA), while at the same time undermining the capacity of our domestic installations to support training activities."

The third National Climate Assessment notes that certain types of weather events have become more frequent and/or intense, including heat waves, heavy downpours, and, in some regions, floods and droughts. Sea levels are rising, oceans are becoming more acidic, and glaciers and arctic sea ice are melting. Scientists predict that these changes will continue and even increase in frequency or duration over the next 100 years.



Army National Guard rescues flooding victims after Hurricane Isaac August 30, 2012. Credit: US ARNG SGT Rashawn D. Price

These climate-related effects are already being observed at installations throughout the U.S. and overseas and affect many of the Department's activities and decisions related

to future operating environments, military readiness, stationing, environmental compliance and stewardship, and infrastructure planning and maintenance.

Climate change also will interact with other stressors in ways that may affect the deployment of U.S. Forces overseas and here at home. As climate change affects the availability of food and water, human migration, and competition for natural resources, the Department's unique capability to provide logistical, material, and security assistance on a massive scale or in rapid fashion may be called upon with increasing frequency. As the incidence and severity of extreme weather events change, the Department will adapt to meet these dynamic operational realities.

RESPONSIBLE SENIOR AGENCY OFFICIAL

The Deputy Under Secretary of Defense (Installations and Environment) is the Department's Climate Change Adaptation Planning Officer and is responsible for overseeing the implementation of the Department's climate change adaptation efforts.

COORDINATING BODY

The Department's Senior Sustainability Council (SSC), established in 2010, comprises Department senior leaders, the military departments and components and is charged with developing strategy, recommending policy, and ensuring coordination on sustainability initiatives across the Department. The SSC is co-chaired by the Deputy Under Secretary of Defense (Installations and Environment) and the Assistant Secretary of Defense for Operational Energy Plans and Programs. The SSC directs, oversees, and supports development of the Department's annual integrated SSPP and has purview over mitigation – through greenhouse gas emissions reduction efforts – and climate change adaptation.

The SSC established a Climate Change Adaptation Working Group (CCAWG) in December 2012, to facilitate implementation of the climate change requirements found in EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, and EO 13653, *Preparing the United States for the Impacts of Climate Change*. The CCAWG takes direction from and provides advice to the SSC regarding the state of climate science, vulnerability and impact assessment, and adaptation practices, and they lead the development of the Department's Roadmap. The CCAWG has membership from all Services and multiple offices, including Policy, Operational Energy Plans & Programs, Personnel and Readiness, and the Joint Staff. The SSC and CCAWG fulfill the Department's original Goal 1, set forth in the 2012 Roadmap - "Define a coordinating body to address climate change." The SSC and CCAWG 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.

EXECUTIVE ORDER REQUIREMENTS

This 2014 update to the Roadmap fulfills the requirements of a Climate Change Adaptation Plan found in Executive Orders 13514 and 13653. Executive Order 13514 requires that all Federal Departments and Agencies evaluate climate change risks and vulnerabilities to manage both the short- and long-term effects of climate change on the agency's mission and operations, and include an adaptation planning document as an appendix to its annual SSPP. Executive Order 13653 notes that "building on these efforts, each agency shall develop or continue to develop, implement, and update comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives and submit those plans to CEQ and OMB for review." A table which cross references this Roadmap to the specific implementation requirements of EO 13653 is provided in Annex 1.

GOAL 1 – IDENTIFY AND ASSESS THE EFFECTS OF CLIMATE CHANGE ON THE DEPARTMENT.

Overview. Utilize an iterative assessment process to identify how climate change might shape the Department’s plans and operations and what current and projected climate-related impacts might occur to its training and testing, built and natural infrastructure, and acquisition and supply chain.

The effects of the changing climate will be felt across the full range of Department activities, including plans, operations, training, infrastructure, and acquisition. The direction, degree, and rates of the physical changes will differ by region, as will the effects to the Department’s mission and operations. By taking a proactive, flexible approach to assessment and analysis, the Department can keep pace with changing climate patterns and minimize effects on the Department.

Initial analysis indicates that four primary climate change phenomena are likely to affect the Department’s activities:

- Rising global temperatures
- Changing precipitation patterns
- Increasing frequency or intensity of extreme weather events
- Rising sea levels and associated storm surge

A high-level summary of potential impacts to the four lines of efforts - plans and operations, training and testing, built and natural infrastructure, and acquisition and supply chain

- is provided in Annex 2. For convenience to the reader, excerpts from Annex 2 are provided in relevant sections of the Roadmap.

