Department of Defense
Strategic Sustainability Performance Plan

FY 2011

JUL 1 1 2011

The mission of the Department of Defense (DoD) is to provide the military forces needed to deter war and to 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 provides the framework necessary to ensure the longevity of these resources, by attending to energy, environmental, safety, and occupational health considerations. Incorporating sustainability into DoD planning and decision-making enables us to address current and emerging mission needs and consider future challenges.

This annual update of the DoD Strategic Sustainability Performance Plan lays out our goals and sustainability performance expectations over the next decade, establishing the path by which the Department will enhance our ability to achieve our mission, lower life cycle costs, and advance technologies and practices that further the sustainability goals of the Nation. The Department not only commits to complying with environmental and energy statutes, regulations, and Executive Orders but to going beyond compliance where it serves our national security needs.

It is DoD policy to address sustainability concepts in our acquisition and procurement processes and in planning and managing our installations. We are committed to integrated risk management practices that protect the environment and promote sustainability while advancing our mission. For every DoD program, the Department will actively seek opportunities to continually improve its activities, and we will continue to develop and improve methodologies to ensure systematic analysis, informed decision-making, and appropriate budgets to address sustainability. We will use our size to leverage sustainable technology development, and, by doing so, jumpstart commercial adoption and achieve payoffs that extend well beyond the defense sector.

During 2010, the Department made significant progress in laying the foundation for the next decade of progress. The Department, Military Services, and other DoD Components issued seminal policy and guidance documents to promote successful implementation of this Plan across the Department. In 2011 and 2012, our primary sustainability focus will be to reduce DoD reliance on fossil fuels through energy efficiency and renewable energy and to continue making the institutional improvements needed to incorporate sustainability into DoD doctrine, policies, budgets, and action.

Although we still have much to do, the Department is committed to making the bold changes necessary to continue our culture of excellence in environmental and fiscal stewardship and to improve national security.

Ashton B. Carter

DoD Senior Sustainability Officer
Under Secretary of Defense
for Acquisition, Technology and Logistics

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Part I: DoD Policy and Strategy

I.1 Sustainability and the DoD Mission

The Department'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 manufactured systems that support it. DoD embraces sustainability as a critical enabler in the performance of our mission, recognizing that it must plan for 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 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 learning to apply this mindset to improve mission performance and reduce lifecycle costs. The Department recognizes that many key issues facing DoD can be addressed through smart investments that improve sustainability as well as promote the mission, 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.

> '"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*

The DoD Strategic Sustainability Performance Plan (the Plan) provides a coherent approach both for complying with multiple federal requirements for sustainability and for ensuring the mission. The Plan does not directly address combat operations and support, such as expeditionary bases, ships, and aircraft. However, this section of the Plan 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 expeditionary bases 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 base camps. Improved expeditionary 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, sustainable practices, to the extent they can be shared with partner nations, build international resilience in the face of climate change. This resilience can contribute to the Department's goal of conflict prevention as outlined in the 2010 Quadrennial Defense Review.

The link between sustainability and the DoD mission is discussed in terms of four key areas of sustainability that form priorities for the Department:

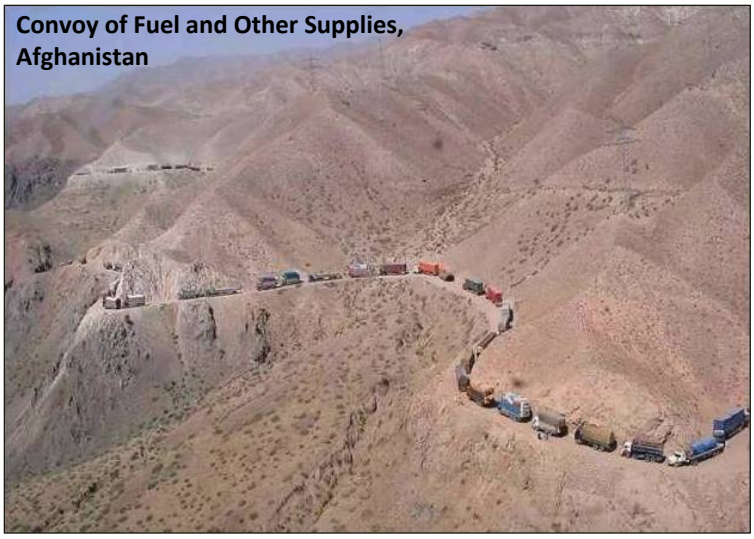
1) Energy and Reliance on Fossil Fuels
2) Chemicals of Environmental Concern
3) Water Resources Management
4) Maintaining Readiness in the Face of Climate Change

> **DoD Energy Security**
>
> "Energy security for the Department means having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs. Energy efficiency can serve as a force multiplier, because it increases the range and endurance of forces in the field and can reduce the number of combat forces diverted to protect energy supply lines, which are vulnerable to both asymmetric and conventional attacks and disruptions."
>
> *— DoD Quadrennial Defense Review, 2010*

I.1.A DoD Reliance on Energy

The U.S. military's reliance on energy—and fossil fuels in particular—poses four broad security challenges. First is the growing operational risk to forces deployed around the globe. Attacks on fuel convoys and fixed energy supplies in Afghanistan, Iraq, and surrounding countries already demonstrate the vulnerability of our current supply networks, and future adversaries likely will possess additional capabilities to target logistics and fuel infrastructure with even greater lethality. A second challenge is the security of petroleum distribution networks. Most petroleum products are transported by sea, and much of this trade passes through vulnerable chokepoints such as the Strait of Hormuz and the Straits of Malacca. Piracy, political instability and military action can threaten the free flow of energy through these vital channels. Additionally, the trend over the last thirty years to migrate refinement of petroleum products to fixed locations outside our country's borders increases vulnerability of usable petroleum products to physical attack, political unrest and commercial mismanagement at governmentally controlled facilities. Energy supply vulnerability is, therefore, a strategic as well as a tactical threat. A third challenge is the price volatility of a valuable commodity such as petroleum. Political instability and tightening global oil supplies within some oil-producing nations create significant price volatility, raising our costs and making budget and acquisition decisions more difficult. The effects of these costs are significant, both in terms of the billions of dollars the nation sends overseas and in the geostrategic consequences. The challenge will increase as the growing demand for energy—particularly in Asia—places pressure on projected oil production and refining capacity.

Relating specifically to the fixed installations under the purview of this Plan, a final challenge is grid vulnerability. DoD's reliance on the commercial grid to deliver electricity to more than 500 major installations places the continuity of critical missions at risk. In general, installations lack the ability to manage their demand for and supply of electrical power, 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 committed to renewable energy not only because it is dedicated to showing leadership in sustainability, but because it 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 and mitigated as needed for any mission or readiness impacts.



Convoy of Fuel and Other Supplies, Afghanistan

Photo: U.S. Army

The Department continues to pursue an investment strategy designed to reduce energy demand in fixed installations, while increasing the supply of renewable energy sources. Efforts to curb demand for energy—through conservation measures 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, improved lighting, and "green" roofs.

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 climates in the United States, affording an exceptional opportunity to assess the technical validity, operating costs, and environmental impact of advanced, pre-commercial technologies. As both a real and a virtual test bed, our facilities can serve as a sophisticated first user, evaluating the technical validity, cost and environmental impact of advanced, pre-commercial technologies. The Department's energy test bed concept is being applied to improve the energy efficiency of buildings, improve renewable energy technologies on or in proximity to installations, and develop smart microgrids. DoD can help create a market for those technologies that prove effective and reliable by serving as an early adopter, as it did with jet engines, computers and the internet. The test bed approach is key to meeting the Department's needs, allowing DoD to leverage both cost savings and technology advances from the private sector. 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.

Photo: U.S. Army

Convoy in Southern Afghanistan negotiates holes made by improvised explosive devices

Energy Management in Operations

The fiscal year (FY) 2009 National Defense Authorization Act defines "operational energy" as the energy required for training, moving, and sustaining military forces and weapons platforms for military operations; it includes energy used by tactical power systems, generators, and weapons platforms. On June 14, the Department released its first operational energy strategy, and a week earlier General Petraeus issued a memorandum which holds field commanders in Afghanistan responsible for the fuel demand of their units. These actions demonstrate recognition by the Department that energy is a capability we can manage, to shift the strategic liability that operational energy represents today into an advantage in the future.

Along with integrating operational energy security into the future force, improvements in the end use and supply of operational energy will be force multipliers that increase the range, endurance, and effectiveness of our military missions. DoD is assessing, testing, and implementing a range of technologies and concepts to reduce the use of energy at expeditionary bases. Across the Department, the Services are employing a range of alternatives associated with power generation and distribution, shelter systems, and personnel and base camp equipment for use at the tactical edge. Together, these efforts to reduce demand and expand supply will enhance combat effectiveness and reduce risk and cost. Operational energy is necessarily exempt from the greenhouse (GHG) emission reduction 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 its 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 lifecycle costs of weapon systems and facilities. The Department must protect people and readiness by reducing

the use of such high-risk contaminants 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, affecting the performance, cost, and schedule of the acquisition of new weapon systems, as well as their maintenance. 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 to the Department, in labor and management time as well as in direct costs. Through the use of safer and greener chemicals, even if they have an appreciably higher purchase price than the chemicals they replace, the Department can realize savings in avoided compliance and other costs.

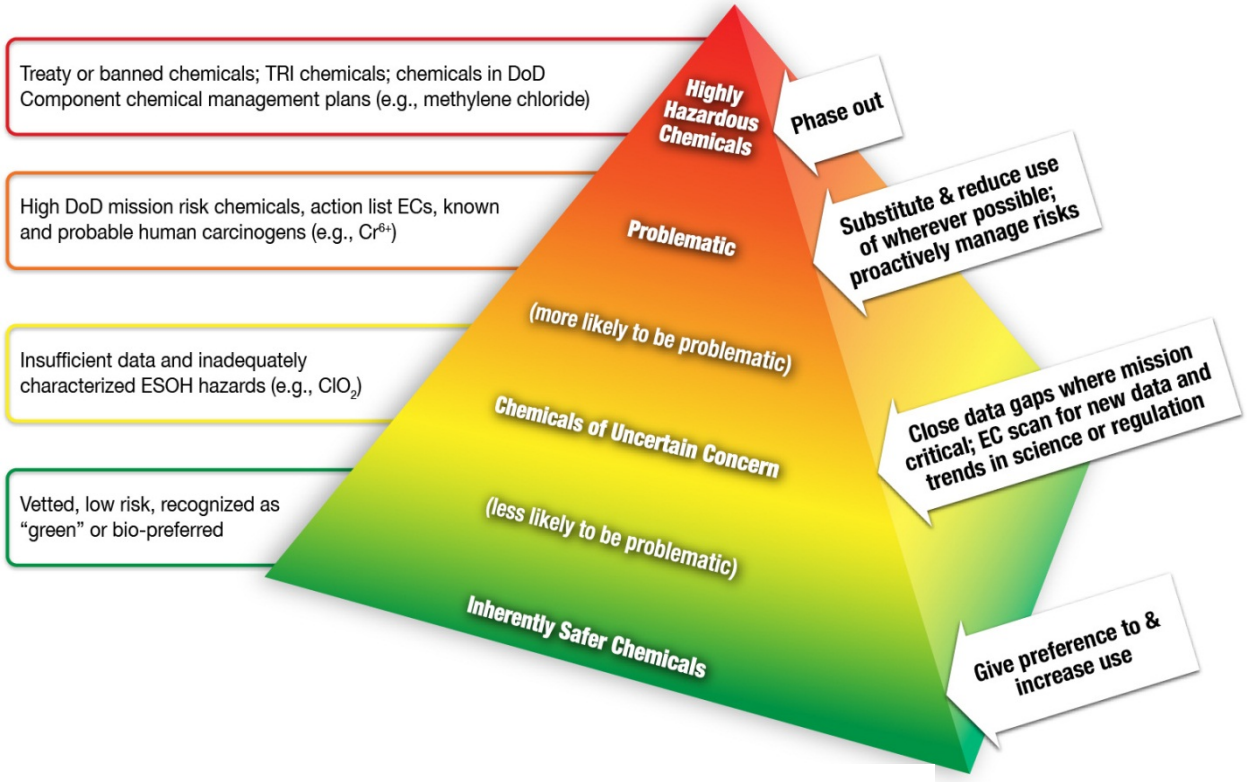
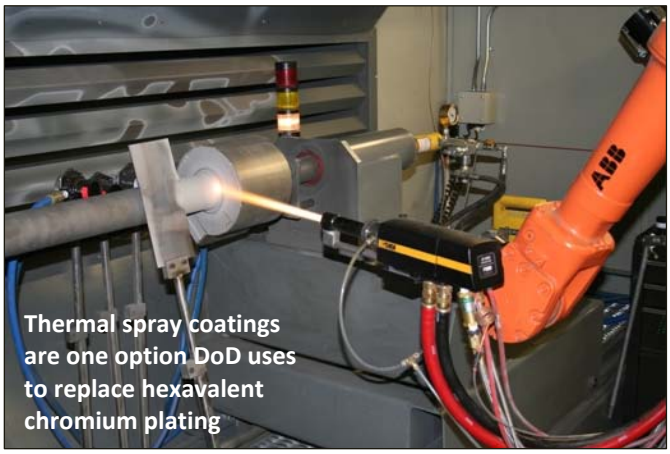


Figure I.1. DoD Chemical Risk Management Strategy
(ECs are emerging contaminants)

Figure I.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 lifecycle approach that considers the selection, management, use and disposal of chemicals of environmental concern in all of its operations. Acquisition reform efforts include evaluation of environmental, safety, and occupational health (ESOH) considerations, including chemical and material selections, earlier in the design phase as part of the DoD Systems Engineering Plan. Sustainment Plans, which address how a weapon system is maintained to ensure readiness, will also include life cycle risk assessments. For example, future regulatory restrictions must be taken into account, as 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, including the construction of separate areas for chemical use, requirements for additional personal protective equipment, proper collection and disposal, and reporting requirements. A successful approach the Department employs to manage hazardous materials is the Consolidated Hazardous Materiel 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, issuing and re-issuing hazardous materials, where the amount of material dispensed for a given purpose is specifically matched to the required quantity, and any remaining material is sent back (or picked up), 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 sustainment and operational activities at military installations.



Thermal spray coatings are one option DoD uses to replace hexavalent chromium plating

Photo: SprayTec Coating Solutions, LLC

The enterprise-wide management of the selection, acquisition, distribution, use, and disposal of chemicals will better prepare DoD for potential future regulatory initiatives. This lifecycle approach of anticipating developments at the international, national and state levels will inform the chemical-usage decisions made by DoD today, and promote military readiness for tomorrow. DoD's emerging contaminants 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 hundreds of chemicals and identified over 50 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 tens of thousands times greater than carbon dioxide. For example, sulfur hexafluoride (SF_6) is critical as a dielectric material in Airborne Warning and Control System radar systems. While it is nontoxic, it is also an extremely potent GHG, remaining in the atmosphere for 3,200 years and having 23,000 times the warming potential as carbon dioxide over a 100-year period. At the state level, SF_6 is starting to being regulated (e.g., California Code of Regulations, Subarticle 3.1, *Regulation for Reducing SF_6 from Gas Insulated Switchgear*, sections 95350 to 95359, title 17). DoD anticipates that SF_6 will be regulated more in the future, which could threaten its availability over the long-term and will certainly increase its cost. In response, the Department issued policy in October 2010 directing the Military Departments to develop and implement procedures to reduce, capture and recycle SF_6 where it is operationally, technically and economically feasible. DoD has been researching ways to reduce SF_6 leakage and searching for alternatives to replace it.

Some hydrofluorocarbons (HFCs) also have high global warming potentials (GWPs). The Department has dedicated significant effort to deploying alternatives to substances that deplete earth's protective stratospheric ozone layer, but for many applications the only alternatives identified so far are HFCs. While HFCs often 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, and proposals have been made to phase them out via an amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer. HFCs are used 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 weapon systems—which often have operational lifetimes of 30 to 50 years—continue to be designed and built 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 it coordinates with the Environmental Protection Agency (EPA) 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 or "green" chemicals to protect the Department from mission risks associated with the removal of certain hazardous and toxic substances from the market or significant increases in their cost. The Department looks in particular for green alternatives that deliver mission benefits in addition to environmental benefits, as mission benefits are more likely to drive the adoption of new products. Green alternatives can also provide other sustainability benefits as well. DoD's Green Procurement Program is essential for increasing the Department's use of safer chemicals and products. 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. In the theater of war, water poses the same challenges as liquid fuel, requiring the protection of large, vulnerable convoys as it is transported to war fighters. Also, the treatment and disposal of wastewater is a human health and environmental issue for our soldiers and the civilian populations we are protecting in theaters of war. For example, it is common for the solid component of human sewage to be disposed via open air burning, combusted with liquid petroleum products such as jet fuel or diesel. Burn pits have been identified as a health risk for the war fighters tending to the burn. To address the issues of water and wastewater in expeditionary bases, the Services and SERDP are supporting research and development into technologies suitable for expeditionary bases that can reclaim potable and non-potable water from graywater and blackwater. Reclaiming expeditionary base wastewater will greatly reduce the amount of water that needs to be delivered to our troops, while reducing the volume of wastewater requiring treatment and disposal. Additionally, the Department is leveraging cost effective commercial sector technology solutions to reclaim contaminated water during the heavy oil extraction process in the Athabasca oil sands in Alberta, Canada.


Overturned Marine Corps water delivery truck in Iraq

Photo: U.S. Marine Corps

At fixed installations, water is also a mission imperative. Water scarcity has caused a number of DoD installations in the U.S. to implement aggressive water conservation and reuse measures. So far, most of these

installations have been located in arid portions of the West, but water scarcity is becoming an issue across the country. Water supply and distribution, water use, wastewater treatment, and stormwater management 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 carbon dioxide. A low impact development (LID) 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 wastewater helps prevent system overload problems such as combined sewer overflows, while also reducing the consumption of energy required to operate the wastewater treatment system.

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

Climate Change, Energy and DoD

"Climate change and energy will play significant roles in the future security environment. Climate change will shape the operating environment, roles, and missions that we undertake…[and]… DoD will need to adjust to the impacts of climate change on our facilities and military capabilities. The Department is developing policies and plans to manage the effects of climate change on its operating environment, missions, and facilities."

— DoD Quadrennial Defense Review, 2010

The 2010 Quadrennial Defense Review highlighted the importance of managing the effects of climate change, citing energy security and climate change as significant challenges requiring a change in how the Department operates. Climate change is predicted to affect the Department in many ways, including direct effects on installations and less direct impacts such as the destabilization of 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 other lands needed for operations, and increasing flood and fire hazards and grid vulnerability.

The Department's low-lying 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 perhaps reduce water supply due to seawater intrusion. In areas of the United States with hurricanes, evidence points to more intense hurricanes. In other areas, climate change may increase the intensity of precipitation events, raising the threat of flooding. The more frequent and extreme heat projected to occur with climate change may limit outdoor training, strain 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 worsen with the warmer temperatures resulting from climate change.

"The Department must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required."

— DoD Quadrennial Defense Review, 2010

In many areas, the warmer temperatures will reduce the amount of snow pack in the mountains, and it is common in the U.S. and elsewhere for areas to rely on mountain snow melt for a significant amount of their water supply. Higher temperatures are also projected to increase the risk of wildfire by reducing moisture in the soil and plant material, and in some areas by lengthening the fire season. Because a variety of range activities can start fires, an increased risk of uncontrolled wildfires can have direct mission consequences. The changing temperature and precipitation regimes accompanying climate change are expected to cause shifts in the composition or geographic range of some species. Among the species shifts anticipated are movement of wildlife to more favorable habitat, 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 wildfire. Threats to federally-protected species may increase and additional species may become endangered, adding to the burden of species protection for some installations. DoD installations in the Arctic will be impacted by melting permafrost and a reduction in the sea ice that protects the coast from erosion by storms.

These 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 decreased precipitation have increased the area's fire hazard.

Apart from strategies to adapt to the coming impacts of climate change, measures that improve sustainability can make the Department more resilient to climate change. 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 an shortages of these resources.

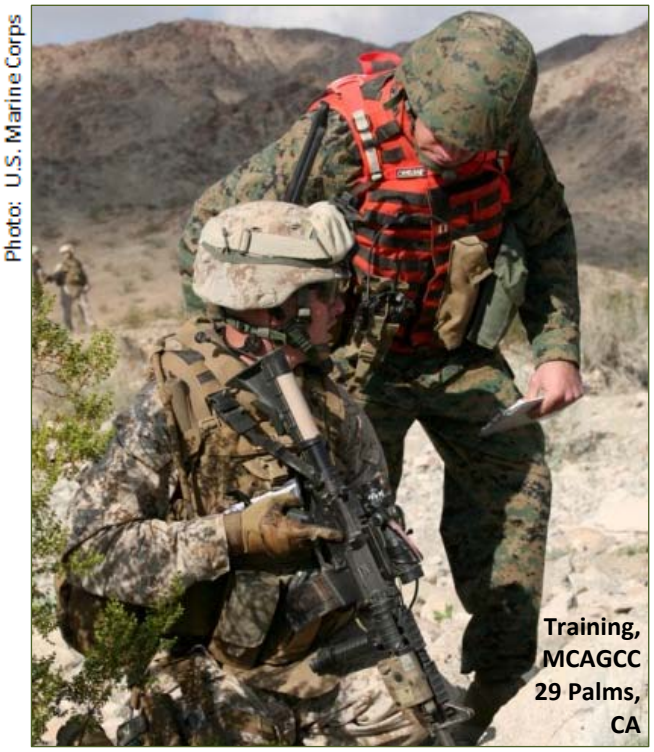


Photo: U.S. Marine Corps

Training, MCAGCC 29 Palms, CA

I.2 Size and Scope of DoD Operations

Table I.1 provides basic information on the size and scope of the Department's operations.

Table I.1. Size and Scope of DoD Operations	
Total # Employees	2,328,937[a]
Total Acres Land Managed	28.4 million[b]
Total Number Buildings Owned	202,178[c]
Total Number Buildings Leased (General Services Administration, GSA)	123[c]
Total Number Buildings Leased	8,965[c]
Other Assets in the Building Portfolio	89,392[c]
Total Building Gross Square Feet (billion GSF)	1.81[d]
Number U.S. Sites	4,337[e]
Number Sites Outside the United States	662[e]
Total Number Fleet Vehicles Owned	64,401
Total Number Fleet Vehicles Leased	127,869
Total Number Exempted-Fleet Vehicles	5,207[f]
Total Operating Budget FY 2010 (million $)	691,000
Total Number Contracts Awarded FY 2010	3,611,088
Total Contracts Awarded FY 2010 (million $)	366,432
Total Amount Spent on Energy Consumption FY 2010 (million $)	15,441
Energy Intensity FY 2010 (British thermal units per gross square foot)	122,217
Water Intensity FY 2010 (gallons per gross square foot)	56.3
FY 2008 Baseline for Scopes 1 and 2 Greenhouse Gas (GHG) Emissions (Comprehensive), million tons carbon dioxide equivalents, $CO_2(e)$	78.4
FY 2008 Baseline for Scopes 1 and 2 GHG Emissions (Subject[g]), million tons $CO_2(e)$	28.0
FY 2008 Baseline for Scope 3 GHG Emissions (Comprehensive), million tons $CO_2(e)$	7.0
FY 2008 Baseline for Scope 3 GHG Emissions (Subject[g]), million tons $CO_2(e)$	6.9

[a] Includes military personnel.

[b] DoD Base Structure Report – FY 2010 Baseline, page DoD-21.

[c] DoD Base Structure Report – FY 2010 Baseline, page DoD-12. DoD occupies 300,658 buildings throughout the world, including those that have been privatized or are operated by private entities in direct support of the DoD mission. The leases reported are those that are tracked in the Services real property inventories and may consist of lease instruments with various entities. The Services may have additional leases directly administered by GSA. "Other Assets in the Building Portfolio" include those buildings that have been privatized or are operated by private entities in direct support of the DoD mission.

[d] From the DoD Base Structure Report – FY 2010 Baseline, page DoD-15 (for the U.S. and Territories).

[e] The U.S. Territories are included in the U.S. value.

[f] This number includes only law enforcement vehicles, not other tactical military vehicles.

[g] Those emissions subject to the Agency GHG reduction target in this category.

I.3 Plan Implementation

I.3.A Leadership and Accountability

The Under Secretary of Defense for Acquisition, Technology and Logistics was designated the Department's Senior Sustainability Officer (SSO) responsible for ensuring the effective and successful implementation of the Plan across the Department. Each Military Department and the Defense Logistics Agency (DLA) has designated a sustainability officer to ensure accountability for the Plan's implementation. Also, each developed a plan for how they will implement the DoD Plan. Additionally, the Department established the governance structure shown in Figure I.2 to ensure the accountability and coordination necessary to meet the Department's goals. Under the leadership of the SSO, the Senior Sustainability Council (SSC), Sustainability Implementation Work Group, and a set of relevant committees and work groups help execute the goals of the Plan. The committees and work groups cover a wide range of sustainability topics, including: GHGs, energy, transportation and fuels, solid waste and recycling, green procurement, electronic stewardship, and sustainable manufacturing.

The Deputy Under Secretary of Defense for Installations and Environment (DUSD(I&E)) and the Assistant Secretary of Defense for Operational Energy Plans and Programs lead the SSC and report directly to the SSO. The current membership of the SSC is listed in Table I.2. 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 Plan; and
4) review the adequacy of policies, resources, and performance in meeting goals, and make recommendations on changes required.

Figure I.2. DoD Sustainability Governance Structure

The Sustainability Implementation Work Group reports to the SSC and is charged with drafting input to the Plan and facilitating compliance and continual improvement in meeting the Plan goals. The Department is

using its existing structure of committees and work groups to address specific issues and engage subject matter experts where appropriate.

Table I.2. Senior Sustainability Council Membership

Deputy Under Secretary of Defense (Installations and Environment) - Co-Chair
Assistant Secretary of Defense, 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 (Logistics and Materiel Readiness)
Director, Cost Assessment and Program Evaluation
Deputy Assistant Secretary of Defense for Manufacturing and Industrial Base Policy
Director for Logistics, Joint Staff
Director, Defense Logistics Agency Enterprise Support
Deputy General Counsel (Environment and Installations)
Assistant Secretary of the Army (Civil Works)

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; environmental and sustainability requirements are a part of this guidance. Another key feature of DoD's planning and budgeting process is the Future Year Defense Plan, which 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.

I.3.B DoD Policy, Planning and Budget Implementation

DoD has a robust and well-functioning process for planning, programming, and budgeting. The SSC is responsible for ensuring the Plan becomes integrated into the Department's enterprise management structure, an ongoing way of conducting business DoD-wide that is continually maintained, evaluated, and refined for optimal performance in all aspects of the DoD mission, including sustainability. The SSC will explore optimal means to codify this Plan to ensure that relevant policies, program plans, guidance, and budget development within the Department reflect the Plan. Table I.3 summarizes the status of the Department's efforts to incorporate sustainability into critical DoD reports and plans.