“And because we know that climate change is taking place, we are assessing our coastal and desert installations to help ensure they will be resilient to its effects. Planning for climate change and smarter energy investments not only make us a stronger military, they have many additional benefits – saving us money, reducing demand, and helping protect the environment. These initiatives all support President Obama’s Climate Action Plan...”

- Secretary Hagel

Halifax International Security Forum (DoD Arctic Strategy) Nov 2013

PLANS AND OPERATIONS

The changing climate will affect operating environments and may aggravate existing or trigger new risks to U.S. interests. For example, sea level rise may impact the execution of amphibious landings; changing temperatures and lengthened seasons could impact operation timing windows; and increased frequency of extreme weather could impact overflight possibility as well as intelligence, surveillance and reconnaissance capability. The opening of formerly-frozen Arctic sea lanes will increase the need for the Department to monitor events, safeguard freedom of navigation, and ensure stability in this resource-rich area. Maintaining stability within and among other nations is an important means of avoiding full-scale military conflicts. The impacts of climate change may cause instability in other countries by impairing access to food and water, damaging infrastructure, spreading disease, uprooting and displacing large numbers of people, compelling mass migration, interrupting commercial activity, or restricting electricity availability. These developments could undermine already-fragile governments that are unable to respond effectively or challenge currently-stable governments, as well as increasing competition and tension between countries vying for limited resources. These gaps in governance can create an avenue for extremist ideologies and conditions that foster terrorism. Here in the U.S., state

and local governments responding to the effects of extreme weather may seek increased DSCA. These potential effects are summarized in Table 1.

Table 1: Potential Effects of Climate Change on Department Plans & Operations
<ul style="list-style-type: none">• Increased demand for DSCA.• Increased demand for disaster relief and humanitarian assistance overseas.• Increased need for air, sea, and land capabilities and capacity in the Arctic region.• Altered, limited or constrained environment for military operations.• Instability within and among other nations.

As a Department, we need to better understand how the changing climate will affect plans and operations in the U.S. and abroad. The Department will need to monitor these developments and decide which situations will require intervention based on U.S. security interests – either preemptively through security cooperation and capacity building, or with stability measures once conditions escalate.

Specifically, the Department must assess how the projected effects of climate change may:

- Alter operating environments. As these operating environments change, so may the need for adjustments to Department capabilities and capacity.
- Impact Department planning assumptions.
- Interact with other stressors—poverty, environmental degradation, political instability and social tensions—to accelerate conflict and instability detrimental to U.S. interests.
- Impact capacity building projects, stability operations, and construction of military and civilian infrastructure.
- Affect the demand for Department capabilities and prioritization of engagement across the range of military operations, with special attention to overseas humanitarian assistance and disaster response missions.
- Influence demands on the Department, including the Reserve Component, to support DSCA and other emergency operations in the U.S.



Hospital ship USNS Comfort and fleet replenishment oiler USNS Leroy Gumman provide support in Haiti, February, 2010. Credit: US Navy, Petty Officer 3rd Class Matthew Jackson

TRAINING AND TESTING

Maintaining a capable and ready Force in the face of a rapidly changing strategic setting requires agility and preparedness. The Department must be able to train our Forces to meet the evolving nature of the operational environment. The Department executes training in the field environment to achieve and sustain proficiency in mission requirements. Similarly, the Department conducts testing in the field environment in anticipation of the military's use of weapons, equipment, munitions, systems, or their components. As such, access to the land, air, and sea space that replicate the operational environment for training and testing is critical to the readiness of the Force. Potential effects to the Department's training and testing are summarized in Table 2.

Table 2. Potential Effects of Climate Change on Department Training & Testing

- Increased number of ‘black flag’ (suspended outdoor training) or fire hazard days.
- Decreased training/testing land carrying capacity to support current testing and training rotation types or levels. Some training/testing lands may lose their carrying capacity altogether.
- Increased dust generation during training activities, which may interfere with sensitive equipment, resulting in greater repairs, or may require more extensive dust control measures to meet environmental compliance requirements.
- Stressed threatened and endangered species and related ecosystems, on and adjacent to DoD installations, resulting in increased endangered species and land management requirements.
- Increased operational health surveillance and health and safety risks to the Department’s personnel.
- Increased maintenance/repair requirements for training/testing lands and associated infrastructure and equipment (e.g., training roads, targets)

The Department must assess the effects of projected climate change on its:

- Ability to carry out training and testing activities in the field environment.
- Access to existing training lands. Diminished access may increase the demand for acquisition/development of new training lands or alternative training to maintain unit readiness.
- Readiness of an individual unit or an individual weapons system’s testing regime from ‘lost days’ at an individual training/testing location. The Department must assess these impacts at local training/testing assets and quantify the cumulative effects across all the Department’s training and testing.
- Health and safety risks to the Department’s personnel, and the extent to which demand for operational health surveillance programs and health services might increase.

BUILT AND NATURAL INFRASTRUCTURE

The Department manages a diverse mixture of built and natural infrastructure to support testing, training and other mission and readiness requirements. For example an installation may need a forest



Amphibious assault training. Credit: Petty Officer 3rd Class Amanda S. Kitchner

or desert landscape for maneuvers, coastal waters for amphibious assault training, or wetlands to prevent flooding and erosion. Climate change will have serious implications for the Department’s ability to maintain both its built and natural infrastructure, and to ensure military readiness in the future. Potential effects to the Department’s built and natural infrastructure are summarized in Table 3.

Table 3. Potential Effects of Climate Change on Department Built & Natural Infrastructure

- Increased inundation, erosion, and flooding damage.
- Changing building heating and cooling demand, impacting installation energy intensity and operating costs.
- Disruption to and competition for reliable energy and fresh water supplies.
- Damage from thawing permafrost and sea ice in Alaska and the Arctic region.
- Increased ecosystem, wetland, sensitive species, and non-native invasive species management challenges.
- Increased maintenance requirements for runways or roads to remain operable during extreme hot days.
- Changed disease vector distribution, increasing the complexity and cost of on-going disease management efforts.

The Department must assess the effects of projected climate change on the:

- Design, operation, maintenance and repair of buildings and transportation assets.
- Management of natural infrastructure assets, including unique landscapes, ecosystems and habitats, particularly those supporting sensitive species.
- Energy, fuel, water supply, and utility services, including electrical grid, drinking water, wastewater, and steam systems.
- Adequacy of existing stormwater management systems to accommodate more frequent and intense precipitation events.
- Emergency preparedness and response.
- Distribution of disease vectors, including exposure to diseases in regions not routinely encountered, that may have acute and long-term impacts on personnel health and safety.



Flooding at Keesler Air Force Base. Credit: SSgt Kimberly Rae

ACQUISITION AND SUPPLY CHAIN

The Department’s acquisition and supply chain include the full range of developing, acquiring, fielding, and sustaining equipment and services and leveraging technologies and capabilities to meet the Department’s current and future needs, including requirements analysis. Climate change impacts may affect the supplies, equipment, vehicles, and weapons systems the Department buys, where and from whom we buy them, how they are transported and distributed, and how and where they are stockpiled and stored. Potential effects to the Department’s acquisition and supply chain services are summarized in Table 4.

Table 4. Potential Effects of Climate Change on Department Acquisition & Supply Chain

- Changed operational parameters for current and planned weapons and equipment, resulting in increased associated maintenance requirements or requirements for new equipment.
- Reduced availability of or access to the materials, resources, and industrial infrastructure needed to manufacture the Department’s weapon systems and supplies.
- Interrupted shipment, delivery or storage/stockpile of materials or manufactured equipment and supplies.
- Alterations in storage and stockpile activities.
- Reduced or changed availability and access to food and water sources to support personnel.

The Department must assess the effects of projected climate change on its:

- Wide array of weapons systems, both in terms of operating range and associated maintenance requirements, and determine if new equipment is required to operate in new environments.
- Individual critical supplier, as well as the cumulative effects across all Department acquisition and supply activities, to identify critical component acquisition and supply chain vulnerabilities and associated cost increases.
- Key transportation modes and routes.
- Storage and stockpile activities, both at the individual site and cumulatively across the Department.

ONGOING EFFORTS

The Department has initiated several research and survey efforts to more fully identify and characterize vulnerabilities, impacts, and risks posed by climate change. The Department is implementing a phased installation-level vulnerability assessment approach to: develop methodologies for conducting consistent screening-level vulnerability assessments of military installations world-wide (starting with coastal and tidal installations); leverage recent scientific advancements regarding coastal assessment; and provide a platform to build upon prior to conducting more comprehensive and detailed assessments, whether coastal installations or otherwise.

A screening level survey assessment tool was piloted in the Fall of 2013 and was deployed in 2014 to assess current installation-specific vulnerability to climate impacts. Data from these screening-level assessments will be used to identify areas and installations where more detailed vulnerability assessments may be needed. The Department is using a whole-of-government approach to develop recommendations on regional sea level rise for use in more detailed coastal vulnerability and impact assessments of military installations worldwide, to ensure consistency in conducting these assessments.