Table I.3. Critical Planning Coordination

Originating Report / Plan	DoD Strategic Sustainability Performance Plan Goals							
	Scope 1 and 2 GHG Reduction	Scope 3 GHG Reduction	Reduce the Use of Fossil Fuels	Improve Potable Water Efficiency	Minimize and Optimally Manage Solid Waste	Minimize the Use and Release of Chemicals of Environmental Concern	Sustainability Practices Become the Norm	Sustainability Built into Management Systems
FY 2010 Quadrennial Defense Review *(Serves as DoD's Government Performance and Results Act Strategic Plan)*	Yes	No	Yes	No	No	No	No	No
Circular A-11 Exhibit 300s (Capital Asset Plan and Business Case Summary)	n/a	n/a	n/a	n/a	n/a	n/a	Y	n/a
Energy Independence and Security Act Section 432 Facility Evaluations Reporting	Yes	No	Yes	Yes	n/a	n/a	No	n/a
DoD FY 2011 Budget	No	n/a	Yes	Yes	No	Yes	Yes	Yes
Defense Installations Strategic Plan (the DoD Asset Management Plan)/Third-Year Timeline	No	No	Yes	No	Yes	Yes	Yes	Yes
Circular A-11 Exhibit 53 Agency IT Investment Portfolio	No	n/a	No	n/a	n/a	No	No	n/a
OMB Scorecards on Energy, Environmental Stewardship and Transportation	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Defense Environmental Programs Annual Report to Congress	No	No	n/a	n/a	Yes	Yes	Yes	Yes
DoD Toxic and Hazardous Chemicals Reduction Plan (Jan 2009)	n/a	No	n/a	n/a	n/a	Yes	No	Yes
Data Center Consolidation Plan (Defense Information Services Agency)	Yes	n/a	Yes	n/a	n/a	No	Yes	n/a
DoD Sustainable Building Implementation Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DoD Green Procurement Plan (2008)	n/a	Yes	Yes	n/a	Yes	Yes	Yes	n/a
Sustainable Ranges – 2010 Report to Congress	No	n/a	n/a	No	No	No	n/a	Yes
Readiness and Environmental Protection Initiative – 4th Annual Report to Congress	n/a	n/a	n/a	n/a	n/a	No	No	Yes
Unified Facilities Criteria	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Environmental Management Systems	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Annual DoD Energy Management Report	Yes	No	Yes	n/a	n/a	n/a	Yes	n/a

"Yes" indicates the Plan goal is relevant and incorporated into the report or plan; "No" indicates relevance but that it has not yet been incorporated; and "n/a" means the goal is not relevant to the report or plan.

DoD environmental protection, pollution prevention, and sustainability policies are integrated into DoD's planning, programming, and budgeting system at the requirements level, and are often less visible as separate line items. For example, sustainable building design is part of the budget for a military construction (MILCON) project and not broken out separately. Almost two decades ago, DoD realized the need to plan and budget specifically for environmental protection and established the Environmental Security budgeting structure within the existing DoD planning, programming, and budgeting system. The functional categories established for environmental budgeting include: recurring and non-recurring environmental compliance, pollution prevention, cleanup, natural and cultural resources conservation, and research. More recently, DoD added a special category to capture resources budgeted for operational range sustainment. While the Environmental Security budget categories still exist today, OSD has emphasized the need for DoD Components to fully integrate environmental protection, pollution prevention, and sustainability into all DoD functions. Likewise, many pollution prevention efforts are integrated into the budgets for procuring equipment and the operations and maintenance (O&M) of installations. Pollution prevention equipment is also designed into new Navy vessels. OSD reviews the DoD Components' proposed Future Year Defense Plans to ensure requirements have been programmed, and holds program reviews to evaluate progress. These reviews are an effective method to ensure appropriate resources are being applied to environmental and sustainability efforts, even if they are not shown as distinct items in the budget.

By the end of FY 2011, the Department will have completed initial refinements to budgets exhibits that capture and track sustainability investments and resources across all of DoD. These exhibits will assist analysts and decision makers in identifying gaps between sustainability objectives and funding. OSD is updating its guidance for the Components to help in their development of plans, programs and budgets for sustainability in FY 2013 and beyond.

I.3.C Methods for Evaluating Progress

The Plan has a built-in performance monitoring system in the form of the 21 quantitative metrics that correspond to two of the goals (Goals 3 and 4 on GHG emissions) and 19 of the 20 sub-goals. Also, DoD Components must submit annual progress reports to OSD, which provide the information needed to analyze their progress on sustainability objectives, goals and sub-goals. Finally, the SSC conducts annual Performance Management Reviews. The progress reports and Performance Management Reviews afford the Department with the opportunity to alter its strategies to better meet the sustainability goals.

I.3.D Internal and External Coordination and Dissemination

Each year when the Plan is approved by the Office of Management and Budget (OMB), the Department will ensure its personnel are aware of performance on the Plan, using the usual internal channels of communication within the Department and within each individual DoD Component, such as web sites, newsletters, and announcements. Two conferences widely attended by DoD civilian and military personnel provide excellent outreach opportunities: GovEnergy and the Environment, Energy Security, and Sustainability Symposium. Annual updates of the Plan will be used as opportunities to remind civilian, military, and contractor staff of the Plan's goals and the Department's expectations. Every year DUSD(I&E) and the Assistant Secretary of Defense for Operational Energy Plans and Programs present the Plan 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 three platforms on the internet for communicating both to 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/);

- the "DoD Goes Green" website at http://www.defense.gov/home/features/2010/1010_energy/; and
- an internal website created by the AT&L Operational Support Directorate entitled TechSpace.

DENIX offers a wealth of information on sustainability, including DoD and federal policy and guidance, useful technical information, and examples of what DoD is doing. Topics covered include: alternative fuel vehicles, ESOH in acquisition, the Toxics Release Inventory, Environmental Management Systems, Green Procurement, Solid Waste and Recycling, and Sustainability. The DoD Goes Green site is focused entirely on energy: energy efficiency, renewable energy, and fuels from sources other than petroleum.

The Natural Resources Defense Council, an environmental non-profit organization, provided content to DENIX in the form of simple steps consumers can take to improve sustainability, such as the type of compact fluorescent bulb to choose for a warm light like that given from incandescent bulbs, and the packaging and energy benefits of using powdered laundry detergent instead of liquid. The organization also agreed to help disseminate DoD success stories on sustainability.

I.4 Incorporating Sustainability into 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 mission benefits of having an off-grid source of electricity can outweigh the higher cost of renewable energy. 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 O&M activities. In areas where air quality is a concern, an Installation Commander might prioritize investment and design decisions to reduce the heat island effect on the installation (e.g., by planting shade trees) and lower vehicle emissions.

Photo: U.S. Army Corps of Engineers

The sustainability principles promulgated in the Plan are the policy of the Department, and should be incorporated into all DoD decisions pertaining to design, investments, and prioritization of activities. In practice, however, decisions made at the facility-level are not always in the best long-term interests of the Department as a whole, including its sustainability objectives. DoD needs to ensure that personnel working on site-level projects bring a broad perspective to the decision-making process that considers objectives of the Department beyond those of the site alone. Another challenge is that it can be difficult to quantify many sustainability considerations, whether at the installation or Major Command level.

The Department recognizes the importance—and the challenge—of ensuring that sustainability is incorporated into decision-making across the organization. At the policy level, the Department is preparing a DoD Instruction on Sustainability specifying that it is DoD policy to ensure that the Department's commitment to sustainability is reflected in all investment decisions, by considering the costs and benefits of factors impacting sustainability. Such clarity is important because budgeting and

execution of projects affecting sustainability is from the bottom up. Programs are executed by a wide variety of commands and offices across the Department rather than through a central DoD office that reviews, prioritizes, and approves sustainability investments. Decisions on the best use of financial and human resources are made at the discretion of each command within the framework of advancing the mission, and are based on considerations specific to their geographic area. Therefore, another task for the Department is to find ways to help Installation Commanders and other decision-makers form an objective basis for making decisions on projects. The Department is in the process of developing a tool to meaningfully compare total ownership cost for MILCON projects based on concept designs at the proposal stage, when few design details have typically been defined yet. The tool—in the form of a template—was designed by a team consisting of the Departments of the Navy, Army and Air Force. The template uses a 40-year period of analysis and an approach focused on cost drivers, such as initial investment, facility energy consumption, and building components that most significantly contribute to sustainment cost. So far, the tool has been developed for seven common types of buildings. It is currently being refined with feedback from the design and construction industry and will be tested on a pilot basis this summer, with full implementation planned for FY 2012.

Sustainable Acquisition

While not included under the purview of this Plan, operational energy has a significant influence on future capabilities. Program managers develop, design, and buy major systems and weapons platforms that can last 30 years or longer and have significant impacts on human health and the environment during their lifecycle. As a result, the Department is evaluating ways to better integrate the long-term resource, capability, and opportunity costs of energy consumption into acquisition decisions. One of these ways is a new Energy Key Performance Parameter being developed by the Department. Key Performance Parameters are a set of mandatory requirements the Department specifies for any new weapon system it sets out to acquire. The Energy Key Performance Parameter will require the decision-makers for weapon systems to stipulate requirements that limit the operational burden imposed by the new system's energy needs. DoD is also developing common methodological guidance for acquisition programs to estimate and apply the Fully Burdened Cost of Fuel to inform analysis and decision-making. In the past, the DoD requirements process addressed the range, weight, and payload of any new system assuming adequate and secure fuel logistics to support combat forces. Recognizing that this longstanding assumption is less valid now and in the future, the Energy Key Performance Parameter and Fully Burdened Cost of Fuel will require the personnel responsible for setting requirements for weapon systems to better manage the amount of energy and logistics demanded by new systems.

The Department continues to make progress in developing a methodology to better integrate sustainability thinking into the DoD acquisition process. DoD personnel have been investigating ways to adopt the life cycle impact assessment process to 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 framework of inputs, outputs, and key impact categories. The overall objective is to develop a Military Standard for conducting life cycle impact assessments at the conceptual, developmental, and design stages of acquisitions. Use of the standard should result in lower total ownership costs and more sustainable systems—those that use less energy, water, and toxic chemicals, and that produce fewer emissions.

Addressing the Maintenance Backlog

The Department's real property assets are diverse and vast, representing about half of the federal government's real property inventory. The large inventory generates a significant maintenance and repair requirement. The Department's policy is to fund Sustainment, Restoration, and Modernization of its real property assets at 90% of modelled requirements. To manage the real property assets in a budget-constrained environment, we are working with the Services to focus resources on the facilities with the greatest maintenance and repair needs. The "worst first" approach will be balanced so that the Services can ensure mission critical facilities and life-safety-health issues are addressed first. More importantly,

we are working with the Services to identify minimum acceptable condition levels for categories of facility assets in recognition that maintenance may need to differ by asset type in constrained funding environments. For example, a storage facility may not need to be kept to the same level of condition as a runway, based on the consequence of a failure of the asset. While these investments and approaches will help give priority to certain assets, we are clearly only managing the problem of deferred maintenance. The Department recognizes that its maintenance backlog threatens the Department's ability to meet its sustainability and GHG reduction goals; however, the Department will give consideration to the importance of minimum condition grades when making funding determinations for assets contributing to these goals.

I.5 Transparency

The Department is committed to clearly communicating progress on the Plan because DoD's mission is advanced by doing so. Ongoing communication about the Plan and progress on it serves two purposes. First, the set of performance metrics in the Plan is a tool for evaluating performance to ensure programs are on track, and for deciding how to take corrective action as needed. Second, the Plan enables the Department to continually instill into personnel, the public, and the international community DoD's commitment to sustainability, and the fundamental principle that DoD's mission and sustainability are tightly coupled. As mentioned in Section I.3.D, DoD communicates about sustainability issues both internally and to the public through two web sites: DENIX and DoD Goes Green.

Each DoD Component provides annual progress reporting through the SSC to the SSO. The annual progress report on the Plan consists of: 1) a report on each sub-goal relevant to the Component (as per Table II.2), 2) narrative descriptions of progress for the fiscal year, including success stories, and 3) a brief discussion of any data collection issues and any issues inhibiting performance. The progress report will also provide the information needed for OSD to prepare Part II of the Plan each year. Although success stories will only be required from the DoD Components annually, their submittal is encouraged on an ongoing basis throughout the year so the Department can use them in communicating with the public. DoD and military award programs will consider outstanding achievements every year for individuals and teams contributing to the Plan's goals. For more information on how the Department plans to engage agency staff regarding its progress and performance on the Plan, refer to Section I.3.D, "Internal and External Coordination and Dissemination."

External communication takes three forms: the media, the internet, and venues such as conferences. The Department will take full advantage of the media to disseminate messages on sustainability performance to the public. OSD will craft press releases for distribution through regular public relations channels, and will also distribute them to the Military Departments for distribution as appropriate through local media outlets. The Department will issue a press release annually each time the Plan is submitted, and will continue to seek opportunities throughout the year to provide examples of DoD progress on sustainability efforts. All Department external communication will comply with the DoD Open Government Plan (http://open.dodlive.mil/open-government-plan/). The Department is already using venues such as conferences, seminars, workshops and external forums to raise awareness of the Plan, report on progress towards its goals, and discuss updates.

I.6 Greenhouse Gas Reduction Goals

Under EO 13514, federal agencies were required to establish FY 2020 reduction targets for non-tactical GHG emissions, measured from a FY 2008 baseline. The EO requires separate targets for direct and indirect emissions from sources controlled by DoD (Scopes 1 and 2), and emissions from sources not owned or directly controlled by DoD (Scope 3). As the Department constitutes more than half of all federal government GHG emissions, DoD's targets have a great impact on government-wide reduction

goals. The Department set an aggressive 34% goal for Scopes 1 and 2 emission reductions by FY 2020, compared to a government-wide goal of 28%. For scope 3 emissions, DoD set a 13.5% reduction goal, versus a government-wide goal of 13%.

The Department will achieve its Scope 1 and Scope 2 goals primarily through more efficient facility energy use, reduced fossil fuel use by non-tactical vehicles, and increased use of renewable energy, as reflected by the following four sub-goals in the DoD Plan:

- Energy Efficiency: a 37.5% reduction in energy intensity (e.g., energy used per square foot of facility space) from FY 2003 to FY 2020.
- Vehicle Fleets: a 30% reduction in the use of petroleum products by non-tactical vehicle fleets from 2005 to 2020.
- Renewable Energy: a requirement that 20% of all facility electricity consumed be supplied from renewable energy sources (thermal as well as electrical).
- Biogas: a requirement that ten facilities will become operational by FY 2020 for the production, capture and use of methane from landfills and/or wastewater treatment plants.

Increased renewable energy from the electricity grid will also play a major role in reducing DoD's emissions. In addition, some GHG reductions will result from sustainability management practices included in the Plan, including sustainable procurement, environmental management systems, high performance sustainable buildings, and improved coordination with regional and local planning groups.

Employee commuting constitutes the largest portion of the Department's Scope 3 emissions, as calculated by federal guidance. DoD's Scope 3 emissions goal is supported by a sub-goal to have 30% of eligible employees teleworking at least once a week on a regular, recurring basis by FY 2020. The second largest source of Scope 3 emissions is business air travel, which is addressed through a sub-goal to reduce these emissions 7% by FY 2020. As federal guidance and data collection methods are improved for Scope 3 emissions, additional categories may be added, including leased assets and supply chain emissions, both of which will constitute large increases to the DoD inventory and require reevaluation of the DoD goal.

It should be noted that in accordance with national security needs and EO 13514 , tactical GHG emissions from sources supporting combat operations, such as expeditionary bases and tactical vehicles and equipment, are excluded from GHG goals. However, the Department recognizes that combat effectiveness can be increased through decreased fuel use, and DoD is working on ways to reduce these emissions.

Part II: Performance Review and Annual Update

II.1 Summary of FY 2010 Accomplishments

The Department has been steadily laying the foundation to meet the Plan objectives, issuing key DoD-wide policies and guidance that promote sustainability: a stormwater policy issued in January, one on sustainable buildings issued in October, and a DoD Instruction (DoDI) on teleworking issued in October. Two more DoDIs are being prepared: one on Sustainability and one on Integrated Solid Waste Management (ISWM). The Sustainability DoDI is an important step forward for the Department, establishing comprehensive DoD policy on sustainability in a way that clearly conveys the scope of what sustainability means to DoD, and delineating the specific responsibilities of all DoD Components, including OSD offices. The Sustainability DoDI is expected to be issued in FY 2012.

In support of the Plan, the Military Departments and other Components have issued key policies and guidance in 2010 and 2011 to promote sustainability, and they are in the process of issuing more. Recent Component-level sustainability policies issued include:

- The Naval Facilities Engineering Command (NAVFAC) established the Navy Shore Energy Building Standard, which establishes energy and sustainability standards for new construction and major renovation building projects as well as existing buildings and routine maintenance.
- The U.S. Marine Corps (USMC) issued a bases to battlefield energy and water strategy in February 2011, *The Marine Corps Expeditionary Energy Strategy and Implementation Plan*.
- The Army has issued three sustainability policy memos since July 2010, on the *Utilization of Efficient Lighting*, *Managing Stormwater with Low Impact Development*, and *Sustainable Design and Development*. In October 2010, the Army also issued updated implementation guidance for re-auditing and re-declaration of its Environmental Management Systems. The Army issued an updated Army Green Procurement Guide and supporting educational briefings and tools in December 2010.
- Air Force Instruction 32-1021, *Planning and Programming Military Construction (MILCON) Projects* was substantially revised in June 2010, including a requirement for all eligible MILCON projects to achieve a minimum of Leadership in Energy and Environmental Design (LEED) silver certification and incorporate the November 2010 Unified Facilities Criteria (UFC) on Low Impact Development, into project designs.
- DLA issued an update in May 2011 to its Sustainable Design and Development Policy in the form of a policy memorandum titled *Defense Logistics Agency (DLA) Sustainability and Energy Efficiency Policy*. The document lays out requirements for sustainable design and development in all DLA MILCON projects and Sustainment, Restoration and Modernization projects, plus all minor construction projects that exceed 25% of the current replacement value.

Also, the Department of the Navy (DON)[1], DLA and the Missile Defense Agency (MDA) issued policies in FY 2010 to reduce the use of printing paper.

The Department and DoD Components have begun to alter existing systems and put new ones in place to improve the capture of rigorous information needed to track, evaluate, and report on progress towards the Plan sub-goals and the GHG emissions goals. New or improved data sets include: GHG emissions (including those from employee air travel and contracted waste disposal), stormwater runoff, teleworking, potable water consumption, and industrial and irrigation water consumption.

[1] Throughout this document, the Department of the Navy (which consists of the U.S. Navy and the U.S. Marine Corps) will be referred to as DON, while the U.S. Navy will be referred to as the Navy.

To help the Department better align sustainability objectives with investment decisions, the Department will complete initial refinements to budget exhibits by the end of FY 2011, so they capture and track sustainability investments and resources across all of DoD. These exhibits will assist analysts and decision makers in identifying gaps between sustainability objectives and funding.

To facilitate the adoption of sustainability at the level of installations, the Tri-Service Collaborative Group led an effort to create an efficient analysis and reporting methodology that installations can use to evaluate their sustainability performance. The Environmental Security Technology Certification Program (ESTCP) picked up the effort, funding a project to test the approach, called Sustainable Communities. The project is divided into two phases. Phase one was launched in spring 2011 and will use at least two field demonstrations to test the suitability of the methodology for installations to evaluate their sustainability performance. Upon completion in early 2012, ESTCP will decide whether to proceed with phase two, which would develop and demonstrate the implementation tool used for Sustainable Communities.

Table II.1 shows the FY 2010 results for each of the 19 quantitative performance metrics in the Plan. The Department's progress on each goal is described in detail in Section II.2, with numerous text boxes highlighting success stories and approaches suitable for widespread adoption.

II.2 FY 2010 Goal Performance Review

Introduction

The Plan consists of four high-level Departmental strategic Objectives, each of which has two Goals. Under the set of eight Goals are 20 sub-goals, as summarized in Table II.1. The hierarchy of Objectives and Goals is as follows:

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

- Goal #1: The Use of Fossil Fuels Reduced
- Goal #2: Water Resources Management Improved

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

- Goal #3: GHG Emissions from Scope 1 and 2 Sources Reduced 34% by FY 2020, Relative to FY 2008
- Goal #4: GHG Emissions from Scope 3 Sources Reduced 13.5% by FY 2020, Relative to FY 2008

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

- Goal #5: Solid Waste Minimized and Optimally Managed
- Goal #6: The Use and Release of Chemicals of Environmental Concern Minimized

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 #8: Sustainability Built into DoD Management Systems

The set of sub-goals tracks closely with the sustainability requirements of EO 13514, EO 13423, the Energy Independence and Security Act of 2007 (EISA), and the Energy Policy Act of 2005 (EPAct). Appendix C summarizes the federal requirements relating to each sub-goal.

Table II.1. DoD Strategic Sustainability Performance Plan Goals and Sub-Goals: FY 2010 Results and Targets for FY 2011 Through FY 2020

#	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 by 30% from FY 2003 by FY 2015 and 37.5% by FY 2020**	**11.4%**	18%	21%	24%	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 20% of Electricity Consumed by Facilities**	**9.6%**	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1.3	**Use of Petroleum Products by Vehicle Fleets Reduced 30% from FY 2005 by FY 2020**	**5.3%**	12%	14%	16%	18%	20%	22%	24%	26%	28%	30%
GOAL #2: Water Resources Management Improved												
2.1	**Potable Water Consumption Intensity by Facilities Reduced by 26% from FY 2007 by FY 2020**	**12.9%**	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
2.2	**Industrial and Irrigation Water Consumption Reduced by 20% from FY 2010 by FY 2020**	n/a	2%	4%	6%	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**	n/a	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Objective #2: DoD Readiness Maintained in the Face of Climate Change												
GOAL #3: Greenhouse Gas Emissions from Scope 1 and 2 Sources Reduced 34% from FY 2008 by FY 2020												
3		**3.6%**	5%	10%			19%			28%		34%

#	Sub-Goal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GOAL #4: Greenhouse Gas Emissions from Scope 3 Sources Reduced 13.5% from FY 2008 by FY 2020												
4		**4.8%**	0%	1%								13.5 %
4.1	**Greenhouse Gas Emissions from Employee Air Travel Reduced 7% from FY 2011 by FY 2020**	n/a	0%	0%	1%	2%	2%	3%	4%	5%	6%	7%
4.2	**30% of Eligible Employees Teleworking at Least Once a Week, on a Regular, Recurring Basis, by FY 2020**	n/a	10%	15%	17%	19%	21%	23%	25%	27%	29%	30%
Objective #3: The Ongoing Performance of DoD Assets Ensured by Minimizing Waste and Pollution												
GOAL #5: Solid Waste Minimized and Optimally Managed												
5.1	**All DoD Components Implementing Policies by FY 2014 to Reduce the Use of Printing Paper**	**3**	1	6	24	31	31	31	31	31	31	31
5.2	**50% of Non-Hazardous Solid Waste Diverted from the Waste Stream by FY 2015 and Thereafter Through FY 2020**	**43%**	42%	44%	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%**	52%	54%	56%	58%	60%	60%	60%	60%	60%	60%
5.4	**Ten Landfills or Wastewater Treatment Facilities Recovering Biogas for Use by DoD by FY 2020**	**1**	0	2	3	4	5	6	7	8	9	10
GOAL #6: The Use and Release of Chemicals of Environmental Concern Minimized												
6.1	**Onsite Releases and Off-Site Transfers of Toxic Chemicals Reduced 15% from CY 2006 by FY 2020**	**2.8%**					5%			10%		15%
6.2	**100% of Excess or Surplus Electronic Products Disposed of in Environmentally Sound Manner**	**100%**	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
6.3	**100% of DoD Personnel and Contractors Who Apply Pesticides Are Properly Certified**	**99.4%**	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

#	Sub-Goal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
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**	n/a	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
7.2	**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%**	7%	9%	11%	13%	15%	15%	15%	15%	15%	15%
GOAL #8: Sustainability Built into DoD Management Systems												
8.1	**All Environmental Management Systems Effectively Implemented and Maintained**	**red**	green	green	green	green	green	green	green	green	green	green
8.2	**The Sustainability of Transportation and Energy Choices in Surrounding Areas Optimized by Coordinating with Related Regional and Local Planning**	*not quantitative*										
8.3	**All DoD Installations Have Integrated Pest Management Plans Prepared, Reviewed, and Updated Annually by Pest Management Professionals**	**84.6%**	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

DoD Component Reporting on Sub-Goals

All 31 DoD Components are required to report on those Plan sub-goals that are relevant to their situation. The reporting requirements for each Component are summarized in Table II.2. Apart from the Military Departments, nine Components indicated by pale blue shading in the table are required to report on goals and sub-goals pertaining to energy, water and GHG emissions. These nine pay for utilities directly, whereas the other Components are tenants at host installations. As tenants, they contract office space through fully serviced leases in which energy and water are provided based on square footage and occupancy, or through inter-service support agreements with the hosts. For the nine Components, along with MDA, reporting on the solid waste sub-goals (5.2 and 5.3) is optional: some of these Components are able to track their solid waste independently of the Services, and would like to do so, but the quantities of waste are so dwarfed by those of the Services that their diversion rates have no bearing on the final DoD-wide numerical results for these sub-goals.

Photo: DoD

Wind turbines, Naval Auxiliary Air Station San Clemente Island, CA

Solar Hybrid PV at African Lion Theatre Security Exercise, Tan Tan, Morocco

Photo: U.S. Marine Corps

Table II.2. Plan Goals and Sub-Goals for Which DoD Components Must Report

(dark cells: reporting required; hashed cells: reporting optional; white cells: reporting not required)

	Component	Abbn	1.1	1.2	1.3	2.1	2.2	2.3	3	4	4.1	4.2	5.1	5.2	5.3	5.4	6.1	6.2	6.3	7.1	7.2	8.1	8.2	8.3
MILDEPs	Department of the Army	Army	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Department of the Navy	DON	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Department of the Air Force	USAF	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
DEFENSE AGENCIES	Defense Advanced Research Projects Agency	DARPA									■	■	■					■		■				
	Defense Business Transformation Agency	DBTA									■	■	■					■		■				
	Defense Commissary Agency	DeCA	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	Defense Contract Audit Agency	DCAA									■	■	■					■		■				
	Defense Contract Management Agency	DCMA	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	Defense Finance and Accounting Service	DFAS	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	Defense Information Systems Agency	DISA									■	■	■					■		■				
	Defense Intelligence Agency	DIA	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	Defense Legal Services Agency	DLSA									■	■	■					■		■				
	Defense Logistics Agency	DLA	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
	Defense Security Cooperation Agency	DSCA									■	■	■					■		■				
	Defense Security Service	DSS									■	■	■					■		■				
	Defense Threat Reduction Agency	DTRA									■	■	■					■		■				
	Missile Defense Agency	MDA			■				■	■	■	■	■	▨	▨			■		■				
	National Geospatial-Intelligence Agency	NGA	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	National Reconnaissance Office	NRO									■	■	■					■		■				
	National Security Agency/Central Security Serv.	NSA	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	Pentagon Force Protection Agency	PFPA									■	■	■					■		■				
DoD FIELD ACTIVITIES	Defense Media Activity	DMA									■	■	■					■		■				
	Defense Prisoner of War/Missing Personnel Off	DPW									■	■	■					■		■				
	Defense Technical Information Center	DTIC									■	■	■					■		■				
	Defense Technology Security Administration	DTSA									■	■	■					■		■				
	DoD Education Activity	DEA									■	■	■					■		■				
	DoD Human Resources Activity	DHRA									■	■	■					■		■				
	DoD Test Resource Management Center	DTRMC									■	■	■					■		■				
	Office of Economic Adjustment	OEA									■	■	■					■		■				
	TRICARE Management Activity	TMA	■	■	■	■			■	■	■	■	■	▨	▨			■		■				
	Washington HQ Services	WHS	■	■	■	■		■	■	■	■	■	■	▨	▨			■		■	■		■	

OBJECTIVE 1
Ensure the Continued Availability of Resources Critical to the DoD Mission

Objective 1 seeks to ensure continued access to reliable energy and quality water to ensure no decline in readiness and training. Under Objective 1, the purpose of Goal 1 is to reduce fossil fuel consumption from stationary and mobile sources through improved facility and vehicle efficiency, increased reliance on renewable sources of energy, and the use of alternative fuels based on materials other than petroleum. The purpose of Goal 2 is to reduce the Department's reliance on potable water through improved efficiency and an increase in the use of non-potable sources, and to minimize the damage of stormwater runoff from DoD properties.

There are many approaches that simultaneously save energy resources as well as water. Individual DoD installations have demonstrated leadership in improving the efficiency of both resources, and as a result earned FY 2010 Federal Energy Management Program (FEMP) awards; several examples are highlighted on the next page. At the policy level, *The Marine Corps Expeditionary Energy Strategy and Implementation Plan* released in February 2011 addresses water as well as energy, on the battlefield and on bases. The Army's Net Zero Installation Strategy, initiated in April 2011, also addresses both energy and water efficiency. Seventeen Army installations have been chosen as pilots to become net zero by FY 2020 with regard to energy, water, and/or waste. Fort Bliss, TX, and Fort Carson, CO will be pilot net zero installations for all three: energy, water and waste.

The text boxes below highlight two approaches that could be adopted widely throughout DoD and by other federal agencies. DON is embracing advanced metering as a critical path to reducing dependence on fossil fuels and potable water. Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms created a cross-functional team responsible for working together to achieve sustainability goals, an approach that can be applied to the entire range of objectives covered by the Plan.

Approach for Widespread Adoption:
DON ADVANCED METERING

The Department of the Navy is rapidly installing advanced meters in most of its buildings, with the goal of covering approximately 95% of consumption of building electricity, natural gas, water and steam by the end of FY 2016. DON will have 17,000 advanced meters installed by the end of FY 2011, and more than 25,000 by FY 2016. Advanced metering does not just measure consumption, it transmits data in real time from all of the meters to a central workstation, giving facility managers the data needed to optimize efficiency. The DON spent about a year designing the advanced metering systems to ensure they were compatible with the Navy and Marine Corps requirements for engineering and information awareness and certification. For example, the transmission of data to computer servers has to be accomplished without introducing cybersecurity risks.

Approach for Widespread Adoption:
MARINE CORPS GREEN COUNCIL

Marine Corps Air Ground Combat Center (MCAGCC) Twenty-nine Palms established a "Green Council"—with a charter signed by the MCAGCC Commanding General—that is responsible for coordinating to track and meet the goals set by the DoD Plan. Council membership includes a public-private venture partner, Marine Corps Community Services, and the Land Expansion Office. This cross-functional team underscores the fact that responsibility for sustainability goes far beyond environmental department. Since the Council was created, the installation has already exceeded its energy efficiency goals, and is leading the way in renewable power and water efficiency. The intent is to eventually take the Green Council installation-wide. This multi-disciplinary participatory approach to improving sustainability can be adopted throughout DoD and the entire U.S. Government.

Examples of FY 2010 FEMP Awards for Projects That Reduce Fossil Fuel and Water Consumption

U.S. Air Force: Minot Air Force Base, ND
Geothermal Heat Pumps

For decades, Minot Air Force Base distributed hot water from an aging central heating plant, operating as the primary heating system for more than 90 facilities. In FY 2009, the base replaced the plant with 400 tons of ground source heat pumps for select large facilities and facility-specific high-efficiency boilers for the remaining facilities. System efficiency is enhanced with energy recovery units that use warm exhaust air to heat cold incoming air, and the use of water-to-air split type geothermal heat pumps. Decentralized temperature controls greatly improved occupant comfort and satisfaction.

- **FY 2009 Savings:** 114 billion Btu fossil fuel use, 16 million gallons (gal) of water (22% and 13% decrease, respectively, from FY 2006)
- **Annual Cost Savings:** $2.6 million (energy and water); $48,000 (maintenance and repairs)

U.S Marine Corps: Logistics Base Barstow, CA
Wind and Solar Energy, Energy and Water Efficiency

Marine Corps Logistics Base Barstow (MCLB), in partnership with Southern California Edison, used a utility energy service contract to install the Marine Corps' first large-scale wind turbine and implement energy saving measures. The 1.5 MW wind turbine generated more than 3,600 MW-hours of electricity in FY 2009, covering about 11.6% of the base's consumption. Additional projects included solar lighting, air conditioning efficiency improvements, and vending machine controls. Apart from the utility energy service contract, Barstow also demolished 300 housing units and constructed 74 new units with high-efficiency plumbing fixtures, which led to the discovery and repair of major leaks.

- **Annual Savings:** 15 billion Btu in energy and $380,000 in costs
- **FY 2009 Water Savings:** 81 million gal (39%)

U.S. Navy: Naval Station Everett, WA
LEED Gold Building and Alternative Vehicle Fuels

The Bachelor Enlisted Quarters at Naval Station Everett, one of the first Navy buildings to achieve LEED Gold status, opened for occupancy in FY 2009. Energy saving technologies included direct digital controls, preferential free cooling with outside air, heat recovery from exhaust air, and a tune-up of HVAC equipment, which are projected to reduce the facility's energy use by 28% compared to a standard building. Low-flow plumbing fixtures, xeriscaping, and advanced irrigation systems reduced water use by 50% over a standard building. Two million kWh of renewable energy was installed to meet 70% of the building's electricity needs. Other strategies included favorable siting, use of recycled materials, and advanced landscaping techniques. The base also converted 90% of its transportation fleet during FY 2009 to alternative fuels.

- **Projected Annual Savings**: 2.5 billion Btu (electricity and natural gas); 1.3 million gal of water; $43,000 in utility costs; over 11,700 gallons of petroleum-based fuel

U.S. Army: Picatinny Arsenal, NJ
Financing Energy and Water Efficiency

Picatinny Arsenal modified a previous energy performance contract to use the cost savings generated by energy and water savings to pay for additional improvements. The project focused on increasing energy performance and reducing water consumption in two large boiler plants, including installing energy-efficient equipment and heat recovery systems; switching fuel from oil and propane to natural gas; rebuilding the non-potable water system to replace potable water in non-potable applications; and improving heating, ventilation, and air conditioning, including energy monitoring and control systems. Compared to developing a new project, the contract modification delivered results two years early, with shorter payback and reduced financing costs. Other benefits included reduced chemical treatment, avoided expansion of the potable water plant, and reduced sewage flow.

- **FY 2009 Savings** due to project: 110 billion Btu, 19 million gallons of water, $889,000 in costs

GOAL 1 The Use of Fossil Fuels Reduced

Goal 1 Sub-Goals

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

Metric

The percent reduction relative to FY 2003 in the total fossil fuel-generated energy consumed by DoD facilities per gross square foot of total DoD building space. A facility is defined as per the Energy Independence and Security Act of 2007 (EISA) §432(1)(C) to be 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

2010	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%
RESULT	**11.4%**										

SUB-GOAL 1.2 By FY 2020, Produce or Procure Energy from Renewable Sources in an Amount that Represents at Least 20% of Electricity Consumed by Facilities

Metric

The numerator is the sum of renewable energy that is produced by DoD, produced from a DoD controlled location, or procured by a DoD component from another source. The denominator is the total of facilities electric consumption as published in the DoD annual energy management report. Renewable energy is defined as per 10 United States Code (U.S.C.) §2911(e) to be 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

2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
RESULT	**9.6%**										

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

Metric

The percent reduction in petroleum product consumption by DoD non-tactical motor vehicle fleets relative to FY 2005. Only fleets numbering 20 motor vehicles or more are covered.

Annual Planning Targets

2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	10%	12%	14%	16%	18%	20%	22%	24%	26%	28%	30%
RESULT	**5.3%**										

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

FACILITY ENERGY INTENSITY

OVERVIEW

Status

Of all the energy consumed by DoD in FY 2010, 26% was consumed by facilities. Of this portion, 70% of consumption was through the use of electricity and combustion of natural gas, as shown in Figure II.1. (This and all other energy graphics in the Plan cover non-operational energy consumption only.) The absolute quantities consumed of different forms of energy are shown in Figure II.2. Figure II.3 illustrates that facility energy consumption in DoD is overwhelmingly dominated by the Services. The nine other Components shown in the figure report their consumption because they pay for utilities, but due to their negligible contribution to overall consumption, the energy discussion here focuses on the Services. Energy intensity data for the Military Departments and the nine other DoD Components that pay for some or all of their utilities directly are provided in Table II.3 and displayed graphically in Figure II.4, showing the large variability across the Department in the amount of energy used per building area. Table II.3 shows progress made by the Department in improving energy efficiency since FY 2003.

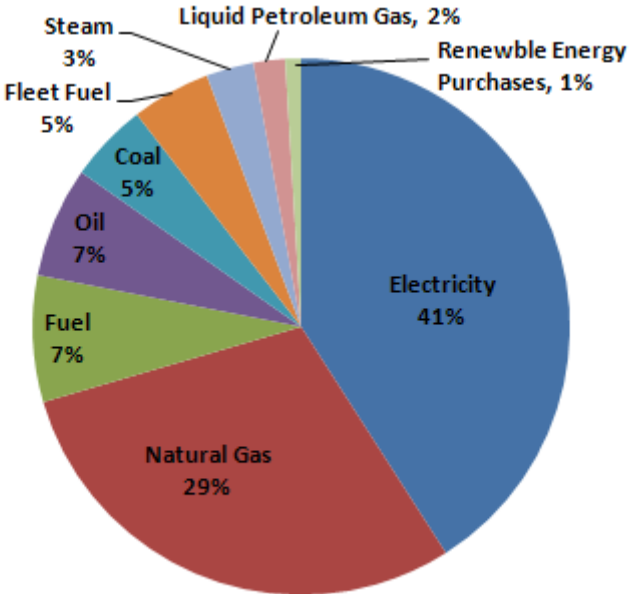


Figure II.1. Breakdown of DoD FY 2010 Facility Energy Consumption By Energy Type

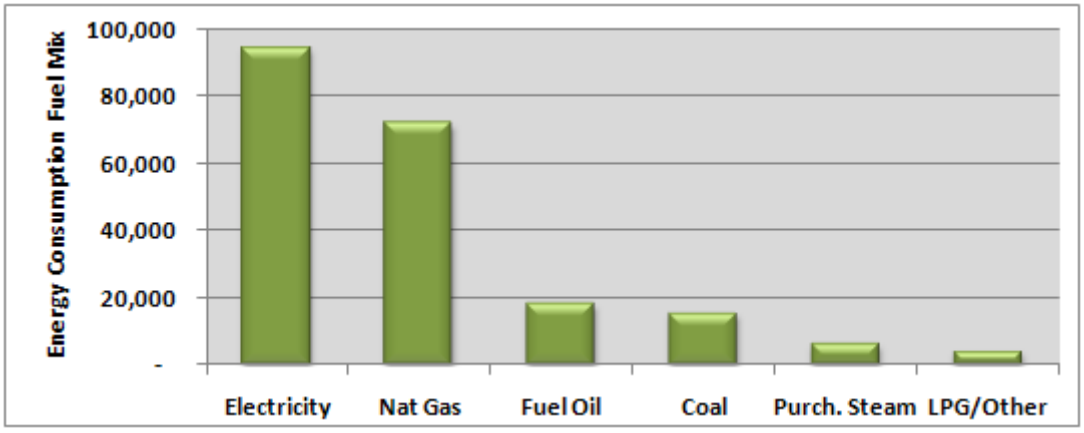


Figure II.2. DoD FY 2010 Facility Energy Consumption by Energy Source (billion Btu)

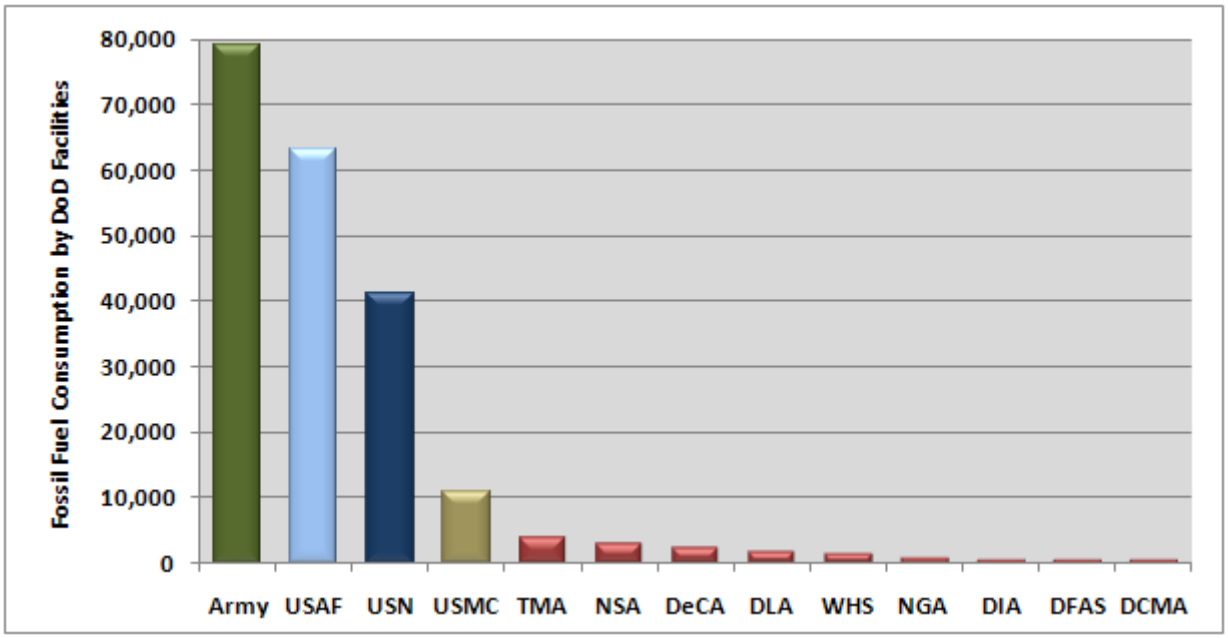


Figure II.3. FY 2010 Fossil Fuel Consumption by DoD Facilities, by Component (billion Btu, site-delivered)

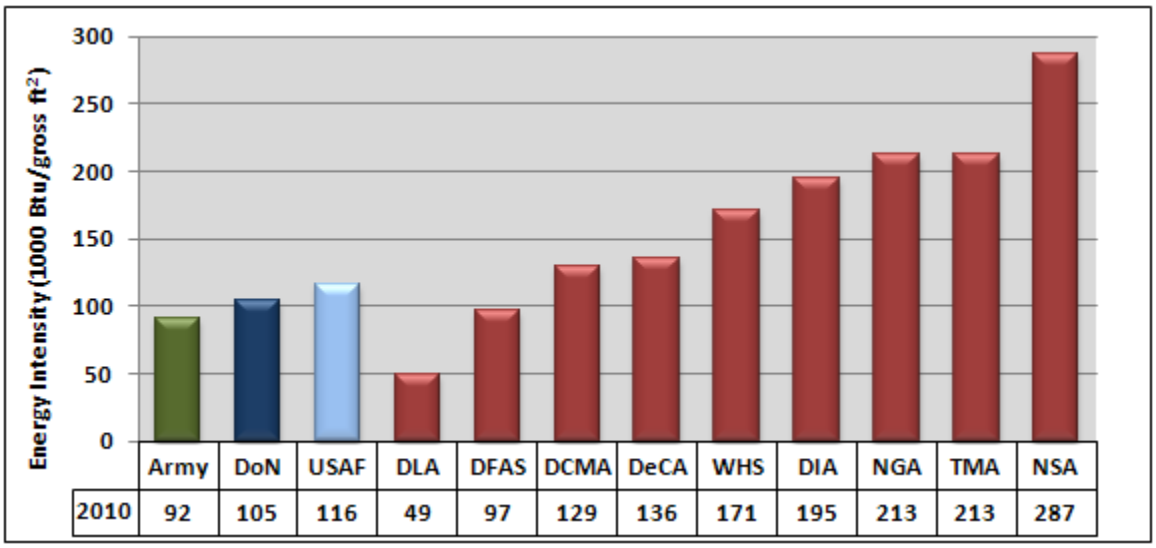


Figure II.4. FY 2010 Energy Intensity of the Military Departments and Nine Other Components

Figure II.5 shows the absolute energy consumption for baseline year of 2003 and the years 2006 – 2010, while Figure II.6 shows relative energy consumption in terms of gross square footage over the same period. The steady rise in total energy consumption over the past few years shown in Figure II.5 reflects the enhanced training requirements, growing troop levels, and increased facility activity in support of wartime operations. However, Figure II.6 demonstrates that the Department's energy use per quantity of facility area during this period has been falling. For the seven year period from FY 2003 to FY 2010, absolute consumption rose by 3.1%, while energy intensity declined by 11.4%. This progress is generated by myriad efforts, large and small, across the Department. The Air Force, for example, had 447 energy and water conservation and efficiency projects underway during FY 2010.

Table II.3. Energy Intensity by DoD Component, FY 2003 – FY 2010

DoD Component	Energy Intensity (thousand Btu/GSF)				2010 Reduction from 2003
	FY 2003	FY 2008	FY 2009	FY 2010	
DFAS	151.8	101.4	93.3	96.8	36.3%
DIA	229.1	216.6	217.0	194.7	15.0%
USAF	**136.4**	**113.4**	**116.5**	**116.1**	**14.9%**
DON	**121.7**	**109.6**	**103.2**	**105.0**	**13.7%**
Army	**100.3**	**89.9**	**93.1**	**91.5**	**8.7%**
DeCA	146.1	139.6	136.7	136.2	6.8%
TMA	226.9	211.1	204.7	213.2	6.1%
DLA	51.4	60.8	49.6	49.4	3.8%
WHS	161.0	176.1	214.0	170.9	-6.1%
NSA	263.5	256.7	281.3	286.8	-8.9%
NGA	177.0	195.8	218.1	212.5	-20.0%
DCMA	n/a	126.3	130.5	129.4	n/a
DoD	**116.1**	**103.7**	**104.5**	**102.9**	**11.4%**

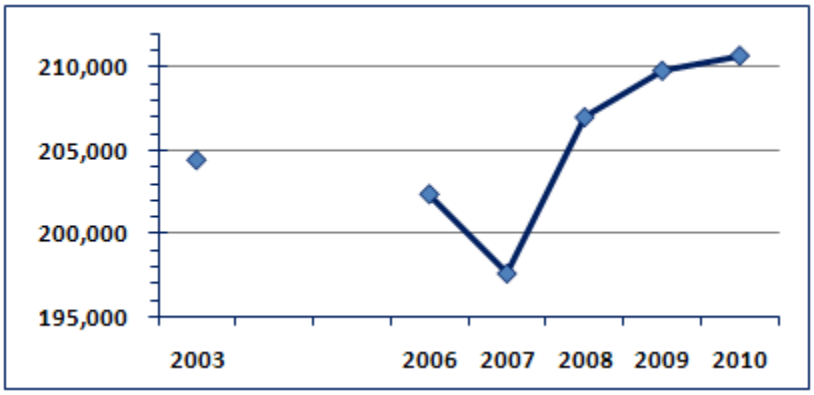


Figure II.5. DoD FY 2010 Facility Energy Consumption from FY 2003 to FY 2010 (billion Btu)

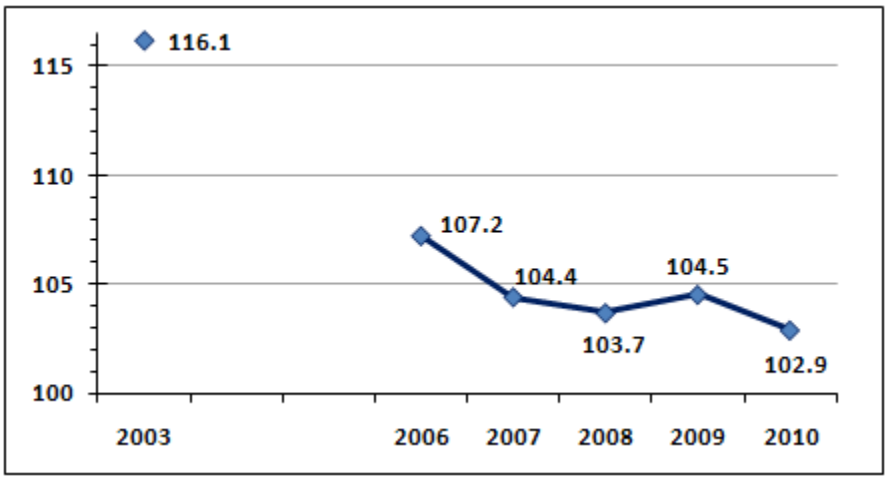


Figure II.6. DoD Facility Energy Intensity from FY 2003 to FY 2010 (000 Btu/gross ft^2)

The Army's updated sustainable design and development policy, issued on 27 October 2010, requires new construction to be designed and built to achieve reduced energy consumption at or below levels specified in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 189.1 Section 7. This is a 15-20% improvement over the Army's previous standard of ASHRAE 90.1-2001. New Army Family Housing projects will be designed to LEED for Homes Silver or higher or Energy Star Qualified New Homes, and will achieve a minimum 45% reduction in energy consumption. Also in October 2010, the Army issued policy, *Utilization of Efficient Lighting*, requiring lighting efficiency to be improved in accordance with EISA. The policy, which went into effect immediately, requires all inefficient lighting to be replaced within five years in all facilities owned, leased or controlled by the Army. In addition, the Army elevated the profile of energy in the department by changing the name of the office formerly known as Assistant Secretary of the Army(I&E) to Assistant Secretary of the Army for Installations, Energy and Environment. The Army also established a Deputy Assistant Secretary for Energy and Sustainability. In early FY 2011, the Army re-chartered its senior energy council to the Senior Energy and Sustainability Council to focus senior leaders on broader the challenge of meeting federal and DoD sustainability goals. The Council is responsible for goals, objectives, performance metrics, and priorities for sustainability and energy security initiatives and programs throughout the Army. The Council reports to the Secretary of the Army and is co-chaired by the Under Secretary of the Army and the Vice Chief of Staff of the Army.

American Recovery and Reinvestment Act (ARRA)

ARRA funding was an important boost for DoD energy goals. For the Navy, typically most Energy Conservation Investment Program funds have supported solar water heating projects because in most regions the ROI is more favorable for these systems than for solar electricity generation. However, with ARRA funding, the Navy was able to channel over $175 million into solar and wind systems across the country. NAVFAC Southwest (NRSW) was especially active in renewable energy in 2010: by the end of calendar year (CY) 2010, NRSW (which includes the Marine Corps as well as Navy) had 70 PV sites producing 7.5 MW. By the end of CY 2011, its capacity is expected to be 8.5 MW. During FY 2010, NRSW completed construction of 39 solar PV projects and awarded two others, funded by $38 million from ARRA. The 39 projects span nine U.S. Naval installations, with 33 rooftop installations and six PV carports generating nearly 4 MW. Navy Region Southeast is spending $66.5 million in funding from the ARRA to install solar energy systems for 32 buildings at 11 naval installations across Florida, Mississippi and Texas.

The Army will complete $365 million in ARRA energy projects in FY 2011, including energy management control systems, high-efficiency lighting retrofits, day-lighting, solar water heating, photovoltaic walls and roof systems, reflective roofs, heating, ventilation and cooling (HVAC) repairs and upgrades, ground source heat pumps, biodiesel, and fuel cells. The Army projects are expected to reduce energy consumption by 1.2 trillion Btu in FY 2012.

The Air Force took proactive steps to make alternative financing for energy management work. In 2007, the use of energy savings performance contracts and utility energy savings contracts decelerated due to Air Force audit findings that identified unfavorable financing terms, a perception of underperformance, and major program management issues among the bases and contracts. Beginning in 2009, the Air Force implemented changes to turn the programs around. The Air Force Civil Engineering Service Agency now centrally manages the programs to prevent overlap and duplication while promoting efficient resource utilization. It works closely with the DOE FEMP, Major Commands, and installations to focus on large energy conservation measures such as heat plant decentralization or other more complex technologies. By emphasizing projects of this type, third-party investments are now an integrated component of the Air Force energy conservation strategy to help achieve energy reduction goals now and in the future.

Implementation Methods

The Navy's January 2011 *Energy Program for Security and Independence* and the Marine Corps' February

2011 *The Marine Corps Expeditionary Energy Strategy and Implementation Plan* aim to reduce installation energy intensity 50% by FY 2020 (from the FY 2003 baseline), while providing reliable energy to 100% of Tier I and II Critical Assets. The Navy and Marines Corps will use a phased approach where funds will first be directed to proven energy efficiency technologies, and then on renewable energy sources to further decrease GHGs and increase energy security.

In April 2011, the Army announced six installations that will be net zero energy pilots under the Army's Net Zero Installation Strategy: Fort Detrick (MD), Fort Hunter Liggett (CA), Kwajalein Atoll (Republic of the Marshall Islands), Parks Reserve Forces Training Area (CA), Sierra Army Depot (CA), and West Point (NY). Additionally, Fort Bliss (TX) and Fort Carson (CO) will pilot integrated net zero energy-water-waste initiatives, and the Oregon Army National Guard will pilot a state-wide net zero energy initiative. A net zero building or installation uses no more energy than it generates through a combination of energy efficiency and renewable energy. Army installations are also developing Comprehensive Energy and Water Management Plans that identify applicable best management practices successfully demonstrated by DOE/FEMP.

DLA will budget nearly 40% of their Sustainment, Restoration, and Modernization funds towards energy efficiency improvements, via higher efficiency equipment and controls that turn off equipment when not in use. DLA plans to demolish inefficient temporary modular buildings in Richmond, VA in FY 2011 and FY 2012.

Table II.4. DoD Energy Metering as of the End of FY 2010

DoD Component	# of Appropriate Buildings	Buildings Metered as of FY 2010
Electricity		
DoD-wide	19,390	95%
DON	9,500	100%
Air Force	6,160	87%
Army	8,300	53%
Other Components	974	77%
Natural Gas		
DoD-wide	5,312	88%
DON	1,587	100%
Air Force	2,908	80%
Army	1,818	49%
Other Components	345	79%
Steam		
DoD-wide	842	69%
DON	563	100%
Air Force	91	51%
Army	Defined in FY 2011	tbd
Other Components	96	36%

DATA MANAGEMENT AND METERING

Status

The Department is well ahead of legislative mandates for metering energy consumption, as shown by Table II.4. Of those buildings deemed appropriate for metering,[2] 95% were metered for electricity by the end of FY 2010, 88% for natural gas, and 69% for steam. EPAct §103 requires buildings to be metered for electricity by 1 October 2012, while EISA §434(b) requires full metering for natural gas and steam by 1 October 2016. In FY 2010, the DON finished installing meters for electricity, natural gas, water and steam

[2] Buildings appropriate for metering are determined by agencies based on the DOE *Guidance for Electric Metering in Federal Buildings* released in February 2006 to clarify EPAct §103, which states that all federal buildings be metered for electricity by 1 October 2012. The DOE guidance broadened the "maximum extent practicable" clause in EPAct §103 from advanced meters to apply to all meters, making it a subjective determination based on whether metering is feasible, capable of providing useful data, a sensible application of the technology, and cost-effective within a ten-year payback period. For military installations, the determination is made by Installation Commanders.

in all Navy and Marine Corps buildings deemed appropriate as of that time.