As climate science advances, the Department will regularly reevaluate climate change risks and opportunities in order to develop policies and plans to manage its effects on the Department's operating environment, missions, and facilities. Research organizations within the Department, including the Strategic Environmental Research and Development Program (SERDP), are planning and completing studies to characterize climate change impacts in specific regions of the world and develop and pilot vulnerability assessment and adaptation methodologies and strategies.

Research involving coastal assessment method development is scheduled for completion during 2014. As a synthesis of this work, SERDP prepared a report in 2013 - *Assessing Impacts of Climate Change on Coastal Military Installations: Policy Implications* - that drew on the lessons learned from the SERDP-funded research efforts in the context of coastal installations and on the expertise of individuals within the DoD community and other Federal agencies. Work in other regions is still underway, including research designed to understand how: increased temperature trends and changes in the fire regime in the interior of Alaska will impact the dynamics of thawing permafrost and the subsequent effects on hydrology, access to training lands, and infrastructure; and changes in storm patterns and sea levels will impact the Department's Pacific Island installations, including their water supplies.

GOAL 2 – INTEGRATE CLIMATE CHANGE CONSIDERATIONS ACROSS THE DEPARTMENT AND MANAGE ASSOCIATED RISKS

Overview. Continue efforts to integrate climate considerations into programs, operations, plans and processes. Develop and implement adaptation strategies to address risks identified through the iterative assessment process in Goal 1.

Adaptation to climate change cannot be a separate decision-making process, but rather integrated into the Department’s existing management processes. Therefore, the Department will review and, as needed, make changes to existing plans, policies, programs, and operations to incorporate climate change considerations. Some additional policy and guidance may be needed to support specific activities and adaptation implementation; however, by and large, the Department will use existing mechanisms to implement policy and guidance that ensure mission resilience.

“Climate change shapes the operating environment and the missions that DoD must undertake.”

- John Conger, Acting Deputy Undersecretary of Defense for Installations and Environment

March/April 2014,
Environmental Law Institute Forum

PLANS AND OPERATIONS

Dynamic environmental conditions, climate-aggravated flashpoints, and increasingly severe natural disasters may require adaptations to how the Department plans and executes operations around the globe. As appropriate, the Department will seek refinements to existing processes and develop new climate-specific plans and guidance.

Specifically, the Department will review and, as needed, modify:

- Plans and guidance unique to climate change related challenges, such as the Department’s Arctic Strategy and the Navy’s Arctic Roadmap.
- Overarching Department-wide plans and guidance to Combatant Commanders.
- Combatant Command deliberate planning, including Theater Campaign Plans, Operation Plans, Contingency Plans, and Theater Security Cooperation Plans.
- Country-specific cooperation and engagement.
- Department-wide Force planning analyses and processes, including Defense Planning Scenarios and war games.
- Internal policy guidance provided to the Components for the preparation and review of program and budget submissions.
- Total Force capacity and capabilities for DSCA, disaster relief, and humanitarian assistance, to include specific focus on the Reserve Component.

TRAINING AND TESTING

The Department’s long-standing stewardship of its training and testing lands is articulated through its sustainable range program, installation-level Range Complex Master Plans (RCMPs), and the Readiness and Environmental Protection Initiative (REPI). As appropriate, the Department will seek refinements to existing processes and develop new climate-specific plans and guidance.

Specifically, the Department will review and, as needed, modify:

- The sustainable range program, RCMPs, and the REPI program.
- Training and testing plans, including the location, frequency, and duration of training and testing rotations.
- Future Base Realignment and Closure (BRAC) and stationing decisions.
- Health surveillance programs, including increased frequency of health monitoring, and adequacy of personnel protective equipment.



U.S. Marines and Navy sailors range training in the Middle East in 2009 under dry conditions. Credit: USMC Cpl Robert C. Medina

BUILT AND NATURAL INFRASTRUCTURE

DoD installations are in essence “power projection platforms” from which the Department employs Forces across the full spectrum of military operations. As such, adapting to changing climate conditions is critical to the ability of the Department to address current and future threats, and sustain its mission. Effective adaptation planning will ensure the continued availability of the land, air, and water resources at our installations and ranges so the Department can train and operate today and into the future. As appropriate, the Department will seek refinements to existing processes and develop new climate-specific plans and guidance. Specifically, the Department will review and, as needed, modify:

- Installation Master Plans to guide development activities.
- Integrated Natural Resource Management Plans (INRMPs), Integrated Cultural Resource Management Plans (ICRMPs), and Integrated Pest Management Plans (INMPs).
- Design and construction standards.
- Encroachment management plans and programs.
- Stormwater management and other utility systems.
- Facility maintenance and repair cost models.
- Installation-level water resource management plans.
- Emergency preparedness and response planning.