In December 2009, the Department issued DoDI 4170.11, *Installation Energy Management*, directing all Components to aggressively pursue metering of energy and water consumption in all appropriate facilities. The Instruction reiterates the policy guidance on metering already delivered in August 2005 via the DoD Energy Manager's Handbook. The Handbook and DoDI 4170.11 define appropriate as "those for which the DoD Component has determined metering would be cost effective and practical as a management enhancement tool to identify energy cost savings attributed to conservation projects, energy systems maintenance activities, energy load management, command leadership, or other specific, discrete measures implemented during the year." Importantly, however, they go on to specify that "usage shall be determined through engineering estimates only when metering proves to be cost prohibitive" and "DoD Components must document findings that support a determination that a given facility is not an appropriate facility to meter." The Handbook and Instruction also greatly accelerate the schedule for metering natural gas on appropriate facilities and steam at steam plants, directing that metering be completed by 2012 rather than 1 October 2016, as required by EISA §434(b). Further, they state that every year installations should "strive to install" meters in at least 15% of facilities that are not yet metered and are appropriate for metering.

Advanced meter, NAS Kingsville, TX

Photo: U.S. Navy

In February 2011, DON issued policy in its inaugural issue of the Shore Energy Bulletin requiring compliance with DoDI 4170.11. The Army's updated sustainable design and development policy places additional emphasis on metering by requiring advanced utility monitoring systems to be installed on all new construction, major renovations, and energy projects of $200,000 or more. Buildings not meeting the criteria must incorporate lower-cost energy monitors when cost-effective over the lifecycle of the building, following the monitoring guidance detailed in ASHRAE Standard 189.1 Section 7. The Air Force issued Facility Metering Policy on 6 May 2010 requiring: 1) meters for electricity, natural gas, steam, and water on all existing facilities meeting certain feasibility criteria; and 2) advanced meters for new construction and major renovations, all Energy Conservation Investment Projects, energy savings performance contract projects, and all renovations to utility systems exceeding $200,000.

Implementation Methods

The Department is in the process of addressing its lack of an enterprise-wide energy information management system. DoD is developing its information requirements with the goal of implementing a secure and enterprise-wide energy information management system. The purpose is to provide the appropriate information on energy consumption at various levels of aggregation, including individual buildings, installations, the geographic region, and the military service as a whole. With accurate management, control, collection, and analysis of energy data, DoD can more effectively monitor, measure, manage and maintain energy systems at their optimal performance levels. The system will also allow DoD to collect renewable energy generation and performance data, and compare performance across facilities and across the Military Departments.

The Navy currently collects energy data using the Defense Utility Energy Reporting System, where data is entered manually at the installation level, making it subject to human error. To obtain more accurate data, the Navy is leading an effort to implement and deploy the Centralized and Integrated Reporting for

Sub-Goal 1.1: Selected DoD Success Stories in Reducing the Consumption of Fossil Fuels

U.S Marine Corps: MCB Hawaii

Savings shown are energy savings in FY 2010:

- ***Outdoor Lighting***: All street lights and exterior building flood lights converted to high-efficiency fluorescent lights, and photocells and motion detectors keep lights off except when there is movement at night. **Savings:** 50% for street lighting; 75% for building lighting.
- ***Lighting Sensors:*** Skylights and high-efficiency white lighting combined with automated daylight sensors and timers turn lights on during building operations only when natural light is insufficient. **Savings:** 50%.
- ***Occupancy Sensors for Air Conditioning***: Controls in living and sleeping rooms keep the air conditioning turned off when rooms are unoccupied. **Savings:** 31%.
- ***Automated Energy Management:*** The base Energy Management and Control System currently connects 56 major buildings to remote workstations. The system maximizes energy efficiency through trend logging and graphic indicators, and rapid, remote operating system information and alarms that enable proactive maintenance.
- ***Ice Storage Air Conditioning:*** Ice is used for cooling during the day, consuming less energy than cooling using the compressor. (The ice is made at night when air conditioning is not needed.) Also, waste heat recovered from chillers and condensing units pre-heats water for building hot water systems, making air conditioning more efficient. **Savings**: 28%.
- ***Mock Residential Billing:*** A four month mock billing program shows residents their energy use compared to an established baseline, and the rebates or additional charges that would result. **Savings:** 15%.

U.S. Army: West Point Lighting Upgrades

The 400-watt high-intensity discharge lighting systems in the Youth Center Gymnasium and the West Point School were switched to highly efficient T5 lighting.

- **Electricity Savings:** 46%/49% (gym/school)
- **Savings in Costs for Replacement Parts**: 52%

U.S. Air Force: Dyess AFB Saved $2.4 Million

- Installed >2,600 lighting occupancy sensors, saving 8,500 million Btu.
- Installed variable flow refrigerant HVAC systems, replaced one HVAC unit, and eliminated the need for 140 tons of air conditioning equipment by expanding the ice plant, saving >7,000 Btu
- Installed 840 smart controls in 11 dormitories, saving 4,374 million Btu.
- **Total FY 2010 Energy Savings:** >24,500 Btu
- **Total FY 2010 Cost Savings:** $2.4 million

U.S. Navy: USS Iwo Jima

FY 2010 FEMP Award Winner

USS Iwo Jima deployed a set of strategies in FY 2009 designed to optimize energy efficiency and reduce fuel consumption. One of the most significant measures undertaken was the proper maintenance of boundaries exposed to outside weather to ensure all doors and hatches are clearly marked, monitored, and properly sealed and maintained. The Navy used Ship Energy Conservation Assistance Training software to generate fuel consumption curves, resulting in continuous monitoring to maximize efficiency. While in port, the ship minimizes the time required to transition from its propulsion plant to energy provided by the port (cold iron status) by strategically shifting to the ship's service/emergency diesel generators, a move that reduces total fuel consumption by 50%.

- **Savings:** 2.3 million gal of fuel, 308 billion Btu in other energy, $5 million in costs

U.S. Air Force: Efficient Wastewater Treatment

Operators at the Cannon AFB wastewater treatment plant in New Mexico installed dissolved oxygen probes in the sequential batch reactors and sludge digester basin. Before this modification, the reactor blowers operated nine hours a day; now they operate three hours a day. In addition to electricity savings, the total nitrogen concentration in the effluent was drastically reduced.

- **Electricity Savings:** $16,300 per year
- **Payback:** the cost of the probes ($7,000) was paid through savings in just over 5 months.

the Comprehensive Utilities Information Tracking System. This enterprise-wide business system will allow the Navy to accurately capture, allocate and report utility consumption among all users throughout all naval facilities worldwide. The system will ensure the efficient and effective use of energy by enabling usage to be tracked and managed. Data from DON advanced meters will feed directly into the system and enable Installation Commanding Officers, tenant activities and other responsible parties to track their energy usage in real time. This transparency in consumption information will inform decision-making on facility and utility upgrades and facilitate behavioral changes. The system is expected to be deployed Navy-wide by the end of FY 2012. Also, since FY 2009, the Navy has funded energy audits at all of its locations in the continental United States, which are instrumental in developing projects for FY 2012 and 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" to Headquarters (HQ) Marine Corps Facilities Branch, signed by both the Energy Manager and the Installation Commander. These reports evaluate the overall energy management program, and provide commands with current program status, future plans, and funding requirements. HQ Marine Corps Facilities Branch prepares a summary analysis for each Installation Command, highlighting strengths and weaknesses of individual installation energy programs. Installation Commands are encouraged to use this information to focus and adjust programs, as required. As part of the annual report process, Installation Commands are required to summarize actions taken over the past year to implement the *Marine Corps Facilities Energy and Water Campaign Plan*, signed in April 2009.

Reflective roof with solar panels, Tyndall AFB, FL

Photo: U.S. Air Force

DLA is actively pursuing energy efficiency opportunities in FY 2011. Fourteen lighting control and sensor projects are in progress at four DLA host sites (where a Military Service owns an installation but DLA manages it), and should be completed in FY 2011. These projects have an estimated annual energy savings of 135, 767 million Btu. DLA will also be installing advanced gas and electric meters at these four host sites during FY 2011, an improvement estimated to yield savings of more than 14,000 million Btu every year. Other projects DLA has approved and funded for completion in FY 2011 include the installation of energy management control systems, lighting upgrades with sensor controls, boiler replacements, water and sewer system repairs, replacements or repairs to heating, ventilation and cooling (HVAC) systems, and roof replacements or repairs, all of which will generate an estimated combined annual savings of almost 185,000 million Btu.

ELECTRONIC STEWARDSHIP AND DATA CENTERS

In addition to the sub-goal on energy intensity, the Department has three other sub-goals that address electronic stewardship:

- ✓ sub-goal 5.1: All DoD Components Implementing Policies by FY 2014 to Reduce the Use of Printing Paper;
- ✓ sub-goal 6.2: 100% of DoD Excess or Surplus Electronic Products Disposed of in Environmentally Sound Manner; and
- ✓ sub-goal 7.1: 95% of Procurement Conducted Sustainably, which covers the procurement of Energy Star and Electronic Product Environmental Assessment Tool (EPEAT)-registered electronics.

Status

In FY 2010, the DoD CIO office reviewed each Component's plan to enable power management features on its eligible electronics equipment. The plans showed a full level of awareness of the power management requirements and an understanding of the overall sustainability goals of EOs 13423 and 13514. Some plans went above and beyond and provided energy-saving actions in great detail, reflecting a strong commitment to implementing power saving solutions. For example, the Army is developing plans to manage plug loads by procuring the most energy-efficient computing equipment available while consolidating its data centers to lower total energy use and improve energy efficiency

Efficiency solutions are being enabled through a series of power management tools, including: Microsoft System Center Configuration, System Center Configuration Manager R3, Wake-on-LAN, Dell Power Management functions, LANDesk Management Suite software, Belkin Power Management System, Microsoft XP power management settings, Powercfg.exe in Windows Server 2003, and uninterruptible power systems. These tools enable system administrators to monitor current power state and consumptions, check compliance and remediate non-compliance, and apply power management policy to enforce different settings for peak and non-peak usage periods. The resulting improved power management capabilities help the Components reduce network strain, energy consumption and power costs.

DoD has been fully engaged with consolidating its servers and data centers, staying on schedule with deliverables of the Federal Data Center Consolidation Initiative effort. Specifically, in 2010, DoD submitted to OMB the Initial Asset Inventory, the Initial Data Center Consolidation Plan, the Final Asset Inventory, and the Data Center Consolidation Plan.

Implementation Methods

The Department uses the metrics shown in Table II.5 to track performance on electronic stewardship. Results for FY 2010 are given, along with targets for FY 2011 through FY 2015. The FY 2010 results were estimated from a representative sampling of four DoD facilities: Barnes Air National Guard Base, the Defense Commissary Agency, Missile Defense Agency, and Office of the Undersecretary of Defense (Personnel & Readiness, Information Management). With authorized access, the raw data can be viewed at: http://www.fedcenter.gov/fec/.

Table II.5. Metrics for DoD Efforts on Electronic Stewardship

	FY10	FY11	FY12	FY13	FY14	FY15
% of electronic product acquisitions (except servers) covered by current Energy Star specifications that must be Energy Star-qualified	98%	100%	100%	hold	hold	hold
% of covered electronic product acquisitions registered with EPEAT	98%	95%	95%	hold	hold	hold
% of covered electronic product acquisitions that are FEMP-designated	98%	95%	95%	hold	hold	hold
% of DoD eligible personal computers, laptops, and monitors with power management actively implemented and in use	75%	100%	100%	100%	hold	hold
% of DoD, eligible electronic printing products with duplexing features in use	50%	95%	100%	100%	hold	hold

The Federal Data Center Consolidation Initiative is a key part of the Department's efforts to reduce energy consumption, with the performance metrics for four key data center efficiency and consolidation goals provided in Table II.6. In addition to the data center reduction goal of 31% from FY 2010 to FY 2013

(from 772 to 532), over this same period the Office of the DoD Chief Information Officer is striving to reduce the total number of DoD racks by 30% (from 23,194 to 16,320), and the number of servers by 25% (from 67,246 to 50,378). These goals have been determined in close coordination with the Components. The metrics on power utilization effectiveness, utilization of central processing units, and metering data centers are still being determined. The Department's data center consolidation plan is being revised, with final release expected in July or August of 2011. Targets for these goals will be established at that time for use in the FY 2012 version of the Plan.

Table II.6. DoD Metrics for Reducing Energy Consumption from Data Centers

	FY11	FY12	FY13	FY14	FY15
Reduction in the number of DoD data centers	720	624	532	490	428
% of DoD data centers independently metered, advanced metered, or sub-metered to determine monthly (or more frequently) power utilization effectiveness	tbd	tbd	tbd	tbd	tbd
% of DoD data centers operating with an average central processing unit utilization greater than 65%	tbd	tbd	tbd	tbd	tbd
Maximum annual DoD weighted average power utilization effectiveness	tbd	tbd	tbd	tbd	tbd

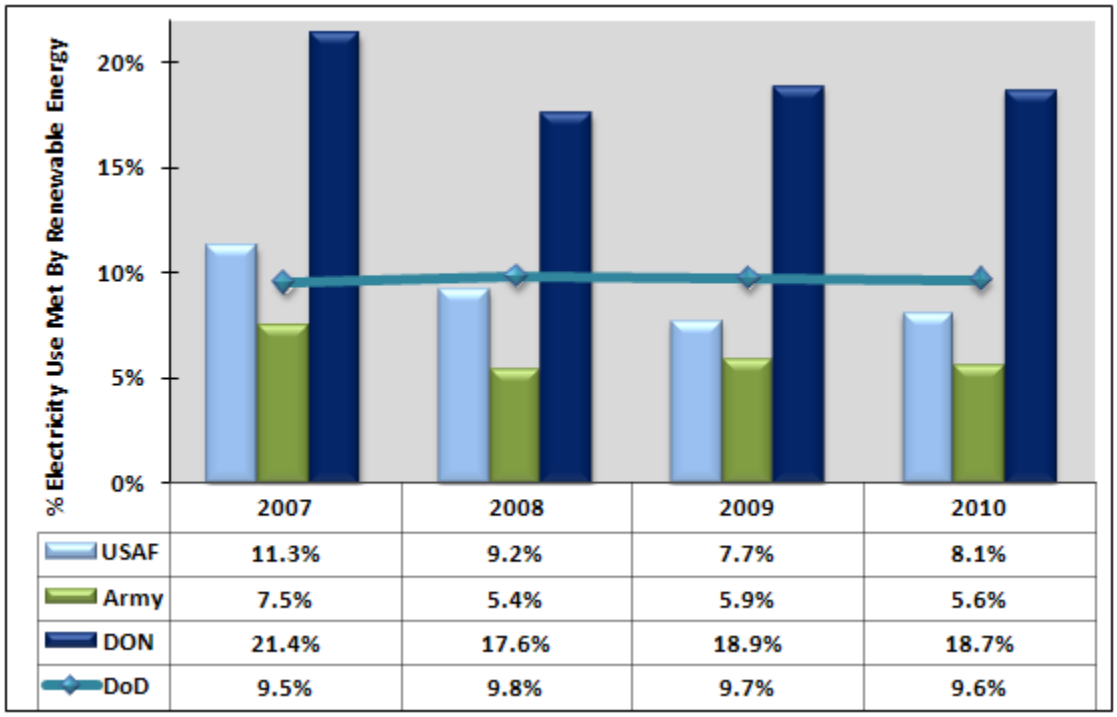


Figure II.7. DoD FY 2010 Facility Electricity Consumption Met by Renewable Energy

RENEWABLE ENERGY

OVERVIEW

Status

Of all electricity consumed by DoD facilities in FY 2010, 9.6% of it was obtained from renewable sources of energy. As shown by Figure II.7, the portion of energy from renewable sources has remained constant from FY 2008 to FY 2010 in spite of steadily rising electricity consumption over this period.

ONSITE RENEWABLE ENERGY

Status

The Department has stressed the importance to mission readiness of increasing the amount of renewable energy generated on or adjacent to its installations, to ensure an uninterrupted supply of electricity in the event of disruption to the electricity grid. Military installations across the United States and overseas have been steadily adding renewable energy to make this vision a reality, with close to 350 renewable energy projects now on DoD properties. As shown in see Table II.7, 30 new projects were added in FY 2010 (where multiple rooftop PV installations on an installation are counted as a single project). The 20 installations with the largest portion of their energy needs being met with onsite renewable energy generation are compiled in Table II.8.

Table II.7. FY 2010 DoD Onsite Renewable Energy Generation Projects

Location	Project Description	Capacity (MW)
Air Force		
Cape Cod AFS, MMR, MA	Wind turbine	1.5
Buckley AFB, CO	PV system	1.0
Joint Base McGuire/Dix/Lakehurst AFB, NJ	Roof-mounted PV	0.90
Air Force Academy, CO	PV system	0.17
Army		
Delaware ARNG, Bethany Beach, DE	PV system	0.38
Presidio of Monterey, CA	PV system	0.38
U.S. Army Garrison Vicenza, Italy	PV system	0.75
Fort Hunter Liggett, CA	PV system (cantonment)	1.0
Navy		
Naval Base Coronado, CA	PV carport	1.1
Naval Base Ventura County, CA	Roof-mounted PV	0.80
Naval Air Weapons Station China Lake, CA	PV parking lot	0.69
Naval Base San Diego, CA	Roof-mounted PV	0.28
Naval Base Point Loma, CA	PV system	0.25
Naval Base Guam, Marianas	Wind turbines	0.25
Naval Weapons Station Seal Beach, CA	Roof-mounted PV	0.22
Naval Air Station Lemoore, CA	Roof-mounted PV	0.20
Naval Base San Diego, CA	PV parking lot	0.15
Naval Postgraduate School Monterey, CA	Roof-mounted PV	0.15
Naval Air Facility El Centro, CA	PV system	0.14
Marine Corps		
MCAGCC 29 Palms, CA	Roof-mounted PV (multiple buildings)	1.3
MCB Camp Pendleton, CA	Roof-mounted PV (multiple buildings)	0.34
Marine Corps Recruit Depot San Diego, CA	Roof-mounted PV (multiple buildings)	0.86

It is worth noting that a handful of projects contribute the lion's share of the Department's total renewable energy production, as illustrated by Figure II.8: the major geothermal facility at China Lake in California put out nearly 4,880 billion Btu in FY 2010, over 58% of DoD's total renewable energy

generation. The next six largest sources of renewable energy account for over a quarter of DoD's renewable energy. (Note that almost half of this amount—the U.S. Army Redstone Arsenal and Hill Air Force Base (AFB) projects—are purchases from nearby, offsite, waste-to-energy facilities.) All of the remaining 345 projects generate much less energy than these, usually much less.

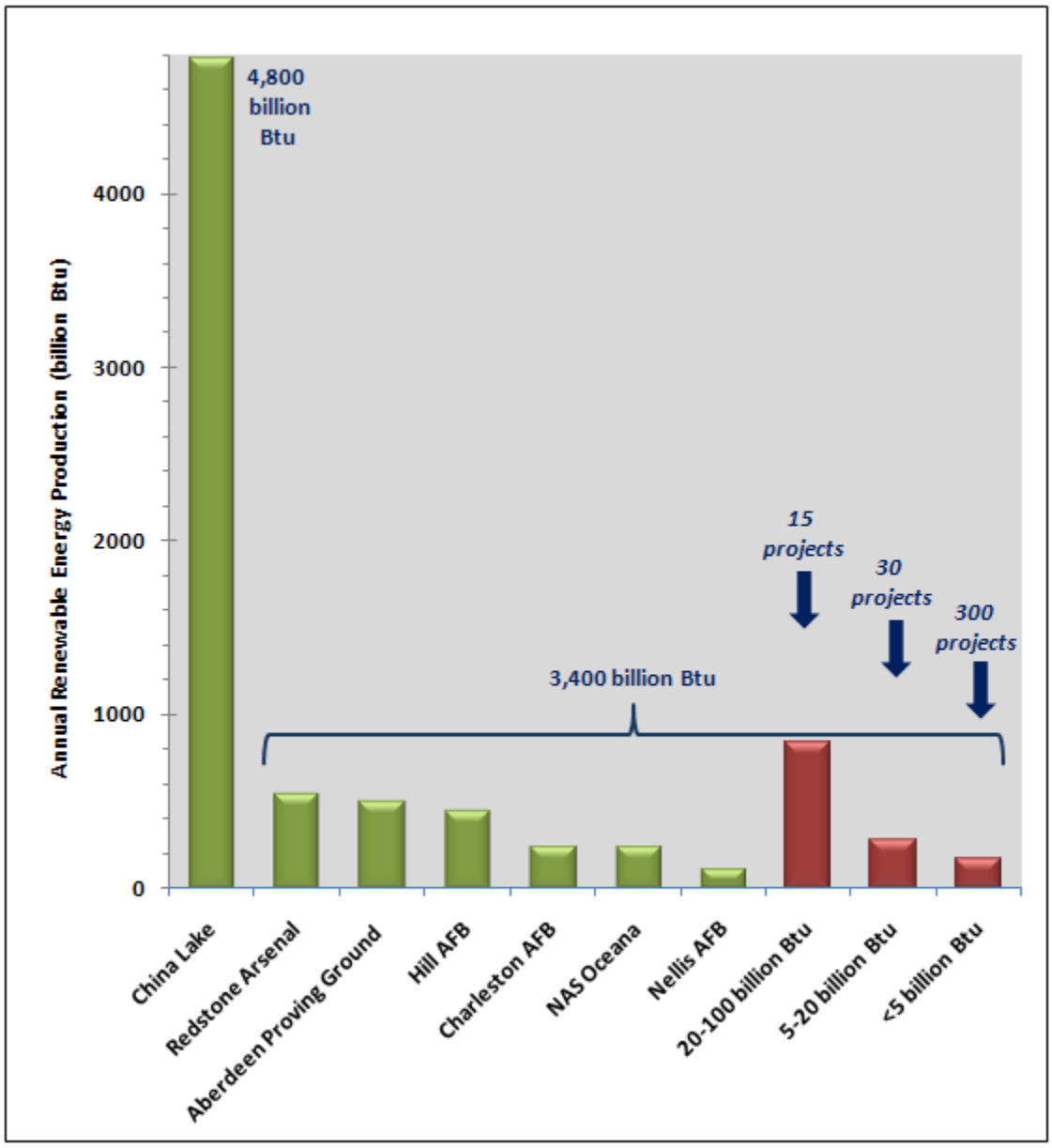


Figure II.8. Output of the Seven Largest DoD Renewable Energy Projects Compared to the Other 345

The Air Force's first priority for increasing the use of renewable energy is generation onsite or on adjacent federal property. To facilitate this priority, the Air Force established the Renewable Energy Project Development Subpanel to coordinate renewable energy efforts and leverage knowledge and resources across the Air Force. The Subpanel provides leadership for and coordination of renewable energy projects by providing a forum, process, and tools to support analysis and decision-making at the earliest stages of project development. For new building construction, the exchange of information fostered by the Subpanel facilitates the identification of viable renewable options. The Subpanel is also exploring the

role that the DoD Energy Conservation Investment Program can play in augmenting the MILCON funds available for new building renewable energy development, an essential component to achieving net zero energy buildings.

Table II.8. Top 20 Installations with the Most Consumption Covered by Onsite Renewable Energy Production

Installation Name	Service	Renewable Production (million Btu)			Total Consumption (million Btu)	Consumption Covered by Onsite Renewable Energy
		Electric	Non-Electric	Total		
China Lake, CA	Navy	4,097,161	0	4,097,161	560,229	**>100%**
Military Ocean Terminal Sunny Point, NC	Army	0	40,000	40,000	18,783	**>100%**
Newport Chemical Depot, IN	Army	71,266	0	71,266	82,740	**86%**
Fort Hamilton, NY	Army	0	44,317	44,317	66,077	**67%**
Adelphi Laboratory Center, MD	Army	0	96,609	96,609	275,191	**35%**
Nellis AFB, NV	USAF	115,814	0	108,406	609,351	**18%**
Deseret Chemical Depot, UT	Army	0	90,281	90,281	521,080	**17%**
NAVFAC Hawaii	Navy	2,324	73	2,397	17,783	**13%**
Fort Polk, LA	Army	69	92,343	92,412	753,847	**12%**
Naval Air Station Oceana, VA	Navy	136	70,863	70,999	819,015	**9%**
Army National Guard, NM	Army	3,071	0	3,071	39,002	**7.9%**
F.E. Warren AFB, WY	USAF	29,778	0	29,778	385,920	**7.7%**
Charleston AFB, SC	USAF	0	19,171	19,171	326,619	**5.9%**
Offutt AFB, NB	USAF	0	45,404	45,404	913,838	**5.0%**
NAS Bremerton, WA	Navy	495	11,100	11,595	251,182	**4.6%**
Pacific Missile Range Facility, HI	Navy	3,412	0	3,412	79,343	**4.3%**
NAS Signoella, Italy	Navy	469	11,980	12,449	307,845	**4.0%**
Naval Support Activity Souda Bay, Greece	Navy	938	499	1,437	42,120	**3.4%**
NAS Whidbey Island, WA	Navy	3,709	11,111	14,820	439,160	**3.4%**
Naval Station Pearl Harbor, HI	Navy	11,806	24,204	36,010	1,248,432	**2.9%**
Naval Air Facility El Centro, CA	Navy	1,027	623	1,650	66,346	**2.5%**
Yuma Proving Ground, AZ	Army	3,184	0	3,184	168,987	**1.9%**
Hill AFB, UT	USAF	51,580	0	51,580	2,230,315	**2.3%**
NAS Pensacola, FL	Navy	0	12,140	12,140	1,058,950	**1.1%**

The Air Force is implementing plans to add over 48 MW of solar energy generation capacity to three of its installations in the Southwest. Nellis AFB, NV will add 17 MW of solar PV capacity during 2012 to the 14

MW array already installed there in 2007. Two bases in Arizona—Davis Monthan AFB and Luke AFB—have developed plans for almost 30 MW of combined solar energy on underutilized base property. At Davis-Monthan AFB in Tucson, a solar electricity company signed a contract in September 2010 to build and operate a 14.5 MW system on 130 acres of base land, covering an anticipated 35% of the base's electricity needs. Luke AFB has partnered with an Arizona electric utility to install a 17 MW array that is expected to supply half of all electricity needed by the base, yielding $10 million in savings over the course of 25 years.

The Marine Corps established policy in October 2009, and subsequently published guidance in Engineering and Construction Bulletin No. 2010-5, requiring rooftop solar thermal and/or PV technologies to be incorporated into all new building construction, as well as major building renovation projects involving complete roof replacements. It is the Marine Corps' position that, in order to achieve the lowest installation cost, the best time to install a roof-mounted PV and/or solar thermal system is during new construction or a complete roof replacement. This reduces the carbon footprint, provides a hedge against volatile energy costs, and makes a visible environmental statement. The policy takes effect as of the FY 2012 Program Objective Memorandum MILCON program. Projects can use ground-mounted PV systems in lieu of rooftop system in cases where the amount of roof area available is less than 15,000 ft^2, or the orientation of the roof is not favorable for solar energy The policy states that the first priority be given to solar thermal hot water systems. The Navy is following suit, and has directed NAVFAC components to execute the October 2009 Marine Corps policy.

Rooftop solar at Naval Weapons Station Seal Beach, CA

Photo: U.S. Navy

Implementation Methods

DoD onsite renewable energy installations planned for FY 2011 to FY 2012, known at this time, are shown in Table II.9.

DON is completing a high-level review of the cost and benefits of solar, wind and biomass energy at all installations. This assessment is using available renewable resource information, coupled with energy rates and financial incentives to determine the potential for cost-effective development of onsite renewable projects. DON is currently following up on the review with onsite audits. For solar energy, the audits will identify available land and roof area for solar, and determine the structural integrity and condition of roofs. The audits will also assess radar interference issues for wind turbines, and the need for environmental assessments for large scale renewable projects. To help identify strategic locations for wind energy investments, DON has begun installing wind anemometers at over 20 sites to characterize the wind regime at specific locations.