ACQUISITION AND SUPPLY CHAIN

The Department depends upon the private sector for the manufacture of its weapons systems and replacement parts. Many major corporations have recognized the potential effects of climate change on their operations and are aggressively pursuing manufacturing/supply resiliency efforts. As appropriate, the Department will seek refinements to existing processes and develop new climate-specific plans and guidance.

Specifically, the Department will review and, as needed, modify:

- Requirements analysis and acquisition strategies, including strategic reserves and stockpiles for critical components.

- New and existing weapons systems and their associated maintenance plans.
- Storage, distribution, and transportation activities, including transportation modes and routes.

ONGOING EFFORTS

In 2013, the Department initiated a review of existing directives, policies, manuals, and associated guidance documents and criteria to identify which ones should incorporate considerations of a changing climate. The initial screen identified 58 documents for review, primarily associated with mission assurance, plus those having the potential to adversely impact the Department's mission if climate change risks were not addressed. During 2014, the Department will work within the existing review and update cycle to establish a plan for incorporating consideration of climate change into the appropriate documents.

Many infrastructure managers are already adapting to changing climate factors. Reported rebuilding efforts after extreme storms include upgrading to more wind-resistant structures, burying utility lines underground, changing storage locations for chemicals used in low-lying wastewater treatment plants, protecting water supply wells, and removing vulnerable trees. In preparation for the possibility of more wildfires, installations reported preparing better firebreaks and making timber stand improvements to reduce fire fuel loads.

"[DoD] needs to consider all aspects of the global security environment and plan appropriately for potential contingencies and the possibility of unexpected developments both in the near and the longer terms. It is in this context that the Department of Defense must consider the effects of climate change ... and how these effects could impact our national security."

- Dr. Daniel Chiu

Deputy Assistant Secretary of Defense for Strategy and Force Development, Testimony to the Senate Defense Appropriations Subcommittee, May 21, 2014

The 2012 Unified Facilities Criteria for Installation Master Planning (UFC 2-100-01) requires the consideration of climatic conditions along with other variables already being assessed (e.g., changes in mission requirements, surrounding land use and population density, and infrastructure assets and configurations beyond and linking to the installation). The 2013 UFC for High Performance and Sustainable Building Requirements (UFC 1-200-02), mandates the consideration of changing climate conditions when designing buildings, including potential increased heating or cooling requirements. The Department issued a Floodplain Management Policy in February 2014 that establishes requirements to minimize risks when military assets must be located within flood plains.

The Department is exploring the expansion of applications of risk management schemes already in use, primarily within the Defense Critical Infrastructure Program. Decisions on where and how to locate future infrastructure will become increasingly reliant on robust risk management processes that account for dynamic factors associated with climate change. While the initial modifications to risk management methodologies are focused on critical infrastructure, it is anticipated that the Department will utilize them across all decision making in the future.

Similarly, the Department already takes many actions addressing its natural infrastructure. The Natural Resources Conservation Program policy (DoDI 4715.03) was updated in 2011 to incorporate consideration of potential climate change impacts in the management of installation natural resources.

These considerations are documented in the INRMPs which are coordinated with the appropriate fish and wildlife management agencies. The INRMP Implementation Guide (DoDM 4715.03) was issued in November 2013 and provides specific direction for how INRMPs should incorporate climate change. Adaptive management approaches are the foundation for sustainable use of natural resources to support mission needs, meet stewardship requirements, and contribute to ecosystem resilience in the face of climate change. Maintaining ecosystem resilience is a key adaptation strategy given the uncertainty of potential impacts.

The Department is actively conducting research that will support further integration of climate change. This includes projects that: assess potential changes in the intensity, duration, and frequency of extreme precipitation events, including changes in the timing and intensity of snowmelt and subsequent run-off events; include development of adaptive decision frameworks; and address understanding the characteristics of species that are either conservation (management) reliant or adaptable to potential changes in climate and human activities.

GOAL 3: COLLABORATE WITH INTERNAL AND EXTERNAL STAKEHOLDERS ON CLIMATE CHANGE CHALLENGES

Overview. Promote deliberate collaboration with stakeholders – across the Department and with other Federal, State, local, tribal and international agencies and organizations - in addressing climate change considerations. This collaboration may include expanded operations, adaptation strategies and research.

Partnerships are needed to fully ensure the Department’s mission is sustainable under climate change. The Department cannot effectively assess its vulnerabilities and implement adaptive responses at its installations if neighbors and stakeholders are not part of the process. The Department’s decisions and those of neighboring communities are intrinsically interconnected. Aspects of our mission, such as Force deployment, may be affected by assets outside our control, such as transportation infrastructure.

The complexities and uncertainties of climate change require a whole-of-government approach. The Department already participates in nationwide efforts such as the U.S. Global Change Research Program and the National Climate Assessment sustained assessment process. It also partners with individual agencies such as the National Oceanic and Atmospheric Administration on, for example, the development and operational implementation of a national Earth System Prediction Capability.

The Department is also represented on all of the councils and working groups established under EO 13653 and will continue to participate in federal climate partnerships and other interagency processes. The Department, through the Air Force Weather Agency, contributes earth-space environmental data, receiving nearly 500,000 weather observations and satellite-derived wind profiles each day and sharing these data with the National Climatic Data Center and the Navy’s Fleet Numerical Meteorological and Oceanographic Center.

“Climate change also creates both a need and an opportunity for nations to work together, which the Department will seize through a range of initiatives. We are developing new policies, strategies, and plans, including the Department’s Arctic Strategy and our work in building humanitarian assistance and disaster response capabilities, both within the Department and with our allies and partners.”

- 2014 Quadrennial Defense Review

PLANS AND OPERATIONS

Collaboration is essential to effectively adapting Department plans and operations, and the Department will enhance collaboration within the Department itself, across the Federal Government, and with external entities that include partner nations, non-government organizations, and the private sector. Focus areas include:

- Cooperation with the Coast Guard, other agencies, and other Arctic nations to ensure that the increasingly accessible Arctic region remains peaceful and open to all nations.
- Continued collaboration with the State Department and foreign militaries to improve vulnerability assessments and adaptation efforts.
- Collaboration with interagency, state, and local officials to streamline and integrate responses to extreme weather events in the U.S.
- Cooperation with partner nations to enhance planning, responses, and resilience to the effects of climate change.

TRAINING AND TESTING

The anticipated effects of climate change on the Department's ability to train and test will drive the need for creative collaboration at multiple levels. Focus areas include:

- Shared use of training and testing assets within the Department and with our Allies.
- Collaboration with maritime and land management agencies.
- Collaboration with the medical and research communities to address health surveillance and disease treatment programs.

BUILT AND NATURAL INFRASTRUCTURE

Effective collaboration with internal and external stakeholders will be required to address myriad built and natural infrastructure challenges. Focus areas include:

- Collaboration on design, construction, and operation of high-performance sustainable buildings and construction standards.
- Collaboration with surrounding communities for planning climate change adaptation and emergency preparedness and response.
- Collaboration with other land/resource management agencies with regard to encroachment challenges.
- Expansion of partnerships with external, non-federal government land and resource stewardship organizations.
- For overseas installations, coordination with host nation military and other appropriate organizations.



Secretary Hagel hosted 10 defense ministers of the Association of Southeast Asian Nations on April 2, 2014. One topic was collaboration on non-traditional security challenges, such as climate change and natural disasters. Credit: DoD Photo by Erin A. Kirk-Cuomo

ACQUISITION AND SUPPLY CHAIN

Collaboration with the private sector, including major manufacturing, supply, and transportation corporations, may enable the Department to leverage best practices and adaptation strategies to increase resiliency in the Department's acquisition and supply enterprises. Focus areas include:

- Collaboration with external producers and suppliers, transportation networks, and inventory management entities.
- Collaboration with industry as part of the acquisition and procurement process.
- Collaboration within the Department to increase shared use of supply/resupply networks and maintenance facilities.
- Collaboration with other Federal Agencies to leverage best practices and adaptation strategies.