The Navy uses a "Watch, Partner, Lead" approach to integrate viable renewable energy technology in the right place at the right time:

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

Table II.9. Onsite Renewable Energy Generation Projects Planned for FY 2011 – FY 2012

Location	Project Description	Capacity (MW)
Air Force		
Nellis AFB, NV	PPA, third party-owned PV array	17.0
Luke AFB, AZ	PPA, third party-owned PV array	17.0
Davis Monthan AFB, AZ	PPA, third party-owned PV array	14.5
Air Force Academy, CO	PPA, third party-owned PV array	6.0
Edwards AFB, CA	PPA, third party-owned PV array	3.5
Cape Cod Air Force Station, Massachusetts Military Reservation	Government-owned wind turbine located on the Massachusetts Military Reservation	6.0
Joint Base Elmendorf/Fort Richardson, AK	Utility privatization landfill gas utilization	3.2
Moron AFB, Spain	Government-owned PV array	1.1
Stewart Air National Guard Base, NY	Government-owned PV array	0.75
Tin City Long-Range Radar Station, AK	Government-owned wind turbine	0.25
Altus AFB, OK	Government-owned PV array	0.075
Army		
Presidio of Monterey, CA	Solar PV system	1.0
National Guard Training Center, Sea Girt, NJ	Solar PV system	0.5
Fort Bliss, TX	Solar PV system	0.5
Kwajalein Atoll, Republic of the Marshall Islands	Solar PV system	0.47
Fort Jackson, SC	Solar PV system	0.19
Fort Carson, CO	Solar PV system	0.10
E.T. Collins Sacramento Army Depot, CA	Solar PV system	0.15
Wailuku Army Reserve Center, HI	Solar PV system	0.10
Marine Corps		
MCB Camp Pendleton, CA	PV system on the Box Canyon landfill	1.45
MCLB Albany, GA	Landfill gas	1.90
Navy		
NAS Oceana, VA	Ground source heat pump - Phase III	See note a
Naval Station Norfolk, VA	Solar PV	2.40
Naval Base San Diego, CA	PV carports	1.16
NAS Kingsville, TX	Solar array	0.55
Naval Weapons Station Seal Beach, CA	PV system	0.19

Table II.9. Onsite Renewable Energy Generation Projects Planned for FY 2011 – FY 2012, continued

Location	Project Description	Capacity (MW)
Naval Base San Diego, CA	PV carports	1.16
NAS Kingsville, TX	Solar array	0.55
Naval Weapons Station Seal Beach, CA	PV system	0.19
NAS Oceana, VA	Solar ventilation preheat	tbd
NAS Corpus Christi, TX	Building integrated PV	tbd
NAS Key West, FL NAS Jacksonville, FL	Building integrated PV Building integrated PV	tbd tbd
NAS Pensacola, FL	Building integrated PV	tbd
Naval Support Activity Orlando, FL	Building integrated PV	tbd
Panama City, FL	Building integrated PV	tbd
Naval Surface Warfare Center Carderock, MD	PV system	tbd
NSA Annapolis, MD	PV system; ground source heat pump	tbd
Naval Auxiliary Air Station San Clemente Island, CA	PV system	tbd
NAS Whidbey Island, WA	Solar walls	tbd
NAS Patuxent River	Rooftop PV	tbd
Naval Station Norfolk, VA	Ground source heat pump	tbd
Naval Station Guantanamo Bay, Cuba	Solar perimeter lights	tbd
Naval Amphibious Base Little Creek, VA	Solar thermal	tbd
Naval Base Coronado, CA	Solar thermal pool	tbd
Naval Base San Diego, CA	Solar thermal	tbd

[a]155,950 million Btu/yr

Navy Region Southeast is using $66.5 million in ARRA funding to install solar energy systems for 32 buildings at 11 naval installations across Florida, Mississippi and Texas. The systems are expected to generate 9.4 million kWh of clean, renewable energy during the first full year after construction, and save the Navy nearly $872,000 annually. Work is expected to begin in September 2011.

Per the *Marine Corps Facilities Energy and Water Management Campaign Plan* signed April 2009, the Marine Corps will evaluate the viability of PPAs and leasing agreements to implement large-scale renewable energy projects and develop geothermal energy resources in a manner that protects the operational mission. The Marine Corps is committed to taking a leadership position in developing onsite renewable power, with the assistance of private sector financing and development expertise.

The Army is evaluating options for establishing an Energy Initiatives Office, based on the Army's highly successful Residential Communities Initiative, which would target large-scale developments while tracking smaller-scale efforts that can be effectively managed at the installation level. Within existing appropriated funding, the Army is focusing some Energy Conservation Investment Program funds into renewable power production.

Sub-Goal 1.2: Selected DoD Success Stories with Onsite Renewable Energy Generation

U.S. Army: Tooele Army Depot Wind Turbine

The first wind turbine at an Active Army installation came online at Tooele Army Depot in July 2010. The project was approved and funded through the Army Energy Conservation Investment Program in 2007. The 262-foot-tall wind turbine has the capacity to generate 1.5 MW of electricity, which will save the base about 14.5 billion Btu and more than $200,000 every year. The turbine requires wind speeds of at least 12 miles per hour to generate electricity and the average speed at the site is 14 miles per hour. The turbine was completed a year ahead of schedule. (Photo: U.S. Army)

U.S. Navy: PV at Naval Weapons Station Seal Beach

The Naval facility at Seal Beach has a total of 2,000 solar panels that produce 6.5% of the electricity needed by the base. The latest addition, completed in FY 2010, is a set of 812 PV panels added to a steel parking lot roof. The $1.9 million installation was funded through the ARRA and has a capacity of 190 kW. It is expected to generate 265,000 kWh of electricity every year, saving the base $30,500 annually in energy costs.

U.S. Marine Corps Air Ground Combat Center 29 Palms Onsite Renewable Energy

At MCAGCC 29 Palms, CA, renewable energy currently makes up over 6% of the energy consumed by the base, supplied by 2.4 MW of PV. 1.3 MW of this were added during FY 2010. The base plans to more than double its renewable energy capacity with the addition of 2.8 MW of additional PV, and it is studying the feasibility of adding wind and geothermal resources.

U.S. Air Force: Wind Farm on Warren AFB, WY

In FY 2009 and earlier, Warren AFB acquired three commercial scale wind turbines: two 660 kW turbines (Vestas V47s) and one 2 MW turbine (Gamesa G87), for a total capacity of 3.3 MW. The turbines generate about 4.4 million kilowatt-hours (kWh) every year, which is expected to save the Air Force an average of more than $570,000 in energy costs and $100,000 in maintenance costs every year. The $8.3 million investment cost for the farm has a payback period of 12 years. Currently, the wind farm is being used to test microgrids, which the military is developing for the purpose of providing installations with a smart energy management system capable of incorporating into one secure microgrid different sources of energy (such as wind turbines and diesel generators), energy storage, electricity distribution, and fluctuating levels of demand. In April 2010, the wind farm was part of an energy security demonstration conducted on the base's microgrid capabilities. Warren AFB partnered on the project with the Idaho National Laboratory and Air Force Civil Engineer Support Agency. (Photo: Air Force)

Wind turbines on Warren AFB, in a wind-swept part of Wyoming

DLA is continuing to evaluate four of its sites for renewable energy potential, and in FY 2011 began conducting renewable energy surveys and developing design project performance work statements at all of its sites. DLA has a wood chip biomass combined heat and power plant under construction in Germany that will be operational in 2012. At the Columbus and Richmond sites, solar domestic water heating projects are planned in 2011, with installation on additional buildings likely in subsequent years. DLA headquarters in Ft. Belvoir, VA has reviewed several options for a 1 MW solar PV system and is working on details for third-party financing and contracting.

The Defense Intelligence Agency (DIA) plans to add 160 additional parking lot solar lights between FY 2012 and FY 2015, pending available funding, at a rate of 40/yr, for a total addition of 168,000 kWh of renewable energy to the Defense Intelligence Analysis Center campus. DIA evaluated the potential for an additional 0.5 MW on the roof of a new Defense Intelligence Analysis Center parking garage, currently in the FY 2013 MILCON program, and it will continue to evaluate other renewable energy opportunities.

RENEWABLE ENERGY FOR DEPLOYMENT

Photo: U.S. Marine Corps

Status

The Marine Corps is aggressively pursuing renewable energy capabilities to increase combat effectiveness by increasing self sufficiency in battlefield sustainment and reducing the expeditionary footprint. The experimental expeditionary base is chaired by the Marine Corps Warfighting Lab, and supported by the Marine Corps Expeditionary Energy Office, Marine Corps Systems Command, the Combat Development Division of Combat Development & Integration, Training and Education Command, and the Office of Naval Research. In May 2011, the experimental expeditionary base focused on scaling hybrid solar capabilities, combined with energy efficient cooling and shelters, to support the battalion-level command post. The experience and leadership of the Marines of India Company, 3rd Battalion, 5th Marine Regiment demonstrated that increasing energy efficiency and using renewable energy sources extends a Marine unit's sustainability in an expeditionary environment, making for a leaner, lighter force. Most importantly, it may also save lives by getting Marines off the road hauling fuel and water.

VEHICLE FLEETS

Status

As shown in Figure II.1, 5% of DoD's facility energy consumption is from its non-tactical[3] vehicle fleets. The breakdown of this consumption by fuel type is given in Figure II.9. Petroleum consumption by the Department's non-tactical vehicle fleet declined by 5.3% in FY 2010 compared to the FY 2005 baseline, as shown in Figure II.10. Discussion of vehicle fuel use will focus on the Services, since all the other DoD Components combined accounted for less than 2% of total consumption (Figure II.11).

[3]A military tactical vehicle is any motor vehicle designed to military specifications or a commercially designed motor vehicle modified to military specification to meet direct transportation support of combat, tactical or relief operations, or for training of personnel for such purposes.

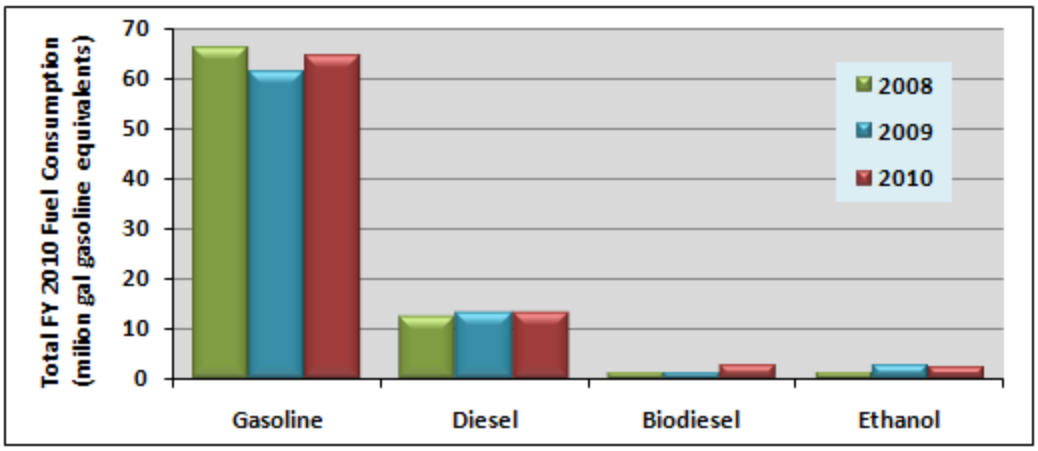


Figure II.9. DoD Non-Tactical Vehicle Fuel Consumption in FY 2010

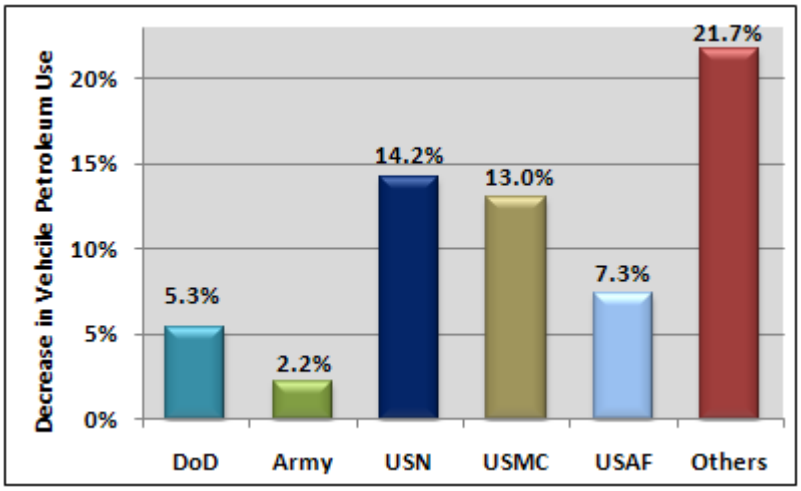


Figure II.10. Decrease in Non-Tactical Petroleum Consumption in DoD Non-Tactical Vehicles from FY 2005 to FY 2010

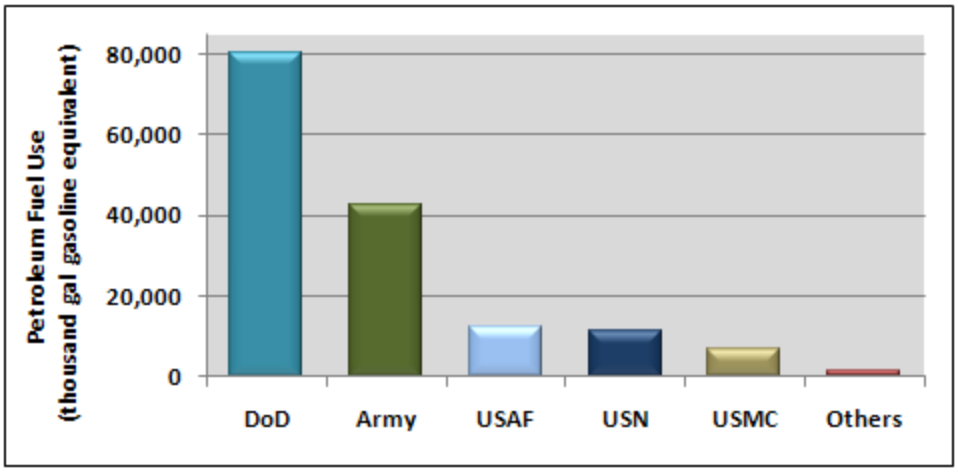


Figure II.11. FY 2010 Vehicle Petroleum-Based Fuel Use

Sub-Goal 1.3: DoD Success Stories in Reducing the Use of Petroleum Products in Non-Tactical Vehicles

U.S. Navy: NAVFAC Hawaii Alternative Energy Vehicle Program

In September 2010, NAVFAC Hawaii awarded a contract for a 10,000 gallon E-85 fueling system at Pearl Harbor Naval Shipyard. Also, the NAVFAC Hawaii Energy Team received its first hybrid hydrogen-powered internal combustion vehicle in June 2010. The vehicle will be fueled by the hydrogen fueling station located at Joint Base Pearl Harbor—Hickam, which produces hydrogen fuel from an electrolysis process powered by renewable energy systems (wind and PV) located adjacent to the station. During FY 2011, the base will install an E-85 fuel station to power its 780 E-85 vehicles. Moving forward, the NAVFAC Hawaii alternative energy vehicle program has plans to convert 25% of its more than 2,000 vehicle fleet to electric vehicles with batteries recharged by renewable sources. It is also exploring clean hydrogen-powered vehicles and a Pilot Bicycle program as a healthy transportation alternative in select situations.

U.S Marine Corps: E-85 Biofuel

Non-tactical vehicles in support of day-to-day operations at Marine Corps installations are handled by the Garrison Mobile Equipment Section (GME). In FY 2010, GME accomplished a dramatic increase of 95% in the use of E-85 on USMC installations. Two of the best examples are at Camp Lejeune, which increased E-85 by 87% from last year, and the South-west Regional Fleet Transportation Department, which tripled its use of E-85 after it began operating its new E-85 infrastructure in FY 2010.

Solar-powered hydrogen fueling station, Hickam AFB, HI

Photo: U.S. Air Force

U.S. Army: Fort Hood E-85 and Biodiesel

Fort Hood, TX added the infrastructure needed to make E-85 (a blend of 85% ethanol and 15% gasoline) and biodiesel available for vehicles, in addition to the JP8 jet fuel, gasoline and ultralow sulfur diesel fuel already provided. The station now includes four E-85 and four biodiesel dispensers. About half of the 1,320 total GSA vehicles at Fort Hood can use alternative fuels, and will now be able to do so conveniently. The base expects to save more than $100,000 during the first year through the use of these alternative fuels. The fueling station is also automated, with each vehicle assigned an associated identification key that is encoded with the customer's billing information. Customers use the keys to start the fuel pump, and the keys track charges on the vehicles and ensure alternative fuels are used where appropriate.

U.S. Air Force: Service-Wide

- Increased alternative fuel vehicle inventory by 2,112 (27%), to 10,037 vehicles.
- Increased the number of hybrid electric vehicles leased from the GSA to a total of 478.
- Down-sized a total of 370 larger vehicles (Class III and IV) to more efficient models.
- Implemented an enterprise-wide energy dashboard that provides all personnel with information on fuel use in ground vehicles.
- Hydrogen fuel demonstrations are ongoing at Joint Base Pearl Harbor-Hickam, HI and at Robins AFB, GA.
- Low-speed all-electric vehicles at Nellis AFB, NV and Tyndall AFB, FL are being used now to help the Air Force prepare for full-sized plug-in electric vehicles when they become commercially available.
- The Air Force is developing a tool for "right-sizing" its vehicle fleet that will balance mission requirements with base-specific demands and vehicle availability, placing an emphasis on alternative fuel use, fuel efficient hybrid technology, and reducing GHG emissions.

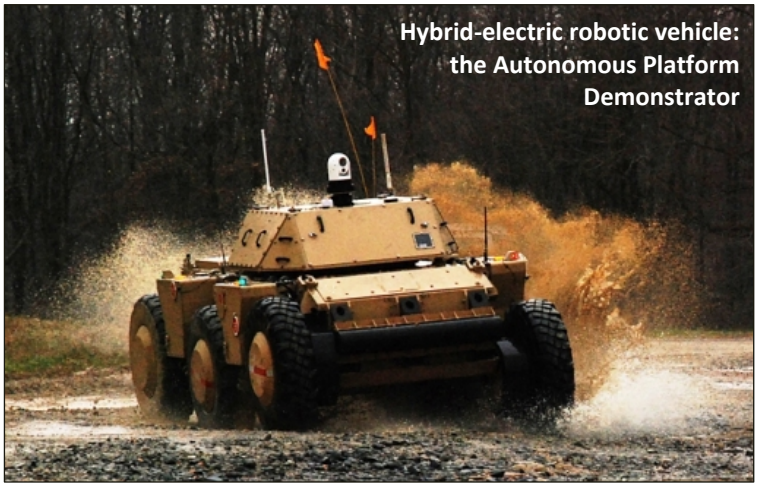
Implementation Methods

DoD fleet managers are beginning to work on a possible alternative funding scheme for the procurement of a large number of electric medium-duty vehicles, in which the vehicle chassis is purchased for roughly the equivalent of the price of a standard petroleum-powered model and the battery is leased at a reduced price.

The Navy is currently working on a demonstration project to validate whether biodiesel can be used in alternative applications, such as in ground tactical vehicles and equipment operating at domestic installations. Results from this study will determine whether and how certain fuel management procedures and technologies can ensure that the use of biodiesel does not harm mission capabilities or assets. From this demonstration, the Navy will develop procedures to improve quality control and the performance of the biodiesel currently used in non-tactical vehicles.

For leased alternative fuel vehicles, the Marine Corps spends approximately $1 million a year from O&M funds to procure a large number of Flex-Fuel vehicles and a small number of hybrid electric vehicles, by paying the General Services Administration (GSA) the incremental costs between an alternative fuel vehicle and the low-bid vehicle in the same category. A major issue for the Marines Corps in reducing petroleum consumption in FY 2010 was the high mileage of its recruiting fleet and the limited availability of E-85 away from Marine Corps installations. The Corps is making efforts to ensure that its Recruiting District leadership has the tools to make their recruiters aware of ethanol fueling stations in their areas. Meanwhile, it has been working with HQ Marine Corps Recruiting Command to increase the overall efficiency of its recruiting vehicle fleet. Another issue is that the current fleet of compressed natural gas vehicles is aging and shrinking, due to reduced availability of replacement vehicles on the commercial market. The Corps is seeking additional funding to modify medium and heavy duty diesel and gasoline vehicles to operate on compressed natural gas.

The Air Force is developing a new vehicle validation tool that will support "right-sizing" its vehicle fleet. The tool will balance mission requirements with base-specific demands and vehicle availability, emphasizing alternative fuel use, fuel-efficient hybrid technology, and reducing GHG emissions. The Air Force's use of radio frequency identification tags on its vehicles at McGuire AFB in New Jersey demonstrated opportunities for significant fuel savings by implementing a strong vehicle idling reduction strategy. The Air Force is planning to employ the tags on its non-tactical fleet throughout the continental United States. The Air Force is also implementing an enterprise-wide energy dashboard, including on ground vehicles, so personnel can see metrics relating to fuel consumption in real time.



Hybrid-electric robotic vehicle: the Autonomous Platform Demonstrator

Photo: U.S. Army

At the direction of the Secretary of the Army, the Army is right sizing its fleet, reducing the number of vehicles to the minimum to successfully complete its mission, and downsizing its fleet, using the smallest, most fuel efficient and most environmentally friendly vehicles to meet mission requirements. Efforts are ongoing to transition the fleet to hybrid, plug-in hybrids, and all electric vehicles as the technology becomes economically feasible. The Army is replacing 4,000 combustion vehicles leased from GSA with low speed electric vehicles, and plans to replace 200 or more GSA-leased vehicles each year with electric

hybrid vehicles over the next five years. The Army already has over 2,700 hybrid vehicles leased from GSA. It is using the annual GSA vehicle replacement cycle to downsize those Class III sport utility vehicles not required for functions such as law enforcement, fire, and emergency services, and to eliminate Class IV or larger vehicles (such as Suburbans and Crown Victorias). For the FY 2011 cycle, 560 Class III and IV sport utility vehicles were identified for replacement and only 74 were approved for either retention or replacement with the same vehicle type. For vehicles procured through GSA, the Army will ensure that: 1) vehicles have the highest possible fuel economy; 2) E-85 vehicles are located only where E-85 fuel is available; 3) all E-85 vehicles utilize E-85 exclusively; and 4) E-85 vehicles in areas where E-85 fuel is not available will be replaced with low GHG emitting vehicles. Through these actions, the Army anticipates exceeding the EO 13514 mandated fossil fuel reductions by 2016, four years prior to the mandated end date.

DLA has undertaken a program to install E-85 fuel dispensers at the remaining two DLA host sites where they have not yet been installed. The dispensers should be operational by the end of FY 2013. DLA plans to establish a Driver Energy Conservation Awareness training program in FY 2011 and FY 2012. DIA is working with GSA to locate an electric vehicle recharging station on the Defense Intelligence Analysis Center campus.

GOAL 2 Water Resources Management Improved

Goal 2 Sub-Goals

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

Metric

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

Annual Planning Targets

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%
RESULT	**12.9%***	**estimated (see narrative)*									

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

Metric

The percent reduction relative to FY 2010 in total water consumed by DoD for irrigation (agricultural and/or landscaping) and industrial purposes (for industrial processes that do not require potable water).

Annual Planning Targets

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	n/a	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%
RESULT	n/a										

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

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULT	n/a										

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

WATER CONSUMPTION

Status

Both absolute DoD water consumption and that relative to square footage have been falling in recent years, as demonstrated by Figure II.12 and Table II.10. The volume of water consumed by the Department per gross square foot of building space was 12.9% lower in FY 2010 than in the baseline year of FY 2007. Figure II.12 shows absolute consumption for the past three years for the Department as a whole, the Military Departments, and all other Components combined, demonstrating that the water consumed by the other Components is dwarfed by that of the Military Departments. With that said, Figure II.13 illustrates the tremendous range in water use intensity across the Components.

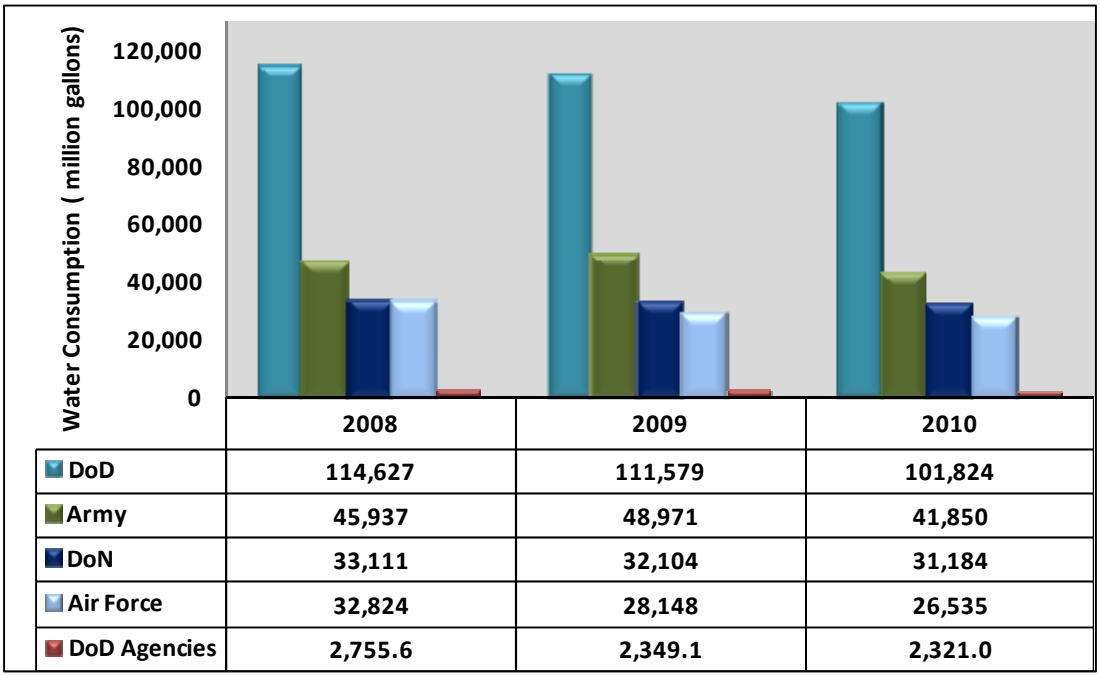
It should be noted that the overall water consumption data for FY 2010 is estimated. Metering for potable water is not yet complete in buildings deemed appropriate for it, and there are many other buildings for which metering is not planned at this time. Also, most non-potable water is not at this point metered separately from potable water, so the potable water consumption figures often include non-potable water.