Annex 1. Cross Reference: EO 13653 Implementation Requirements vs. Roadmap

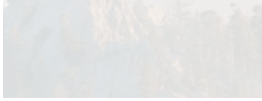
Preparing Federal Agency Climate Change Adaptation Plans in Accordance with Executive Order 13653 (12/19/13)	Department of Defense FY 2014 Climate Change Adaptation Roadmap
Planning Requirements	NA
Affirming Agency Commitment – Policy Framework for Climate Change Adaptation	Policy Framework for Climate Change Adaptation
Planning for Climate Change Related Risk: Section 5(a) of E.O. 13653 states that, “each agency shall develop or continue to develop, implement, and update comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives...”	NA
i. identification and assessment of climate change related impacts on and risks to the agency’s ability to accomplish its missions, operations, and programs	Goal 1: Identify and assess the effects of climate change on the Department
ii. description of programs, policies, and plans the agency has already put in place, as well as additional actions the agency will take, to manage climate risks in the near term and build resilience in the short and long term	Goal 2: Integrate climate change considerations across the Department and manage associated risks
iii. a description of how any climate change related risk identified pursuant to paragraph (i) of this subsection that is deemed so significant that it impairs an agency’s statutory mission or operation will be addressed, including through the agency’s existing reporting requirements	Goal 1: Identify and assess the effects of climate change on the Department
iv. a description of how the agency will consider the need to improve climate adaptation and resilience, including the costs and benefits of such improvement, with respect to agency suppliers, supply chain, real property investments, and capital equipment purchases such as updating agency policies for leasing, building upgrades, relocation of existing facilities and equipment, and construction of new facilities	Goal 2: Integrate climate change considerations across the Department and manage associated risks
v. a description of how the agency will contribute to coordinated interagency efforts to support climate preparedness and resilience at all levels of government, including collaborative work across agencies’ regional offices and hubs, and through coordinated development of information, data, and tools, consistent with section 4 of this order. [Note: section 4 is ‘providing information, data, and tools...’]	Goal 3: Collaborate with internal and external stakeholders on climate change challenges
Modernizing Federal Programs and Policies to Support Climate Resilient Investment: Section 2(a) of E.O. 13653 states that Federal agencies shall address efforts to modernize Federal programs and policies “(To) support the efforts of regions, States, local communities, and tribes, ... consistent with their missions and in coordination with the Council on Climate Preparedness and Resilience (Council) established in section 6 of this order...” That section also states that agencies shall “report on their progress in achieving the requirements identified above, including accomplished and planned milestones, in the Agency Adaptation Plans developed pursuant to section 5 of this order.”	NA
IV.i. identify and seek to remove or reform barriers that discourage investments or other actions to increase the Nation’s resilience to climate change while ensuring continued protection of public health and the environment	Goal 1: Identify and assess the effects of climate change on the Department
IV.ii. reform policies and Federal funding programs that may, perhaps unintentionally, increase the vulnerability of natural or built systems, economic sectors, natural resources, or communities to climate change related risks	Goal 2: Integrate climate change considerations across the Department and manage associated risks
IV.iii. identify opportunities to support and encourage smarter, more climate-resilient investments by States, local communities, and tribes, including by providing incentives through agency guidance, grants, technical assistance, performance measures, safety considerations, and other programs.	Goal 3: Collaborate with internal and external stakeholders on climate change challenges
Senior Level Commitment... updated Plans must be reviewed and signed by the agency representative to the Council.	Policy Framework for Climate Change Adaptation

Annex 2. High-Level Summary of Potential Impacts

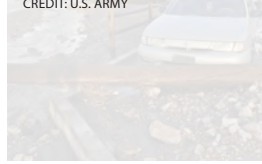
Potential Effects of Climate Change on the Department
Plans and Operations
<ul style="list-style-type: none"> • Increased demand for DSCA. • Increased demand for disaster relief and humanitarian assistance overseas. • Increased need for air, sea, and land capabilities and capacity in the Arctic region. • Altered, limited or constrained environment for military operations. • Instability within and among other nations.
Training & Testing
<ul style="list-style-type: none"> • Increased number of ‘black flag’ (suspended outdoor training) or fire hazard days. • Decreased training/testing land carrying capacity to support current testing and training rotation types or levels. Some training/testing lands may lose their carrying capacity altogether. • Increased dust generation during training activities, which may interfere with sensitive equipment, resulting in greater repairs, or may require more extensive dust control measures to meet environmental compliance requirements. • Stressed threatened and endangered species and related ecosystems, on and adjacent to DoD installations, resulting in increased endangered species and land management requirements. • Increased operational health surveillance and health and safety risks to the Department’s personnel. • Increased maintenance/repair requirements for training/testing lands and associated infrastructure and equipment (e.g., training roads, targets)
Built & Natural Infrastructure
<ul style="list-style-type: none"> • Increased inundation, erosion, and flooding damage. • Changing building heating and cooling demand, impacting installation energy intensity and operating costs. • Disruption to and competition for reliable energy and fresh water supplies. • Damage from thawing permafrost and sea ice in Alaska and the Arctic region. • Increased ecosystem, wetland, sensitive species, and non-native invasive species management challenges. • Increased maintenance requirements for runways or roads to remain operable during extreme hot days. • Changed disease vector distribution, increasing the complexity and cost of on-going disease management efforts.
Acquisition & Supply Chain
<ul style="list-style-type: none"> • Changed operational parameters for current and planned weapons and equipment, resulting in increased associated maintenance requirements or requirements for new equipment. • Reduced availability of or access to the materials, resources, and industrial infrastructure needed to manufacture the Department’s weapon systems and supplies. • Interrupted shipment, delivery or storage/stockpile of materials or manufactured equipment and supplies. • Alterations in storage and stockpile activities. • Reduced or changed availability and access to food and water sources to support personnel.