Approach for Widespread Adoption: Reusing Vehicle Wash Water

The Army's largest vehicle washing facility, at Letterkenny Army Depot, PA, uses water recycling equipment with its wash racks. Recycling the wash water not only greatly reduces water consumption, but prevents petroleum products and other contaminants washed from the vehicles into the wastewater from being released to the environment. Based on the success of the Letterkenny facility, the Army Materiel Command is developing plans to install similar water recycling equipment at their production facilities. (Photo: U.S. Army)

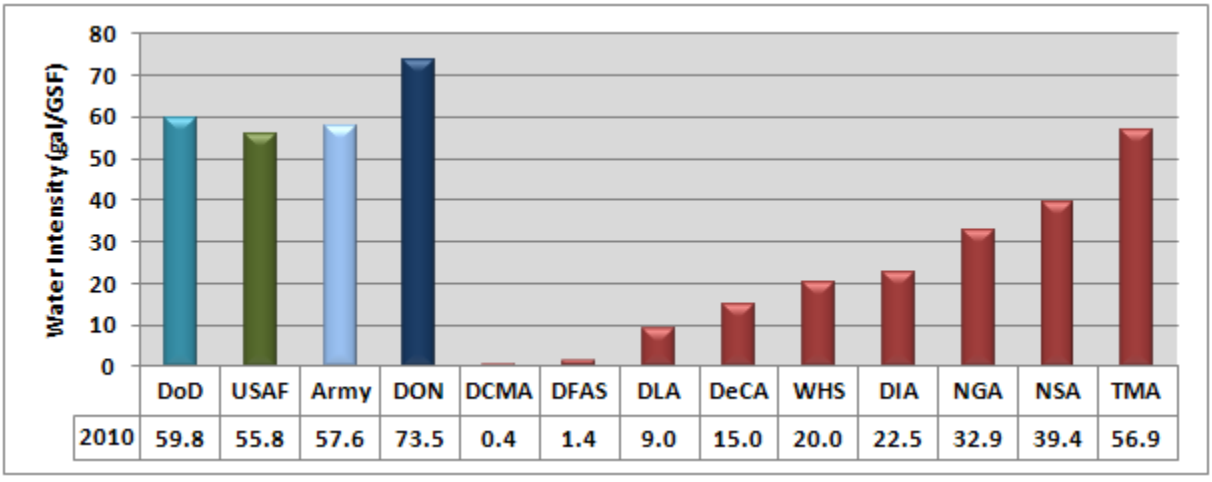
Closed Loop Vehicle Wash Rack, Letterkenny Army Depot, saves water and minimizes discharge

In December 2009, the Department issued DoDI 4170.11, *Installation Energy Management*, directing Components to meter all appropriate facilities for water by 2012, allowing usage to be determined through engineering estimates only when metering proves to be cost prohibitive. The Department has started the process of water metering, so far finding 4,849 of its buildings to be appropriate for water metering, completing installation in 74% of these (Table II.11). The Air Force issued Facility Metering Policy in May 2010, specifying that installations will have water meters at all potable water entry or service points, on well facilities, and at any location where annual usage exceeds two million gallons. In the event that it is not cost effective to install stand-alone meters, the policy dictates that a temporary meter be used to collect a minimum of 30 days of data.



	2008	2009	2010
DoD	114,627	111,579	101,824
Army	45,937	48,971	41,850
DoN	33,111	32,104	31,184
Air Force	32,824	28,148	26,535
DoD Agencies	2,755.6	2,349.1	2,321.0

Figure II.12. Total Water Consumption for DoD, Military Departments, and Other Components Combined, FY 2008 – FY 2010



	DoD	USAF	Army	DON	DCMA	DFAS	DLA	DeCA	WHS	DIA	NGA	NSA	TMA
2010	59.8	55.8	57.6	73.5	0.4	1.4	9.0	15.0	20.0	22.5	32.9	39.4	56.9

Figure II.13. FY 2010 Water Intensity for DoD, the Military Departments, and Nine Other Components

Table II.10. DoD Water Intensity from FY 2007 to FY 2010

MILDEP	Water Intensity (gal/GSF)				Intensity Reduction (FY 2007 to FY 2010)
	2007	2008	2009	2010	
DoD	59.8	58.1	57.1	52.1	12.9%
USAF	55.8	56.5	50.8	49.3	11.6%
Army	57.6	54.0	58.2	48.8	15.3%
DON	73.5	70.8	67.8	67.0	8.8%

Table II.11. DoD Water Metering as of the End of FY 2010

Water	# of Appropriate Buildings	Buildings Metered as of FY 2010
DoD	4,849	74%
DON	2,971	100%
Air Force	2,124	48%
Army	defined in FY 2011	tbd
Other Components	499	66%

Implementation Methods

The Department is still in the early stages of installing water meters to enable it to accurately track potable and non-potable water consumption, and will be focusing on ramping up metering over the next two years. The metering data will be crucial in enabling the DoD Components to develop their strategies for water efficiency and inform their investment decisions on water efficiency projects. As noted above in the Goal 1 Status section on Metering and Data Management, DON is in the process of installing advanced meters—including for water—in most of its buildings.

The Navy conducts energy and water evaluations for its "covered facilities" (as defined by EISA §432) every four years, and decides whether to fund potential water conservation and efficiency projects based on ROI, legal requirements and impact to critical infrastructure. Progress on funded projects are tracked with periodic monitoring and follow-up. For wastewater reuse, NAS Jacksonville in Florida began construction on a new wastewater reuse pump station and pipeline that will significantly reduce the amount of potable water consumed by the base, while also reducing the station's wastewater discharge to the St. Johns River.

The Army's updated sustainable design and development policy, issued 27 October 2010, requires new construction projects to employ strategies that use a minimum of 30% less potable water than the indoor water use baseline calculated for the building, and 50% less outdoor potable water. Design and fixture selection will generally follow the guidance in ASHRAE Standard 189.1 Section 6 and focus on technologies that minimize consumption. Additionally, the Army launched its Net Zero Installations strategy in April 2011. Net Zero Water is one of the three focus areas of the strategy, which strives to limit the consumption of freshwater resources by improving water efficiencies and capturing and repurposing rainwater and graywater. The pilot net zero water installations are: Aberdeen Proving Ground (MD), Camp Rilea (OR), Fort Buchanan (Puerto Rico), Fort Riley (KS), Joint Base Lewis-McChord (WA), and Tobyhanna Army Depot (PA). Additionally, Fort Bliss (TX) and Fort Carson (CO) will pilot integrated net zero energy-water-waste initiatives. Army installations are also developing

Sub-Goal 2.1: DoD Success Stories in Reducing the Use of Potable Water Through Water Efficiency

U.S. Army

- **Fort Benning, GA** – Reduced its water consumption by 49% from the FY2007 baseline through water-efficient design and retrofits in facilities, as well as upgrades to the privatized water system.
- **Fort Huachuca, AZ** – The Fort has a long history of energy and water conservation initiatives. As a result of an extensive public outreach program during FY 2010 that touched over 1,000 military and civilian personnel, water consumption for the base was reduced 36% from the FY 2007 baseline.
- **The Presidio of Monterey, CA** – In order to meet strict state and regional water allocation rules, the Presidio must include water conservation efforts in all new and retrofit projects. The recent upgrade of three barracks included dual-flush toilets, pressure reducing valves, and water-saving shower heads and faucet aerators. Projects to detect and repair water leaks are being developed.

U.S Marine Corps: MCB Hawaii

The base installed water-efficient plumbing fixtures, such as showerheads and aerators, some of which was conducted under an energy savings performance contract. The base also uses reclaimed water from the wastewater treatment plant to irrigate the golf course. For many years, the base has had a proactive leak management program in place, which continued in FY 2010 with the replacement of both water lines in housing as well as water mains.

- **FY10 water savings**: 14% from FY 2007

U.S. Air Force

Examples of water efficiency FY 2010 successes:

- **Randolph AFB**, TX – Installed low-flow showerheads in new facilities and limited water flow rates to 2.0 gal per minute. **Savings:** 1 million gal/yr.
- **Sheppard AFB**, TX – Implemented various maintenance projects, including valve repairs, assorted water main leak repairs, and the installation of low-flow fixtures. **Savings:** 4 million gal annually.
- **Lajes Field**, Azores – 177 aerators on sinks and showers in housing. **Savings:** 9.3 million gal.
- **Hanscom AFB**, MA – Repaired leaks in the steam and condensate distribution and reduced boiler make-up water requirements by over 5 million gal/yr.
- **Dover AFB**, DE – Heat plant decentralization. **Savings**: about 16 million gal/yr.
- **Hurlburt AFB**, FL – The base reduced water consumption 11% (15.3 million gal/yr) through policy changes, xeriscaping and mandatory construction project water efficiency requirements.
- **Langley AFB,** VA – The base identified 60.5 million gal/yr in water losses during a base-wide water audit, and is working to repair them. **Projected savings**: $229,000 annually in usage fees and pumping cost.

U.S. Navy: Faucet Aerators

Naval Base Point Loma, CA – Through the diligent effort of Naval Base Point Loma Seabees (Construction Battalion), the base installed more than 2,000 low-flow (one gallon per minute) faucet aerators throughout the base.

- **Savings** from new sink faucets: 55%.

Photo: U.S. Navy

Xeriscaping at Naval Station Pearl Harbor, HI

Comprehensive Energy and Water Management Plans that identify applicable best management practices successfully demonstrated by DOE/FEMP. To evaluate the vulnerability of select installations to potential water shortages over the next 30 years, the Army conducted a series of 15 water availability studies. The studies identified policy options to minimize potential water shortage impacts on Army missions, and to help installations implement sustainable water strategies. The Army is making the study methodology available at all Army installations for site-specific application. Starting in FY 2011, the Army is tracking industrial, landscaping, and agricultural water consumption.

The Marine Corps plans to identify problems and promote innovation by updating water metering systems and completing a comprehensive water evaluation of facilities every four years. It plans to meet its water efficiency targets primarily by funding construction and repair of water conveyance and/or production capability, and through conservation measures to reduce water use, such as efficient fixtures and water recycling.

The Air Force funded a wastewater reuse project at Holloman AFB, NM that is expected to save 70 million gallons of potable water annually once completed. The Air Force is also in the process of evaluating two aircraft wash water recycle projects at Laughlin AFB, TX, which are projected to save about four million gallons of potable water every year.

The new DLA headquarters building design for Defense Depot Susquehanna Pennsylvania will incorporate a number of water efficient designs and includes storage of rain water from roof runoff to supply non-potable water to all toilet flush valve fixtures. The rain water harvesting will reduce potable water demand in the building by 40%.

Photo: U.S. Army

STORMWATER RUNOFF

Status

DUSD(I&E) issued policy in January 2010 directing all DoD Components to comply with the stormwater design requirements of EISA §438. This DoD policy is consistent with the goals in EO 13514 §2(d)(iv). EISA §438 requirements were incorporated within the DoD UFC 3-210-10, *Low Impact Development*, in November 2010. The DoD policy specifies that the predevelopment hydrology—in terms of pre-project hydrologic conditions of temperature, rate, volume, and duration of stormwater flow from a project site—must be maintained or restored to the maximum extent technically feasible. The policy applies to new construction and major renovations with an outdoor footprint greater than 5,000 ft², including all horizontal hard and disturbed surfaces as well as building area. The policy included guidance on implementing the EISA §438 requirements, including a flowchart from the December 2009 EPA *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*.

The Army promulgated an LID policy in October 2010 through its *Memorandum for Sustainable Design and Development Policy Update (Environmental and Energy Performance) (Revision)*. The policy directs that all master planning, project development and project site planning follow the ASHRAE Standard 189.1 Section 5 guidance; incorporate LID criteria; maximize use of the existing topography (including slope, hydrology, flora and soils); and minimize site clearing and soil grubbing activities to the greatest extent possible. The Army is developing guidance on implementing its LID policy.

Sub-Goal 2.2: DoD Success Stories in Reducing Stormwater Runoff and the Use of Potable Water for Irrigation

U.S. Army

- **Fort Gordon**, GA — Installed a non-potable landscape irrigation distribution system to reduce demand on the potable water supply.
- **Fort Stewart**, GA is implementing a new water conservation plan that includes the use of graywater to irrigate the golf course and supply water to the central energy plant.
- **Fort Knox**, KY – Converted the golf course irrigation system to a non-potable water source and installed 500 waterless urinals and 525 low-flow toilets.
- **Fort Bliss**, TX is developing a project to re-claim water to irrigate its 51 acres of parade grounds instead of the annual 257 million gallons of potable water currently used.
- **The Presidio of Monterey**, CA - Projects under development include rainwater harvesting, smart irrigation controls and/or a graywater irrigation system.

U.S. Air Force

- **Incirlik Air Base**, Turkey – A wastewater effluent reuse system servicing the base golf course reduced potable water use by 30%.
- **Robins AFB**, GA **–** Grass pavers and porous pavement replaced impervious surface area in a parking lot, eliminating over 20,000 gallons of stormwater runoff. The underground storage capacity can infiltrate rainwater from a 50-year 24 hour storm event.
- **Edwards AFB**, CA – Replaced 10 acres of grass with xeriscaping, saving 23 million gallons of water annually.
- **Air National Guard** – Reduced landscaping irrigation, decreasing water use by 29%.

Defense Logistics Agency: Rain Water Harvesting for Toilet Flushing

The new Headquarters building at Defense Distribution Depot Susquehanna in Pennsylvania will use rain water harvesting to supply non-potable water to all indoor flush valve fixtures, such as toilets and urinals. Rain water collected from the roof will be stored in cisterns until needed, which is projected to reduce the building's potable water demand by 40%.

U.S. Navy

- **Navy Exchange at Pearl Harbor** – A large-scale, drought-tolerant xeriscape project was completed in August 2010 at the Navy Exchange at Pearl Harbor, HI. The design incorporates hearty, drought-tolerant plants, efficient irrigation, ground cover, and balanced soil to produce a landscape that requires half or less the amount of water to maintain than traditional landscaping. More than 45,000 plants, ranging from crown of thorn shrubs to dwarf sugar cane, were planted.
- **Navy Region Southwest** – NRSW continued to incorporate irrigation improvements, which include upgrading irrigation systems to use weather-based controllers, monitoring irrigation meter data for excess consumption, and performing on-going survey and repair of irrigations systems. A dedicated irrigation resources efficiency manager ensures irrigation occurs only where necessary and that systems are maintained for efficiency.
- **NAS Jacksonville** – The Helicopter Maritime Strike Squadron hangar facility, commissioned in July 2009, has three features that reduce stormwater runoff and the demand for potable water: 1) a rain water harvesting system for use in toilets and helicopter wash rack systems; 2) porous pavement in the parking areas, eliminating the need for a storm water retention pond; and 3) the use of reclaimed wastewater to irrigate the Timuquana Country Club golf course, which not only reduces the demand for potable water but reduces the installation's outflow to the St. John's River, helping it comply with new discharge requirements.

  Water from the rainwater harvesting system first passes through built-in sand filters for mechanical particulate removal, and is then subjected to ultraviolet light to destroy pathogens. All water goes through the same process regardless of whether it is used for toilet flushing or the wash rack. The systems collect both from the roof and the adjacent parking lot.

Other Military Departments have also been proactive on this issue. DON developed and implemented a capability to electronically track compliance with stormwater runoff and LID requirements, using the NAVFAC project management tool called "eProjects." The Air Force has drafted a new Sustainable Design Development policy that includes specific guidance on LID criteria for compliance with EISA. The Technical Division of the Air Force Center for Engineering and the Environment developed a stormwater hydrology analysis tool to help construction and planning engineers estimate pre- and post-development hydrology parameters. The tool includes a detailed questionnaire to ensure that applicable construction projects comply with DoD policy, generates a certificate that documents actions taken, and provides a permanent record on the project. The Air Force demonstrated the tool to all Services at the Clean Water Act Services Steering Committee, and other services are evaluating the tool for its application during the programming and planning phases of projects.

MDA is in the design or construction phase with four MILCON projects for administrative building space totaling over one million square feet, where MDA will be the sole occupant. MDA and its construction agents are actively designing and constructing all four projects so the pre-construction hydrology of the property is maintained or restored with regard to the temperature, rate, volume, and duration of stormwater flow. MDA requires a Preconstruction Survey of the project site with the contracting officer, during which photographs are taken to show existing environmental conditions in and adjacent to the site and submitted a report for the record.

Implementation Methods

The OSD Facility Investment and Management office is in the process of developing a mechanism to track progress with sub-goal 2.3. DoD UFC 3-210-10 on LID defines verification as documentation provided by the designer of record which validates that the LID management practices meet the design requirements and analyses.

OBJECTIVE 2
DoD Readiness Maintained in the Face of Climate Change

The Department reduced its GHG emissions by 593,719 metric tons (1.7%) in FY 2010, from the FY 2008 baseline, as shown in Table II.12. DoD targeted emissions totaled 33.7 million metric tons of CO_2-equivalent emissions during FY 2010, including a 415,117 metric ton reduction for renewable energy. While Scopes 1 and 2 emissions declined 3.6% in that two-year period, Scope 3 emissions increased by 6%, mainly due to increased emissions from employee travel. However, this Scope 3 increase does not reflect renewable energy credits permitted under Section 4.1.3 of the Federal Greenhouse Gas Accounting and Reporting Guidance. These credits are associated with projects on federal lands where DoD does not retain Renewable Energy Certificates, but has contributed to increasing the overall renewable energy supply for the nation. When this credit of 747,000 metric tons is applied, DoD Scope 3 emissions declined by 5% in FY 2010 from the FY 2008 baseline.

The relative contributions of different sources to DoD's FY 2010 GHG inventory are shown in Figure II.14, illustrating the importance of fossil fuel combustion to DoD's GHG emissions. Scope 1 emissions are purple, scope 2 green, and scope 3 blue.

Table II.12. Change in DoD GHG Emissions From FY 2008 to FY 2010

Scope and Category		DoD GHG Emissions, MT $CO_2(e)$[a]		
		FY 2010	FY 2008	% Decrease (from FY 2008)
Scope 1	Stationary Combustion	6,675,076	6,732,200	
	Non-highway Vehicles, Aircraft, Ships, and Equipment	985,176	1,204,098	
	Passenger Fleet Vehicles	677,659	728,564	
	Fugitive[b], Fluorinated Gases and Other	298,923	245,504	
	Fugitive, On-site Wastewater Treatment	6,356	6,304	
	Fugitive, On-site Landfills	1,098,382	1,097,054	
	Manufacturing and Industrial Process Emissions	3,324	3,401	
Scope 2	Purchased Electricity	15,908,249	16,349,506	
	Purchased Biomass Energy	9,815	0	
	Purchased Steam and Hot Water	1,764,419	1,654,303	
	Reductions from Renewable Energy Use	-415,117	0	
Scopes 1 and 2		**27,012,262**	**28,020,935**	**3.6%**
Scope 3	Transmission & Distribution Losses[c]	1,037,453	1,048,500	
	Employee Business Air Travel	1,886,311	1,730,587	
	Employee Business Ground Travel	328,140	286,852	
	Employee Commuting	3,473,736	3,231,357	
	Off-site Wastewater Treatment	7,493	7,247	
	Contracted Municipal Solid Waste Disposal	621,689	635,325	
	Renewable Energy Generated with No Renewable Energy Credits	-747,641	0	
Scope 3		**6,607,181**	**6,939,868**	**4.8%**
Total Emissions		**33,619,443**	**34,960,803**	**3.8%**

[a]Does not include excluded emissions

[b]Fugitive emissions are escaped gases (usually leaks) that cannot be directly measured, such as leaks from refrigeration systems.

[c]Losses in electricity when transported over power lines.

GOAL 3 Greenhouse Gas Emissions from Scope 1 and 2 Sources Reduced 34% from FY 2008 by FY 2020

Annual Planning Targets

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Goal 3	3%	5%	10%			19%			28%		34%
Result	3.6%										

Goal 3 Responsible OSD Office: AT&L/I&E

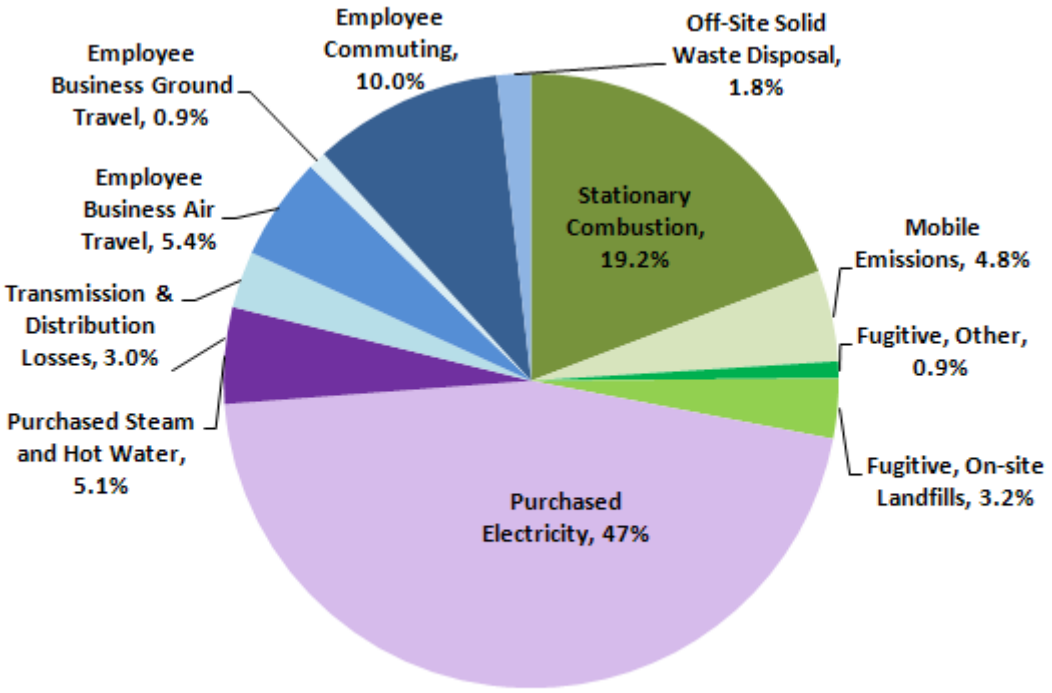


Figure II.14. DoD FY 2010 GHG Inventory

GOAL 4 Greenhouse Gas Emissions from Scope 3 Sources Reduced 13.5% by FY 2020, Relative to FY 2008

Annual Planning Targets

Fiscal year	2010	2011	2012
Goal 4	0%	0%	1%
Result	+4.8%	*When renewable energy credits are included*	
Result	-6.0%	*Without including the reductions due to renewable energy credits*	

SUB-GOAL 4.1 Greenhouse Gas Emissions from Employee Air Travel Reduced 7% by FY 2020 Relative to FY 2011

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

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	0%	0%	1%	2%	2%	3%	4%	5%	6%	7%
RESULT	n/a										

SUB-GOAL 4.2 30% of Eligible Employees Teleworking at Least Once a Week, on a Regular, Recurring Basis, by FY 2020

Metric

The percent of DoD employees eligible to telework who are doing so at least once a week 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

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	10%	15%	17%	19%	21%	23%	25%	27%	29%	30%
RESULT	n/a										

Goal 4 Responsible OSD Office

Sub-Goals 4.1 and 4.2: AT&L/Personnel and Readiness
Sub-Goal 4.3: AT&L/I&E

EMPLOYEE AIR TRAVEL

Status

The Department's FY 2010 GHG emissions from employee air travel increased 9% from the FY 2008 level. The Defense Travel Management Office (DTMO) published several articles on green travel topics over the last year in *DTMO Dispatch*, a quarterly publication for the DoD travel community. The articles provided practical information for travelers to reduce their environmental footprint when travelling, such as how to rent hybrid cars and use Defense Connect Online to virtually attend meetings instead of travelling.

Implementation Methods

DTMO is collaborating with other agencies to find the best ways to reduce energy consumption and GHG emissions from employee business travel. DTMO is working with GSA and EPA to formulate a proposal to incorporate emissions reductions into the criteria used to evaluate vendors applying for the GSA City Pair Program. This effort is still in the discussion stage. DTMO is an active participant in the Green Travel Working Group, consisting of DoD, DOE, EPA, GSA and the White House Council on Environmental Quality (CEQ). One of the main focuses of the group is to develop a Federal Green Travel website to provide training and other educational tools on how to travel more energy efficiently. The group is conducting a government-wide analysis of the viability of replacing non-essential travel with virtual meetings. On 30 September 2010, GSA issued *Guidance for Sustainable Temporary Duty (TDY) Travel Policies and Practices*, which provides improved guidance based on the Federal Travel Regulation regarding sustainable travel, including guidance on evaluating whether travel is mission critical or can be avoided. DTMO is evaluating whether to use the new guidance to modify the DoD travel regulations: the Joint Federal Travel Regulations (applies to uniformed personnel) and Joint Travel Regulations (applies to DoD civilian employees and others traveling at DoD expense). DTMO is also evaluating whether to develop an online Green Travel training course, and the potential for including a session dedicated to more sustainable travel at the annual Defense Travel Seminar.

TELEWORKING

Status

The Department's FY 2010 GHG emissions from employee commuting increased 7.5% from the FY 2008 baseline. The DoD GHG Accounting Working Group agreed to report Scope 3 GHG emissions from commuters based on the national average determined by the 2009 U.S. Census Bureau American Community Survey (Table B08301)). The Department continues to explore options for collecting commuter data for future GHG inventories, including ways to track impacts of increased teleworking. The Department issued new telework policy 21 October 2010, via DoDI 1035.01, *Telework Policy*, which states:

> It is DoD policy that telework shall be actively promoted and implemented throughout the Department of Defense in support of the DoD commitment to workforce efficiency, emergency preparedness, and quality of life. Telework is not an entitlement, but its use can serve as an effective recruitment and retention strategy; enhance DoD efforts to employ and accommodate people with disabilities; and create cost savings by decreasing the need for office space and parking facilities, and by reducing transportation costs, including costs associated with payment of transit subsidies.

The DoDI lays out responsibilities, including the designation of the Under Secretary of Defense for Personnel and Readiness to oversee the development and implementation of telework policy for the Department. The DoDI requires that all heads of DoD Components develop and implement telework programs, and provides detailed procedures to guide Components in doing so.

Public Law 111.292, *The Telework Enhancement Act of 2010*, was signed by the President on 9 December 2010. The Act provides details on criteria needed to establish a telework program and to manage the operational aspects of the program. The Department is revising DoDI 1035.01 to incorporate the requirements of the Act into existing Department policy.

DLA's teleworking rate is 30%—in terms of those teleworking at least once a week on a regular, recurring basis—up 2.6% from the prior year. At the end of FY 2010, 55% of encumbered DLA positions were identified as eligible for telework.

MDA has been actively promoting the expansion of its telework program. On 13 December 2010, MDA issued Instruction 1035.01-INS, *Telework*, in accordance with the October DoDI on Telework Policy. The MDA instruction establishes policy and prescribes procedures for MDA teleworking, and assigns specific responsibility for collecting and reporting employee telework statistics to track telework participation.

Approach for Widespread Adoption:
AIR FORCE HEADQUARTERS TELEWORK HOTEL PILOT

A teleworking "hotel" is the term used for shared office space set aside for teleworkers, typically those who are eligible for full-time telework and are equipped for mobile work with a laptop and cell phone. The approach lowers overhead costs by reducing the amount of physical office space needed. The HQ Air Force Information Management Office piloted the concept at its Rosslyn location by creating 12 "hotel" spaces for 48 workers. The projected cost savings for leased space for 48 employees is $314,000 per year. The employees were approved to work at remote sites and could use the space as needed, usually driven by customer meetings or the need for a secure internet protocol router. The spaces were a mix of work stations that required reservations for day-long visits, plus spaces for short visits available on a first-come, first-served basis. Based on the success of the pilot, the program was expanded to 36 cubicles and two offices (the latter for Division and Branch Chiefs) and was opened to all employees, regardless of telework status. So far, the Air Force added hoteling in three other locations: Andrews AFB, Bolling AFB and the Pentagon.

Implementation Methods

The Department's revision of DoDI 1035.01 to incorporate the requirements of the Telework Enhancement Act of 2010 will lay the foundation for DoD to increase the percentage of eligible employees teleworking on a regular and recurring basis. Supervisors within all DoD Components will be required

to determine the eligibility of all relevant employees to telework, based on position duties, performance, and conduct, and notify employees of their eligibility to participate in telework. The Department will ensure that telework training is provided to all employees eligible to telework and their supervisors before an employee enters into a written agreement to telework. DoD's Civilian Personnel Management Service is developing an application in the Defense Civilian Personnel Data System to track DoD-wide telework eligibility among DoD's civilian personnel, by position and employee. The application will be completed by the end of FY 2012.

The Department will mandate interactive training for all teleworkers and their managers before they enter into a telework agreement. The training will facilitate an increased understanding of the elements of a successful telework arrangement, such as supervisor and employee responsibilities and effective performance management, and will reduce barriers to telework by alleviating management concern about remote workers.

DON is implementing several initiatives to reduce employee commuting by enhancing its telework program. One initiative is to update the DON telework policy to be consistent with the Telework Enhancement Act of 2010. Also, DON is developing two online training programs, telework for employees and telework for supervisors, and it is exploring IT issues related to increased capacity for remote access and portable hardware solutions. It is exploring ways to improve metric collection through an automated telework management tool that will track employee telework agreements, employee eligibility for telework, and gather ROI information on reduced commuting, increased productivity, and enhanced recruitment and retention. Currently, there are no existing resources for these initiatives, but DON estimates that a telework software system, increased remote access capability, and expanded IT equipment capable of sustaining a 30% goal for telework would cost in excess $10 million.

The Administrative Assistant to the Secretary of the Army is updating the Army's telework policy (DA Memorandum 690-8) to incorporate new requirements in DoDI 1035.01 and the Office of Personnel Management's December 2010 *Washington, DC, Area Dismissal and Closure Requirements*. Staff are working to increase the number of Army organizations that have implemented telework programs, and the number of participating employees. As part of that effort, the Army is working in FY 2011 to quantify the number of eligible employees and improve its reporting capabilities.

Both DLA and MDA continue to enhance their teleworking programs. The DLA Human Resources Department is working to improve tracking and reporting processes, automate the approval process, refine its teleworking policy, provide internal training and marketing, and improve integration with the DLA timekeeping system and Continuity of Operations and Emergency Readiness programs. MDA is completing the identification of all positions eligible to telework, and is the process of identifying ways to increase teleworking participation and reduce employee commutes. MDA is also requiring employees to take environmental awareness training that discusses the benefits of teleworking, and is in the process of procuring the required technology (e.g., laptops and workstation video teleconferencing capability).

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

GOAL 5 Solid Waste Minimized and Optimally Managed

Goal 5 Sub-Goals

SUB-GOAL 5.1 All DoD Components Implementing Policies by FY 2014 to Reduce the Use of Printing Paper

Metric

The number of DoD Components that: 1) have issued a policy that establishes a program for reducing the use of printing paper, where the program consists of two or more initiatives that drive the transition to a culture of reduced paper; and 2) are actively implementing that program. Components counted are the Departments of the Army, Navy and Air Force, the 18 National Agencies, and the ten DoD Field Activities.

Annual Planning Targets

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	1	6	24	31	31	31	31	31	31	31
RESULT	**3**										

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

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%
RESULT	**43%**										

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

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%
RESULT	**72%**										

SUB-GOAL 5.4 Ten Landfills or Wastewater Treatment Facilities Recovering Biogas for Use by DoD by FY 2020

Metric

Cumulative number of qualifying landfills and wastewater treatment facilities:

a) that are owned by DoD and became operational for the production, capture and use of methane from biogas; and

b) that are owned by other parties, with which DoD has entered agreements to buy biogas (or energy from it), and became operational for the production and capture of methane from biogas for use by DoD.

A project will be counted towards the sub-goal if: 1) it came on-line during FY 2010 or later; and 2) it results in the collection of at least 50,000 standard cubic feet per day of biogas, on average.

Annual Planning Targets

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	0	2	3	4	5	6	7	8	9	10
RESULT	**1**										

Goal 5 Responsible OSD Office

Sub-Goal 5.1: OSD Director of Administration
Sub-Goal 5.2 to 5.4: AT&L/I&E

REDUCING THE USE OF PAPER

Status

The DON, DLA and MDA issued policy in FY 2009 and FY 2010 to help reduce the use of printing paper.

DLA is the appointed DoD printing agency, responsible for over 36,000 copiers worldwide. In FY 2010, DLA aggressively promoted approaches to documentation that reduce the use of printing paper throughout the Department. DLA Headquarters enacted a policy in November 2010, titled "Defense Logistics Agency (DLA) Sustainability and Energy Efficiency Policy Update", that includes a requirement to maximize the use of duplex (double-sided) printing, and DLA placed a requirement in all solicitations that all new copiers have the duplex feature enabled as a default.

All of the following DLA polices result in less DoD paper consumption worldwide:

a) *Duplex Printing*. DLA Document Services has reduced paper usage during FY 2010 by strongly encouraging all DoD agencies to print their documents double sided. DLA also had all multi-functional copiers delivered in FY 2010 with the default set to duplex printing.

b) *Scanning and Conversion*. DLA Document Services routinely offers and recommends hard copy document conversion to digital file format for distribution and archiving purposes within DoD, and in FY 2010 converted 16.4 million pages to digital format.

c) *Electronic Document Management*. DLA Document Services developed and implemented electronic document management as a service for managing information through state-of-the-art client-server or web-based solutions that reduce DoD's reliance on paper. The service provides DoD agencies with assessments to help move them to a digital storage environment, reducing the need for publications warehouses. One of the service's technology solutions has resulted in a reduction of 177,000 square feet of warehouse space and the reallocation of 23 full-time equivalent personnel, for an annual savings of over $3.8 million. The program works hand in hand with two other energy saving initiatives, Print On Demand and Distribute and Print, as described below.

d) *Print On Demand*. The DLA Print on Demand service offers a "print what you need when you need it" environment that replaces print orders placed with the Government Printing Office. This convenient option for DoD agencies reduces the use of paper and energy, and the need for space.

e) *Distribute and Print (D&P)*. DLA Document Services developed the Distribute and Print service so that documents can be distributed electronically to the DLA Document Services location closest to the final point of delivery, and printed there. This eliminates the need for warehousing printed material, which creates paper waste. Historically, the Air Force printed and stored paper documents with an average annual obsolete rate of approximately 10%. With the implementation of the DLA Document Services D&P program, the Air Force Material Command was able to map a strategy and develop the capability to improve document management and delivery, facilitating on-demand printing as well as an on-line viewing strategy, which will in the future reduce annual printing. Overall reduction of paper output is unknown at this time but will be monitored by DLA Document Services. DLA Document Services now has ten DoD agencies actively using the service, with an annual print volume of approximately 16 million pages. As this is a worldwide service available to all DoD and federal customers, the results are a worldwide reduction in paper and fuel usage, pollution, and paper waste throughout DoD. Through an on-demand, on-line strategy, the Distribute and Print program aims to deliver the order to the end user in 72 hours or less.

The Navy policy, *Department of the Navy Strategy for Green Information Technology Electronic Stewardship and Energy Savings Strategy*, was issued in April 2009. Included in the policy are provisions designed to reduce the use of printing paper by requiring that double-sided printing be the default setting on all duplication equipment, if available, without requiring the user to manually load the paper.

In support of the DON policy, the Space and Naval Warfare Systems Command issued policy on duplex printing requiring all of its locations to use Energy Star duplication devices (such as printers, photocopiers, fax machines, and multifunction printers) with duplex printing capability to the maximum extent possible, and for users to print double-sided. It also developed guidance on the use of duplex-printing; for example it suggests that settings be configured at both the user's workstation and the printing device to facilitate duplex printing.

MDA took a multi-pronged approach to reduce the use of printing paper during FY 2010. At the policy level, the agency issued a Sustainable Electronics Management Program Directive making it MDA policy for all duplex-capable imaging equipment to be set to duplex printing by default. MDA's technical approaches consisted of converting the imaging equipment at each of its facilities to default double-sided printing; obtaining printers configured to require users to enter a personal identification number to retrieve documents; and configuring the network servers to delete print jobs not retrieved by the user within six hours of printing. Finally, MDA required all employees to take an updated Environmental Awareness Training class that emphasized the need to reduce MDA's environmental footprint by conserving resources and printing double-sided documents whenever possible.

Implementation Methods

By the end of FY 2011, the Department will develop and issue DoD-wide guidance on effective strategies for reducing the use of paper, for example by encouraging the use of digital documents in lieu of paper, requiring printers with automatic duplexing capability to default to this setting, and modifying routine office tasks to reduce paper use. The Assistant Secretary of the Army for Installations, Energy and the Environment will work with the Administrative Assistant to the Secretary of the Army to develop and issue a policy in FY 2011 to reduce the use of printing paper. The Marine Corps will release an administrative policy in 2011 that requires the reduced use of printing paper. The policy will require mandatory duplexing to the fullest extent possible, and require all new copying and printing devices to have duplexing capability. The Corps plans to use current devices to the end of their life cycle and

Sub-Goal 5.2: Selected DoD Success Stories with Solid Waste Diversion

U.S. Marine Corps Air Ground Combat Center 29 Palms - Dining Hall Waste Reduction

MCAGCC Twentynine Palms installed three automated food waste composters at its three dining facilities. The devices grind up food and compostable utensils, rapidly reduce the volume of the waste by 80% to 90% through dehydration, and convert it into a high-quality organic soil amendment. The system captures and uses the heat energy given off during the process, reducing overall energy consumption. The base also installed an EcoShredder at its Camp Wilson dining facility to shred cardboard serving trays and paper cups. The shredder reduces the volume of the waste by a factor of ten and the shredded cardboard is combined with the other organic waste for composting.

U.S. Navy: Naval Station Rota Community Outreach

Increased communication by the NS Rota Environmental Division to the base community regarding its Qualified Recycling Program has yielded impressive results over the last two years. The base has distributed flyers, held recycling awareness events (dumpster dives), and provided orientations for new base employees and residents on what can be recycled and where, special item recycling rules, and specific recycling instructions (such as removing caps from bottles). One byproduct of the outreach has been increased communication between the base community and the Environmental Division, which is now contacted regularly by base tenants concerning recycling or reuse of items that are no longer needed. For example, in May 2010 the Navy Exchange Service contacted the office concerning proper disposal of an excess of 132 gallons of liquid floor wax. The base janitorial staff agreed to take and use this excess product in buildings on base, allowing NS Rota to divert the product from its waste stream. Results from FY 2008 to FY 2010:

- Decrease in the Waste Stream: >18%
- Decrease in Disposal Costs: $137,000 (11%)
- Increase in Recycled Material: >10%
- Increase in Recycling Revenue: $41,000 (80%)

Missile Defense Agency

MDA achieved a 93% diversion rate in FY 2010 for non-hazardous and C&D waste through:

1) **Required Employee Training**
2) **Waste to Energy** – documents For Official Use Only are destroyed in a waste-to-energy facility.
3) **Recycle Bins** – aluminum, paper, plastic, glass.
4) **"Office Supply Take Back Programs"** – collects excess supplies and donates them to schools or reuses them.
5) **Huntsville Warehouse Recycling Program** – Recovered and recycled in FY 2010:
   - Batteries – 718 pounds
   - Cardboard – 22,960 pounds
   - Classified Destruction – 155,800 pounds
   - Polyfoam, Styrofoam® – 1282 cubic feet
   - Packing materials – 93 cubic feet
   - Scrap metal – 7,360 pounds
   - Shrink wrap – 95 cubic feet
   - Toner cartridges – 4,212 cartridges
6) **Electronics and Furniture Reuse** – In FY 2010, donated 6,789 pieces of electronics and furniture, mostly to schools.
7) **Construction and Demolition Debris** - 92% of construction waste from the LEED Gold Headquarters Command Center was recovered.

U.S. Air Force Robins AFB Recycling Center

A new recycling center in 2009 collected and sold over 1 million pounds of scrap metal and lead acid batteries, generating over $150,000. The base recycled over 50% of its non-hazardous solid waste, including 1,658 tons of waste wood, 1,614 tons of cardboard, 758 tons of paper, and 16 tons of toner cartridges. High rates of C&D debris diversion were also achieved: 71% in FY 2009 and 54% in FY 2010.

MCAS Yuma: Contract Requirements for Construction and Demolition Debris Diversion

Marine Corps Air Station Yuma regularly achieves high C&D diversion rates by incorporating diversion requirements into contracts. As a result, all contractors, vendors, and suppliers involved in C&D participate. Much of the debris from the base is concrete and asphalt that is crushed and re-used for building materials.

replace them with duplex-capable devices. The Air Force is evaluating which office would be most effective at issuing a paper reduction policy and implementing the subsequent Air Force Instruction that would result. The Department expects the Air Force to meet the requirements of sub-goal 5.1 by no later than the end of FY 2012.

DIA began an informal initiative in FY 2010 to increase the purchase and use of two-sided copiers and will meet the DoD goal of having a printing reduction policy in place by 2014. DLA and MDA, having already issued policy to reduce the use of printing paper, will continue implementing policies to reduce the use of printing paper. DLA will monitor world-wide paper usage, scanning, and conversion of paper documents for on-line viewing on a semi-annual basis, throughout the DLA Document Services in-house production facilities. It will also continue to market the conversion of paper documents into digital format, and continue to aggressively promote duplex printing of all hardcopy requirements. DLA continues its conversion to Electronic Document Management for digital document storage, archival, and retrieval. MDA plans to audit a sample of imaging equipment in FY 2011 to ensure that all new machines are configured correctly for duplex printing and to ensure that server patches work as intended on all duplex capable machines. It will also require employees to take environmental awareness training, which discusses the need to reduce paper use.

INCREASING SOLID WASTE DIVERSION

Status

During FY 2010, DoD diverted 43% of its non-hazardous solid waste away from the waste stream, and over 72% of its construction and demolition (C&D) debris. The Department's solid waste diversion avoided over $176 million in disposal costs. Solid waste generation decreased 18% since FY 2006. The Department has improved its C&D diversion by placing an increased emphasis on requiring maximum diversion in demolition contracts. There is increased awareness of DoD diversion requirements through DoD's Qualified Recycling Program Management course, offered in the U.S. and overseas. The course was updated to incorporate the Plan sub-goals and recent DoD policy for ISWM.

Implementation Methods

A DoDI on ISWM is under development, with an expected completion by the end of December 2011. This DoDI will establish DoD-wide policy, assign responsibilities, and prescribe procedures for executing an ISWM program focusing on waste prevention and diversion DoD manages solid waste according to the following hierarchy from most to least preferred:

- source reduction
- reuse
- diversion (recycling, composting, mulching)
- incineration for volume reduction with energy recovery or other forms of volume reduction
- landfilling

The DoDI will also help to ensure that recycling requirements are incorporated into all relevant contracts. The Department will develop and implement systems to track the amount of solid waste diverted to composting and the amount it sends to energy recovery facilities.

Under the Air Force Asset Management Program, which includes Waste Management as one of its five primary mission lines, the Air Force completed its first Waste Activity Management Plan. The plan identifies the investment strategy and approach for achieving solid waste management goals. The Air Force will rely upon each Major Command to develop a strategy to achieve the goal across the installations within their command, prioritizing installation waste diversion rates based upon knowledge of opportunities, markets, and waste volume. HQ Air

Force is in the process of developing a Reporting Guide for Non-Hazardous Solid Waste to help installations understand what to track and report as non-hazardous solid waste. In the upcoming year, the Air Force will launch its third edition of the "Win the War Against Waste" campaign to provide installation solid waste program managers with tools to help them communicate program goals and local recycling procedures to base personnel.

The Army is targeting improved recycling and waste minimization at Army installations, including the Army's newly-launched Net Zero Waste initiative, which establishes the waste management hierarchy shown above. The Army's pilot net zero waste installations are: Fort Detrick (MD), Fort Hood (TX), Fort Hunter Liggett (CA), Fort Polk (LA), Joint Base Lewis-McChord (WA), and U.S. Army Garrison, Grafenwoehr, Germany. Additionally, Fort Bliss (TX) and Fort Carson (CO) will pilot integrated net zero energy-water-waste initiatives.

The Marine Corps is planning to implement several initiatives to support installation efforts to increase diversion of different types of solid waste from the waste stream. These efforts include:

- Periodically publishing a newsletter to engage the installation solid waste community in discussions to increase awareness of solid waste diversion goals, current and future initiatives, and installation success stories.
- 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.
- Surveying a representative set of installations to identify areas where HQ Marine Corps can provide support by issuing policy or guidance to help improve solid waste diversion. Initial efforts could focus on the largest generators of solid waste.

To increase overall emphasis on diversion rates, in FY 2011 or FY 2012 the Navy will issue an updated policy on integrated solid waste management, via the Chief of Naval Operational Instruction 5090.1. The Navy is also conducting a study of Qualified Recycling Programs to determine the most cost-effective means of achieving diversion goals. Results of this study may help focus diversion efforts and increase overall rates.

Pulling recyclables from dumpsters in a NAS Whidbey I. Waste Characterization Study

Photo: U.S. Navy

MDA plans to focus on improving its diversion of C&D debris from the waste stream. It is finalizing a Sustainable Buildings standard operating procedure that will help maximize LEED points by stipulating that as much C&D debris be segregated for reuse and recycling as possible. MDA will also require executing and construction agents to segregate C&D debris for reuse and recycling whenever feasible, and to acquire annual metrics of MDA C&D debris generation and diversion.

RECOVERY OF BIOGAS

Status

The Department is ahead of schedule on its sub-goal to recover biogas from waste (landfills or wastewater treatment facilities). The Marines Corps Logistics Base (MCLB) Albany, in Georgia, awarded a $20 million energy savings performance contract in December 2009 for a landfill gas cogeneration project. The project will provide the base with 1.9 MW of renewable electric power and 45,000 million Btu from a combined heat and power plant, bringing MCLB Albany's total renewable energy use to 22%

of the base's total energy use. The project will also provide the base with process steam and save about $1.15 million per year. The plant will become operational in June 2011, and the contract has a term of 22 years. Benefits include removing GHG emissions equal to about 16,000 vehicles, producing enough renewable energy to power the equivalent of 1,200 homes, and increasing MCLB Albany's energy security and reliability. The plant can use landfill gas, natural gas or a blend of the two fuels. During power outages, the base can use biogas from the landfill to maintain critical electricity loads.

The Air Force is now including landfill gas as a possible source of methane and renewable energy in ongoing renewable energy development and evaluation efforts. Air Force Civil Engineering has evaluated a number of Air Force landfills for their energy potential, and is engaged with municipalities on the potential for the mutual use of off-base landfill gas.

Implementation Methods

The Army will work with the 14 Army installations that operate onsite landfills to evaluate the potential for installing methane recovery systems to offset the amount of energy purchased by these installations. Moving forward, the Air Force will evaluate wastewater treatment facilities for biogas potential, in addition to landfills. DLA does not operate any open landfills, but in FY 2011- FY 2012, it will survey all closed landfills located on its host sites to develop a short list of any landfills that present the most return on investment for landfill gas projects. If any landfill gas projects appear feasible from an economic standpoint, a more rigorous financial analysis will be conducted to identify the best option(s) for moving forward.

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

Goal 6 Sub-Goals

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

Metric

The toxic chemicals released into the environment and transferred offsite (in total pounds), as a percentage of the CY 2006 baseline. The chemicals reported are the sum of releases reported on EPA Form R Part II from: 1) Section 5 (Quantity of the Toxic Chemical Entering Each Environmental Medium Onsite), and 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 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 2011 reporting is CY 2010 data).

Annual Planning Targets

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-					5%			10%		15%
RESULT	**2.8%**										

SUB-GOAL 6.2 100% of Excess or Surplus Electronic Products Disposed of in Environmentally Sound Manner

Metric

The percent of excess or surplus DoD electronic products disposed of in an environmentally sound manner, where environmentally sound is defined as either:

- donating to a charitable cause;
- using a manufacturer's take-back or trade-in service; or
- trading-in, recycling (including refurbishment and resale) or disposal through a facility that is fully licensed for treatment and disposal, and in a manner consistent with the EPA guide titled "Plug-In to eCycling: Guidelines for Materials Management" (http://www.epa.gov/osw/partnerships/plugin/pdf/guide.pdf).

Electronic products are defined as computers (desktops and laptops), monitors, personal digital assistants, phones, and televisions.

Annual Planning Targets

Fiscal year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sub-Goal 6.2 Targets	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULT	**100%**									

SUB-GOAL 6.3 100% 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 4150.7-P and DoDI 4150.7-M, 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 Environmental Protection Agency rules and regulations and are accepted as valid certifications.

Annual Planning Targets

Fiscal year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sub-Goal 6.3 Targets	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULT	**99.4%**									

Goal 6 Responsible OSD Offices

Sub-Goal 6.1: AT&L/I&E
Sub-Goal 6.2: DLA
Sub-Goal 6.3: Armed Forces Pest Management Board (AFPMB)

CHEMICAL USE, RELEASES AND TRANSFERS

Status

DoD decreased toxic chemical releases, as defined by sub-goal 6.1, 2.9% from CY 2006 to CY 2009. Table II.13 provides further insight into the Department's chemical reductions. It shows progress the Services have made in reducing chemicals or categories of chemicals they identified as priorities for meeting the requirements of EO 13423.

DoD amended the Defense Federal Acquisition Regulation (DFAR) with regard to hexavalent chromium, which is carcinogenic, issuing the final rule on 5 May 2011. The rule codifies the DoD policy for considering human health and environmental risks related to the use of hexavalent chromium, and prohibits DoD from acquiring items containing more than 0.1% by weight of hexavalent chromium,[4] unless there is no acceptable alternative. The DFAR ruling supports the April 2009 policy issued by the

[4] The chromium composition criterion applies to "homogeneous material", meaning a material that cannot be mechanically disjointed into different materials and is of uniform composition throughout.

Department, *Minimizing the Use of Hexavalent Chromium*, which laid out a new set of requirements for the Military Departments around hexavalent chromium.

In July 2010, the Department issued *Managing Chemicals, Materials and Impacts to Readiness from REACH: a Strategic Plan*, to safeguard military readiness in the face of potential changes to DoD's global supply chains caused by the European Union regulation entitled *Registration, Evaluation, Authorisation and Restriction of Chemicals* (REACH). This relatively new and complex regulation is fundamentally changing the way in which chemicals are regulated, and products are formulated, throughout the world. DoD had already experienced adverse impacts of a much less sweeping European Union regulation, the *Restriction of Hazardous Substances*, which affected only six substances compared to the thousands impacted by REACH. The DoD Strategic Plan for REACH serves many vital purposes:

- to reduce the use of toxic and hazardous chemicals wherever feasible;
- to guard against disruptions to the supply chain as a result of REACH;
- to identify strategies and solutions to promote potential positive impacts of REACH while minimizing potential negative ones;
- to protect the availability of substances in the supply chain that have no viable substitutes *and* whose elimination would cause an adverse impact on the mission;
- to ensure the adequate performance of substitutes; and
- to provide a roadmap to unify, coordinate and communicate these activities across DoD.

Table II.13. Progress on Service-Specific Chemical Use Reduction Goals

Service	Chemical or Chemical Family	Reduction	Timeframe and Details
Army	Trichloroethylene	80%	CY 2009 TRI data, relative to CY 2007[a]
	Methylene chloride	10%	CY 2009 TRI data, relative to CY 2007
Navy	Chlorofluorocarbon-114	62%	FY 2009 data, relative to FY 1998
Air Force	Lead in electronics	99%	90,875 pounds avoided under EPEAT silver registration, as of the end of CY 2009
	Hexavalent chromium in conversion coatings	48%	Use of coatings as bare surface treatment for depot aircraft painting; as of August 2010, relative to CY 2008
	Hydrochloro-fluorocarbon-225g	32%	Use of solvent in cleaning aircraft oxygen systems and equipment as of August 2010, relative to CY 2008
Marines	Class I ozone depleting substances	100%	In facilities and equipment that are not mission-critical (mostly legacy); as of July 2010 relative to CY 2006
	TRI chemicals	24%	Non-range facilities; CY 2008 relative to CY 2006

[a]TRI data is reported on a calendar year (CY) basis, and data for a given CY is not available until the following CY.

During 2010, DoD re-organized management of its Toxics Release Inventory (TRI) work group, composed of subject matter experts throughout the Military Departments, to fall under the same office responsible for implementing the 2008 *Agency-Level Toxic and Hazardous Chemicals Reduction Plan*. The reorganization improved the leveraging of chemical expertise throughout DoD, and strengthened OSD's ability to evolve TRI from a reporting process to a tool for driving improvements in chemical management. It also helps link the goals under TRI with complimentary goals relating to the adoption of more sustainable chemicals and green products.

In 2010 OSD designed an online training course on selecting inherently more benign chemical and materials. The course became available in April 2011. Among the key challenges in moving towards more benign materials and chemical processes is the need for research and testing to develop updated specifications for products. It is a complicated and expensive undertaking to find the "owners" of specifications, assure no adverse mission impact, gain acceptance, and make enterprise-wide changes However, DoD is making progress in getting new products approved under military specifications and technical orders.

One example of an exceptional product substitution was research sponsored in 2010 by SERDP, and conducted by the Army, to replace the electrolytic hard chromium plating that coats the inside of medium caliber gun barrels (20 to 40 millimeter). The coating in gun barrels extends their life by protecting the bore surface against the harsh environment of the hot propellant gases and the mechanical effects of the projectile. The electrolytic hard chromium plating is performed in tanks containing chromic acid, where the chromium is in the hexavalent state. The research yielded a highly effective replacement for this process involving a 9:1 tantalum-tungsten alloy that is highly resistant to corrosion. The research demonstrated the technology on full-length medium caliber gun barrels in an operational environment. The SERDP project has been transitioned to an ESTCP project to further demonstrate and evaluate the process in live firing tests, after which the process is expected to achieve Technology Readiness Level 7 in preparation for the transition to production. Not only has the advance reduced DoD's dependence on hexavalent chromium, but initial results indicate that a tantalum-coated gun barrel will reduce maintenance and allow bullets to travel farther. The cost savings associated with avoided worker exposure and waste disposal, combined with the improved gun barrel lifetime, are projected to save DoD $14 million over a 15-year period. Four more examples of FY 2010 advancements are shown under "DoD Success Stories for Product Substitutions to Reduce Chemicals of Environmental Concern".

Simulated explosives now free of perchlorate due to Army research

Photo: Connecticut Army National Guard

DoD's National Defense Center for Energy and Environment (NDCEE) is a critical component of the Department's drive to reduce chemicals of environmental concern. NDCEE conducts research, development, testing and evaluation to help field technology solutions that meet military readiness requirements while reducing costs and fulfilling DoD's ESOH, energy and sustainability objectives. The mission of the program is to identify, demonstrate, validate, and transition emerging and existing technologies that offer viable, safer alternatives to those currently in use by DoD. NDCEE also provides training to facilitate the fielding of newly validated technologies. Chemical- and material-related technology categories now under investigation by NDCEE include bio-based products, coating removal processes, and substitutes for solvents and ozone depleting chemicals.

One such effort has significantly reduced DoD's last large-scale use of trichloroethylene: the cleaning and degreasing of small arms and combat vehicle components. The Army targeted reductions in trichloroethylene in its January 2009 Toxic and Hazardous Chemical Reduction Plan. Anniston Army Depot is the Army's largest user of the compound, accounting for over 85% of the Army's total usage. Anniston has been working with NDCEE to identify environmentally-friendly alternatives. After evaluating a variety of options, two ultrasonic cleaning technologies were selected as the most promising,

Goal 6: DoD Success Stories with Product Substitutions to Reduce Chemicals of Environmental Concern

U.S. Navy: Toluene Reductions

The Navy Environmental Sustainability Development to Integration program and DoD ESTCP are sponsoring research aimed at developing alternatives for solvents, such as n-butyl alcohol, xylene, and toluene, which accounted for 18% of Navy's CY 2009 reportable TRI releases. These efforts are starting to show results, with the Fleet Readiness Center Southeast eliminating the use of more than 700 gallons of toluene in 2010 by switching to an alternative, environmentally-friendly aviation solvent. This represents a 95% decrease in the use of toluene at Fleet Readiness Center Southeast.