O N T H E F R O N T C O V E R

A C130J FROM THE 146TH AIRLIFT WING IN PORT HUENEME, CALIF., DROPS A LINE OF RETARDANT OVER THE TREES IN THE MOUNTAINS ABOVE PALM SPRINGS JULY 19, 2013.
CREDIT: AIR NATIONAL GUARD, SrA NICHOLAS CARZIS



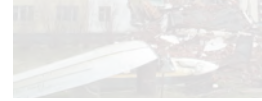
DAMAGE FROM SEVERE PRECIPITATION AND FLASH FLOODING AT FT. IRWIN, CALIFORNIA, AUGUST 2013.
CREDIT: U.S. ARMY



SEAMAN RECRUITS JAMAL POWELL (LEFT) AND STEPHEN HARMON STAND THE FORWARD LOOKOUT WATCH ABOARD THE GUIDED-MISSILE CRUISER USS NORMANDY (CG 60) AS THE SHIP NAVIGATES THROUGH AN ICE FIELD IN THE ARCTIC CIRCLE NORTH OF ICELAND ON JUNE 12, 2007.
CREDIT: U.S. NAVY, LTJG RYAN BIRKELBACH



THAW SETTLEMENT RELATED TO PERMAFROST DEGRADATION IS PRESENTLY RESPONSIBLE FOR DAMAGE TO HOUSES, ROADS, AIRPORTS, MILITARY INSTALLATIONS, PIPELINES, AND OTHER FACILITIES FOUNDED ON ICE-RICH PERMAFROST.
CREDIT: VLADIMIR E. ROMANOVSKY



ARMY TESTS NETWORK CAPABILITIES AT NIE 14.2.
CREDIT: NANCY JONESBONBREST, PEO C3T



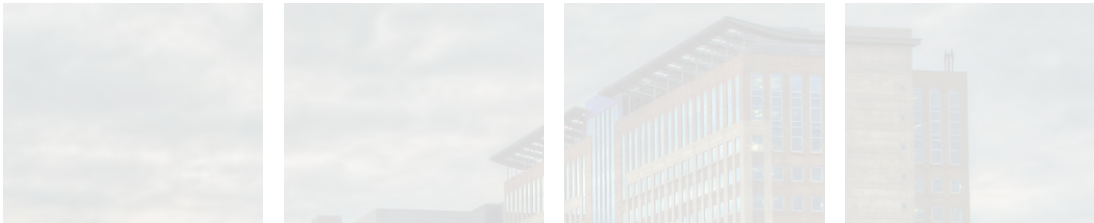
HATCHLINGS FROM ENDANGERED SEA TURTLES ARE RELEASED INTO THE ATLANTIC OCEAN NEAR KENNEDY SPACE CENTER/CAPE CANAVERAL.
CREDIT: NASA, KIM SHIFLETT



NORTH DAKOTA NATIONAL GUARD VEHICLES PATROL ONE OF THE MANDATORY EVACUATION ZONES IN MINOT, N.D. JUNE 22, 2011, FLOODED BY THE RISING WATER OF THE SOURIS RIVER. THE PATROLS ENSURE THAT ALL CITIZENS HAVE EVACUATED THEIR HOMES AND RENDER ANY REQUIRED ASSISTANCE.
CREDIT: USAF, SMSgt DAVID LIPP



O N T H E B A C K C O V E R



THE 17- AND 15-STORY OFFICE TOWERS AT THE DoD MARK CENTER COMPLEX IN ALEXANDRIA, VA., COMPLETED IN 2011, CONSOLIDATED ABOUT 6,400 EMPLOYEES FROM VARIOUS DoD AND RELATED AGENCIES THROUGHOUT THE NATIONAL CAPITAL REGION. THE PROJECT WAS PART OF THE 2005 BASE REALIGNMENT AND CLOSURE (BRAC) MANDATE AND INCLUDES THE TALLEST STRUCTURES EVER BUILT BY THE U.S. ARMY CORPS OF ENGINEERS. THE ARMY CORPS' NEW YORK DISTRICT MANAGED THE DESIGN AND CONSTRUCTION OF THE \$1.08 BILLION PROJECT. THE DoD MARK CENTER COMPLEX IS CERTIFIED BY THE U.S. GREEN BUILDING COUNCIL FOR LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN, OR LEED GOLD.
PHOTO CREDIT: MARC BARNES, ARMY MEDICINE



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