~ For another Navy success story reducing hazardous waste, see Goal 8 ~

NDCEE: Evaluating Electrical Connectors Without Cadmium or Chromium

Many electrical connectors used in military ground systems and tactical vehicles are coated with cadmium and hexavalent chromium. NDCEE tested five alternatives to cadmium coatings and two alternatives to hexavalent chromium top coatings used to protect electrical connectors from corrosion. Three of the cadmium alternatives and one of the chromium alternatives showed promising results, to be further explored in FY 2011 and FY 2012. The tests found that several candidates can achieve comparable performance under simulated operational environments. NDCEE also conducted an economic analysis and concluded that eliminating cadmium electroplating could save a facility more than $20,000 per employee working the plating line per year by reducing workplace hazards and the need for medical surveillance.

NDCEE: Evaluation of Bio-Based Products

DoD's NDCEE supports technology transitions by investigating, demonstrating, and fielding viable, mission-driven solutions that fulfill DoD's energy, environmental, health, safety, and sustainability requirements. To support DLA and increase the use of commercially available bio-based products, NDCEE has evaluated over 500 bio-based hydraulic and metalworking fluids, lubricants, greases, fuel additives, cleaners and parts washing solutions, and corrosion preventatives—including more than 200 products in FY 2010. NDCEE is conducting onsite demonstrations of two bio-based penetrating lubricants and several sorbent products provided by five different manufacturers. As a result, four new national stock numbers (NSNs) were established for bio-based penetrating lubricants. NDCEE also created a searchable Green Products Database for military applications.

Defense Logistics Agency: Green Cleaners

The DLA Hazardous Minimization program and Green Products Branch conducted tri-service qualifying testing with the Naval Air Systems Command to identify aircraft cleaning compounds with low levels of volatile organic compounds and no hazardous air pollutants, to replace more toxic legacy cleaners. Successful testing resulted in four new NSNs for use throughout DoD, falling under specification MIL-PRF-85570 Type I (low solvent) and Type II (solvent-free.) These cleaners are supplied in pre-diluted, easy to use media such as trigger spray, aerosol and pre-saturated wipes. Previously, aircraft maintainers had to dilute the more toxic and polluting legacy cleaner with potable water to an exact dilution. This presented numerous safety, environmental and logistical challenges – especially in remote, dry regions of the world. As a result of this project, all four NSNs are now easily available to all the Services.

Goal 6: DoD Success Stories Making Process Changes to Reduce Toxic and Hazardous Substances

U.S. Army: Reducing Nitric Acids and Nitrates

The Radford Army Ammunition Plant accounts for most of the DoD nitrate emissions reported under TRI, in part because it is the only U.S. manufacturer of nitrocellulose, a critical component of military explosives. Wastewater from the plant discharges into the New River, a designated Historic Wild and Scenic River. As part of an ongoing pollution prevention endeavor, NDCEE identified and implemented improvements in the nitrocellulose manufacturing process that reduce: 1) the volume of acid sent to the Acidic Wastewater Treatment Plant; 2) the amount of nitrates discharged to the New River, and 3) the raw materials and electricity needed to produce nitrocellulose. NDCEE conducted additional efficiency studies and conceptual designs that have a potential to recover and re-use up to 200,000 lbs of nitric acid annually while reducing energy usage.

U.S Marine Corps: Advanced Domestic Wastewater Treatment

The predominant non-range releases reported by the Marine Corps under TRI is the category of nitrate compounds associated with domestic wastewater treatment, accounting for 89% of all non-range releases and off-site transfers in CY 2009. The solution is more advanced treatment to reduce the amount of nitrogen in domestic wastewater, which is a combination of sewage and water discharged from clothes washers, bathtubs, showers, and sinks. MCB Camp Pendleton achieved a 34% reduction in nitrate compounds from CY 2008 to CY 2009 with the installation of a tertiary wastewater treatment plant that began treating the majority of the base's domestic wastewater in CY 2008. The base plans additional projects to replace and consolidate two older plants.

Defense Intelligence Agency: Green Printing

DIA's Printing Press operation in its centralized printing plant has converted to a chemical free plate process. The Print Press operation uses soy based inks. The DIA Photo Lab has eliminated the use of 52 pounds hydroquinone from their developing process.

U.S. Army: Groundwater Sampling

Sampling technologies currently used to test groundwater for hazardous chemicals require that water be purged from the wells and sent off-site for analysis. Often the purged water must be disposed as a hazardous waste. NDCEE demonstrated and validated three in-situ groundwater sampling technologies at the Milan Army Ammunition Plant that do not require the water to be purged, and require a much smaller volume of water for testing. The in-situ technologies not only reduce the release of hazardous substances, but they reduce the labor and shipping costs associated with purging the well and shipping a larger volume to offsite analytical laboratories.

Photo: U.S. Marine Corps

Tertiary wastewater treatment plant, Camp Pendleton, CA

which it will subject to full-scale demonstrations at Anniston in FY 2011. The pilots reduced Anniston's use of the compound by 80% from CY 2007 to CY 2009. Four other examples of DoD successes reducing problem chemicals and materials through process changes are provided under "DoD Success Stories Making Process Changes to Reduce Toxic and Hazardous Substances".

GASES WITH HIGH GLOBAL WARMING POTENTIALS

The Department issued a policy memorandum in October 2010 regarding the implementation of risk management options for the use of SF_6. To make efficient use of existing supplies of SF_6, including reuse, the memorandum directs "the Secretaries of the Military Departments to develop and implement procedures for the reduction, capture and recycling of SF_6 where it is operationally, technically and economically feasible." To ensure the availability of SF_6 for critical military applications, the memorandum directs the director of DLA to work with the Services to determine the feasibility of capturing SF_6 from applications where it is no longer needed and "banking" it for future DoD needs.

In the absence of known alternatives, or when retrofitting with alternatives is not affordable or practicable, the Department has still been able to reduce HFC emissions by designing higher efficiency air conditioning systems that release fewer refrigerant emissions. The first phase of this work was conducted a few years ago but efforts are ongoing to develop the next generation high efficiency systems, with a prototype expected late in FY 2011. Newer designs now in use or under development will reduce HFC emissions by 95% to 99% over older models, and will be even more energy efficient. The Army recently deployed a fire extinguisher it developed based on water and potassium acetate to replace the existing halon fire extinguishers on the M1 tank.

Approach for Widespread Adoption:
PARTNERING TO DEVELOP NEW STANDARDS

One class of chemicals inherent to DoD's mission are the "energetic compounds" used in military explosives and gun and rocket propellants. Beginning in 2006, the Army worked with government and industry to develop ASTM standard E2552 – 08, *A Standard Guide for Assessing the Environmental and Human Health Impacts of New Energetic Compounds*, issued in 2008. (ASTM International is a recognized developer of international voluntary consensus standards.) The guide provides the basis for selecting the best energetic compounds for a given purpose to minimize environmental and human health risks while being consistent with the criteria required in weapons and weapon system development, including ESOH and environmental requirements. It is DoD policy to follow this new ASTM standard.

Implementation Methods

The Department's overarching goal for chemical management is to protect personnel, property and the environment, while supporting the war fighter mission capability. Intrinsic to the success of this goal is the capability to identify, reduce, and eventually eliminate the ESOH risks posed by hazardous materials, by proactively determining the potential risk of emerging chemicals to the DoD mission, and finding safer alternatives. To better accomplish this moving forward, DoD is placing improved emphasis on informing decisions based on total lifecycle costs and risks. This entails assessing chemical risks throughout the process of researching, developing, testing, evaluating, and acquiring weapons and weapons platforms. Careful and deliberate consideration of hazardous material risks and costs across the lifecycle of DoD activities is essential for sound management decisions that will target those activities with the most significant environmental impact due to hazardous materials. Future DoD efforts on chemical management will focus on:

1) expanding awareness of training relevant to chemical management, and expanding training and outreach materials;
2) determining the fiscal tools required to realize the cost savings and improved efficiencies offered by safer alternative chemicals;
3) making better use of chemical use information already required by existing chemical regulations, without added burden to the Military Departments; and

4) continuing to work with DLA on chemical management enterprise information integration, such as the Product Hazard Data project.

The Services will continue supporting research to develop alternatives for substances that are safer for human health and the environment. For example, the Air Force is working to replace the ozone depleting substances in one corrosion preventative product for cleaning the surfaces of electronic and structural subsystems in Air Force aircraft. The new product effectively displaces moisture and other contaminants, preventing them from initiating corrosion. The ozone depleting substances in the original product were banned as of January 2009 in the European Union and Canada, and will also be prohibited in the United States beginning in 2015.

The Air Force is in the process of collecting baseline information related to its release and transfer of toxic waste reported under TRI, in order to develop a strategy to reduce these wastes. The current data collection process does not capture information on the underlying industrial processes and activities that contribute to Air Force toxic waste. In FY 2011, the Army will focus on revising the applicable technical manuals to phase out use of hexavalent chromium epoxy primers in favor of alternatives free of chromium. Also, the Army will focus on completing the approval process to adopt the most promising of the three paint strippers it identified and tested in 2010 that are free of methylene chloride.

The Navy has a number of chemical management systems in place. One of these, the Regional Hazardous Inventory Control System, is a hazardous materials management system that will soon be replaced by the Navy Enterprise Resource Planning system. The new system will help prevent over ordering, reduce disposal of chemicals with an expired shelf life, and help identify products containing TRI chemicals, assisting in targeted reduction efforts. The Chief of Naval Operations will provide updates to its primer, *Getting Started with The Emergency Planning and Community Right to Know Act – A Primer for Navy Facilities*, to help personnel calculate TRI releases. The Navy is also upgrading several wastewater treatment plants to reduce the amount of nitrate compounds released. This will not only help the Navy meet stringent National Pollutant Discharge Elimination System (NPDES) permit requirements but it supports the Chesapeake Bay Initiative Act of 1998. NAS Jacksonville, FL, has begun construction on a new wastewater reuse pump station and pipeline that will significantly reduce the station's wastewater discharge to the St. Johns River. Naval Support Facility, Indian Head, MD is upgrading its treatment plant to add a biological nutrient removal system.

Based on a thorough analysis conducted by the Chief of Naval Operations, Energy and Environmental Readiness Division in 2010, the Navy's Environmental Sustainability Development to Integration (NESDI) program—in cooperation with ESTCP and the Joint Services Solvents Substitution team—will identify alternative chemicals and processes to reduce toxic chemical use and releases related to weapon system production and maintenance processes. For example, NESDI researchers and the Joint Services Solvents Substitution team are developing new non-aqueous solvent and cleaner specifications suitable as environmentally-compliant solvents. NESDI is also sponsoring research and leveraging efforts underway by ESTCP to identify alternative materials and processes to eliminate the use of hexavalent chromium.

GASES WITH HIGH GLOBAL WARMING POTENTIALS

In addition to assessing the feasibility of an SF_6 bank, the Department will:

- expand research and development efforts for SF_6 and HFC substitutes for unique military applications;
- follow and leverage research being conducted by the Electric Power Research Institute regarding SF_6 substitutes for electrical transmission and distribution equipment in DoD infrastructure; and
- initiate an assessment of mission risks associated with the continued use of HFCs and propose proactive risk management measures.

Toxic Chemical Reductions by a Single Industrial Installation: MCAS Cherry Point

This box provides a sample of the many proactive measures taken at MCAS Cherry Point to reduce the release of chemicals and materials of environmental concern.

Solvent Reclamation

The base uses a solvent reclamation unit called the Safety-Kleen Minimizer to reclaim solvents from waste paint sludge. The device is a proven approach that reduces waste solvents by over 95%, allowing the user to save money on both product and compliance costs. Using a patented distillation process, the 18-gallon Minimizer® recycles lacquer thinner, paint waste, and a variety of solvents having a boiling point under 350°F, including acetone, xylene, methyl ethyl ketone, and toluene. Used paint thinner is automatically transferred to the Minimizer® and recovered for reuse. The waste removed in the process is reduced to a solid (referred to as a hockey puck) that is collected and picked up as part of the Safety-Kleen service. This residue, consisting of paint solids, is a fraction of the original waste thinner volume resulting in savings on thinner costs, waste disposal, and significant waste minimization. At the current waste paint sludge generation rate on the base, the Air Station will save approximately $27,000 per year in sludge disposal and virgin solvent purchases, compared to an initial cost for the unit of approximately $21,800.

Solvent Replacement

The Airframes Division of Marine Aviation Logistics Squadron at MCAS Cherry Point requires the use of a chemical stripper to remove paint from aircraft parts. Prior to 2006, Airframes used a dip tank containing methylene chloride and phenol, which are listed as federal hazardous air pollutants and extremely hazardous substances. These chemicals have a significant hazardous waste disposal cost and pose concerns with regard to Occupational Safety and Health Administration regulations. Based on a study of less toxic paint strippers that still meet military specifications, a Ramaco AJA Kleen System with F0606 solvent was procured to replace the antiquated methylene chloride dip tank, eliminating the use of methylene chloride and phenol. The Ramaco solution is safer for workers because it does not contain any listed air pollutants except volatile organic compounds, and has a lower volatile organic carbon content than methylene chloride. Other operational benefits are a higher flash point, which lower the risk of ignition, and a lower vapor pressure which reduces losses to evaporation. Additionally, the Ramaco system works faster than an unheated chemical paint stripper and is less expensive than the stripper that it replaces.

Control Center for Hazardous Material Reuse

The base improved material management by creating and maintaining a hazardous material control center. Excess material collected at MCAS Cherry Point is advertised for reuse at MCAS Beaufort, SC and MCAS New River, NC. The program saved $482,000 in costs in FY 2008 and FY 2009, from avoided disposal costs and hazardous material reissued by the Center.

Converting Used Fuels to Energy

MCAS Cherry Point began operating a blending facility in FY 2003, blending recovered fuels, used oil, and used fuels and using it to fuel its central heating plant. A total of 160,000 gallons were delivered to the central heating plant for burning during FY 2008 and FY 2009, saving over $505,000 in the purchase of virgin heating oil.

Refurbishing Old Fire Extinguishers for Reuse

MCAS Cherry Point Environmental Affairs Department and the Hazardous Minimization Control Center teamed together to implement a program to recharge, service and reissue fire extinguishers. The base disposes of a large number of non-facility fire extinguishers, which is labor intensive, costly, and may expose workers to the contents when damaging the containers to prevent reuse. The program has collected and refurbished 400 fire extinguishers, avoiding an estimated $35,000 in costs for both disposal and replacements.

ELECTRONICS DISPOSITION

Status

The Department already has a rigorous system in place to dispose of excess or surplus electronic products in an environmentally sound manner, either donating to a charitable cause; using a manufacturer's take-back or trade-in service; or trading-in, recycling or disposal through a facility that is fully licensed for treatment and disposal. Most DoD surplus or excess electronics pass through the DLA Disposition Services, ensuring that environmentally sound and best practices are applied to the handling of electronics equipments at the end of their life in the Department. When DoD Components do not use DLA Disposition Services, they process the waste through a company certified to properly handle the waste. For example, Hewlett-Packard collects all unclassified Marine Corps machines for recycling, and all classified machines are processed through DLA Disposition Services.

Once excess commercial e-waste is turned in to the DLA Disposition Services site, DLA determines whether to process the items through the full reutilization, transfer, donation, and sales program. (Electronics unique to the military, however, can generally only be reutilized within DoD and require total destruction and demanufacturing, or demilitarization, at the end of their useful lives.) Under the reutilization, transfer, donation, and sales program, property is available to DoD, Special Programs, and federal and state agencies. An example of a Special Program is Computers for Learning, which reuses a large quantity of excess information technology equipment. Participating schools sign a Memorandum of Agreement that ensures all environmentally regulated property will be handled, stored, and disposed in accordance with applicable federal, state, and local environmental laws and regulations. Property not reused, transferred or donated is available for sale through a Usable Sales Contractor. Prior to resale, the contractor tests all central processing units and laptops to determine the best sales venue. All computers are checked for hard drives and other storage media, with proper national security precautions taken to ensure that all hard drives are removed, certified and sanitized in accordance with DoD erasure standards prior to resale.

If the excess commercial electronic wastes are determined to have no reutilization, transfer, donation, or sales potential, they are processed through one of the following outlets:

a) *Sales through a Scrap Venture contractor* – Upon receipt, the U.S-based scrap venture contractor assures that all sensitive data, such as classified and personally identifiable information, is purged. The contractor degausses and certifies the computer hard drives, and disassembles, shreds, or otherwise destroys any items that cannot be resold, selling the subsequent scrap residues. The scrap venture contract requires that environmentally regulated property be handled, stored and disposed of in accordance with applicable federal, state, and local environmental laws and regulations.

b) *Precious Metals Recovery Program* – Through a service contract, components containing precious metals are recovered and refined at the contractor's U.S. location. The vast majority of recovered precious metals are obtained from surplus DoD military electronic equipment (ground, naval and air systems) and their components; only a small portion comes from commercial electronic wastes. The resulting metals are supplied to DLA Troop Support for reuse as Government Furnished Material on other DoD contracts. DoD defines precious metals as gold, silver, platinum, as well as platinum family metals such as palladium, rhodium, iridium, osmium and ruthenium. The service contract terms and conditions provide for environmental, safety and security controls of the process generating the refined metals.

c) *Federal Prison Industries* – Federal Prison Industries, Inc. is a wholly owned government corporation that, through a Memorandum of Agreement, recovers usable computers, laptops, monitors and televisions. In a process overseen by the Department of Justice, the company dismantles and recycles any residues from non-operational items, and reports the discovery of any classified or unauthorized property shipped in error. To verify that items were processed, DLA Disposition Services monitors delivery order requests and matches weight shipped by our sites against weight reported as being

processed. When this process was established, DLA Disposition Services conducted a thorough review of Federal Prison Industries processes, verifying environmental health, safety and security plans and processes. The company complies with the DoD hard-drive policy for data management.

d) *Demanufacturing* – Under a service contract, the demanufacturing process disposes of surplus DoD military electronic equipment (ground, naval and air systems) that was specifically designed, configured or adapted for military use. Also, commercial items such as personal digital assistants and cellular phones are processed through the demanufacturing contract to alleviate data security concerns. All material processed by the demanufacturing process is destroyed by shredding at U.S. locations. The DLA Disposition Services scrap venture contractor processes the resulting scrap residue for sale or precious metal recovery. Weights are validated when received at the processing site and again when the destruction process is completed, matching weight processed to the scrap venture contractor against weight shipped. DLA Disposition Services personnel certify the destruction and send documentation back to the original site. The terms and conditions of the contract require the contractor to comply with all federal, state, and local environmental health and safety laws and regulations. The contract also requires site security, accountability, and reporting of any ineligible property shipped in error, including classified, radioactive, and dangerous articles. DLA Disposition Services regularly audits the demanufacturing process and takes corrective action immediately on any findings.

DoD recovered $7.1 million in precious metals (gold, silver, platinum, palladium, rhodium and iridium) in FY 2010. After subtracting the $1.1 million in costs to operate the metals recovery program, taxpayers saved almost $6 million as a result. Over the last 30 years, the program has saved taxpayers nearly $300 million.

The Department continues to participate fully in the ongoing Interagency Task Force on Electronics Stewardship and Federal Electronics Stewardship Workgroup to ensure the latest electronics goals and best practices are implemented and documented. Some Components have issued additional guidance and policy for their employees to reiterate the importance of electronic stewardship and issue guidance on implementation. In April 2010, MDA released the *Sustainable Electronics Management Program* directive, which states the priorities for the different options regarding electronics disposition and details guidance on complying with each option.

Implementation Methods

The upcoming Navy update of Chief of Naval Operations Instruction 5090.1 on ISWM will include specific guidance regarding disposal of electronic products.

DLA is in the process of incorporating the requirements of the DoD Electronics Stewardship Implementation Plan into the procurement process for the contract that will follow the existing electronics demanufacturing contract, which expires in January 2012. DLA will include a requirement in the contractor selection criteria for third-party recycling certification, adhering to Responsible Recycling Standards, and for pollution liability insurance. DLA will use elements of the Federal Electronic Challenge "checklist for selection of electronic recycling services" to help evaluate contractor bids. DLA will further process circuit cards from the demanufacturing process through the precious metals recovery program contractor so there is a single domestic disposition source. Future DLA surveillance efforts of the follow-on electronics demanufacturer contractor will utilize the Federal Electronic Challenge "Guidelines for Onsite Reviews of Electronics Recyclers" during onsite audits.

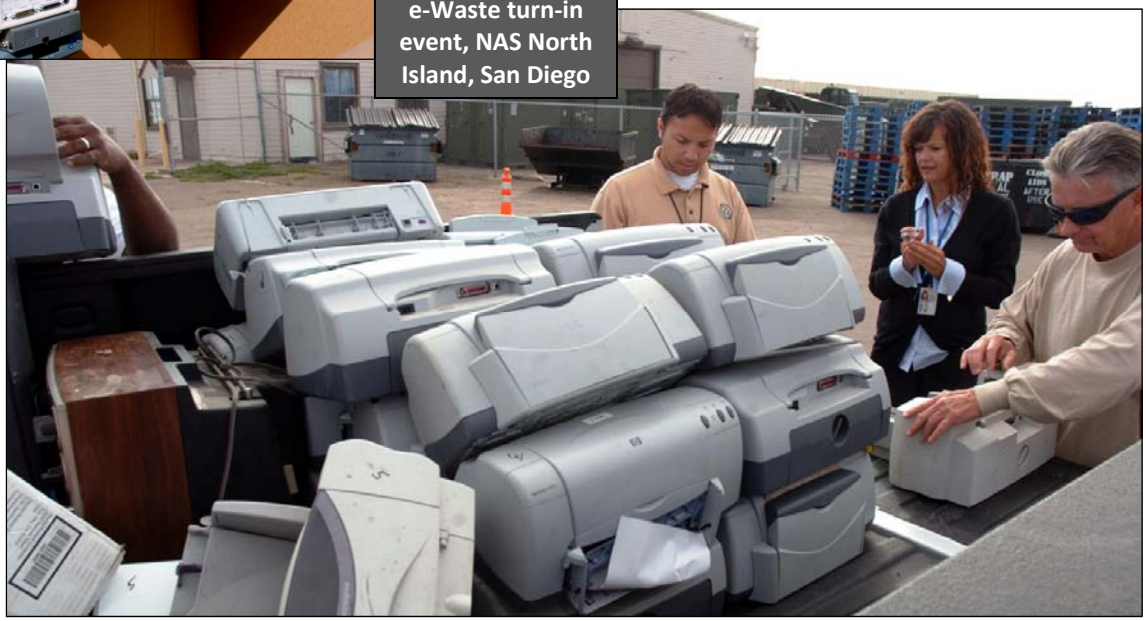
Sub-Goal 6.2: DoD Success Stories on Electronic Waste

Defense Logistics Agency
Law Enforcement Support Office

DLA's Law Enforcement Support Office ensures that excess DoD electronics are given a new life with state and local law enforcement agencies throughout the United States. Over the last six years, thousands of computers and computer-related hardware that were headed for destruction were instead given to law enforcement agencies. Some of the laptop computers are used in patrol cars while desktop computers are used to handle daily administrative or logistics work. The reutilization of this equipment has saved the law enforcement agencies and taxpayers millions of dollars.

Naval Base San Diego
Electronic Waste Turn-In Event

Naval Base San Diego, CA hosted its first electronic waste turn-in event on 28 October 2010, supported by personnel from DLA Disposition Services, Navy Region Southwest Recycling, and a private hazardous waste disposal company. A parking lot on the base was used as a drop off location for shore commands to relinquish any government owned electronic devices or appliances that were no longer used. Nearly 17,000 pounds of discarded electronics and component parts were collected and transferred to DLA Disposition Services and 2,600 pounds of appliances were sent to NRSW Recycling. Material collected included 221 monitors, 65 computer processing units, 62 servers, 42 printers, and numerous other items such as televisions, refrigerators, microwave ovens, facsimile machines, copiers, and coffee makers. The retail value for the used items turned in was approximately $430,000. Over nine tons of debris was diverted from hazardous waste, saving the taxpayer approximately $10,000 in disposal costs.



e-Waste turn-in event, NAS North Island, San Diego

PESTICIDE USE

Status

A major factor in ensuring that pesticides are only applied when absolutely necessary, and in a safe and effective manner, is to ensure that the person applying the pesticide is appropriately certified. In FY 2010, 99.4% of DoD personnel and contract personnel who applied pesticides were certified. It should be noted that due to turnover in military personnel, it is unlikely that the DoD will achieve 100% certification. However, under EPA guidelines, DoD's uncertified personnel are allowed to apply pesticides as long as they are under the direct supervision of someone who is appropriately certified. Those uncertified personnel also have a two-year window to achieve the required certification.

The Department closely adheres to the principals of Integrated Pest Management (IPM) to control pests such as insects, ticks, weeds, and fungi, which impact its personnel, facilities and materiel. Pesticides are only one of a number of tools used to control these pests, and they are applied only after careful analysis of concerns such as human and environmental safety, cost, and overall effectiveness determines them to be the best method. DoD actively monitors its pesticide usage and reports that usage to EPA on an annual basis. The numbers of applicators certified by the Components and DLA are also forwarded annually to EPA, after the data is collected by the AFPMB and collated.

Pesticide use in FY 2010 was approximately one-half of the amount reported in 1993. While the DoD has significantly reduced the amount of pesticides it uses, invasive species control continues to be an issue and since these situations often require quick, safe and effective measures, pesticides often end up being the weapon of choice. The AFPMB and the Components' Senior Pest Management Professionals continue to address all issues related to invasive species and other pest management issues including keeping DoD's use of pesticides and any associated risk at a minimum. The effectiveness of DoD's certification program was recognized by EPA, which presented DoD with one of only five awards for "Sustained Excellence Promoting Integrated Pest Management" in late 2009.

Implementation Methods

The AFPMB and Components will continue to closely interact with the EPA to ensure the DoD remains on the forward edge in the area of pesticide applicator certification. For more information on the DoD's plans for using pesticides on its installations, see sub-goal 8.3.

The Marine Corps is strengthening its established compliance audit mechanisms through the Marine Corps Environmental Compliance Evaluation Program. The program ensures that installations have implemented an effective IPM plan and are complying with IPM requirements to have all personnel who apply pesticides on Marine Corps installations properly certified. Air Force Pest Management Recertification Mobile Training Courses can provide up to 25 students with training at far lower cost than traditional classes. The Air Force hopes to make more extensive use of these courses in the future, placing more emphasis on maintaining certifications and less on the much more time-intensive (three-week) training needed for initial certifications. All of the Army's 957 pesticide applicators were certified, and it anticipates 100% certification in FY 2011 as well.

DLA achieved 100% compliance in pesticide applicator certification and further identified an improvement opportunity in the information and coordination flow between key pest management positions, primarily government and contractor applicators, and the contracting officer representative, Installation Pest Management Coordinator, and Agency Pest Management Consultant. To effect this improvement, DLA is seeking funding to implement and maintain the Integrated Pest Management Information System. The software was developed by DoD and endorsed by AFPMB, and would streamline DLA's reporting, oversight, and validation process.

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 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, bio-based, environmentally preferable, non-ozone depleting, containing recycled content, and/or are non-toxic or less-toxic alternatives. The sub-goal applies to products and services, including task and delivery orders, but excluding the acquisition of weapon systems and their components and spare parts. The Federal Procurement Data System will be used as the source of data on contracts meeting these requirements.

Annual Planning Targets

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

SUB-GOAL 7.2 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 ft^2 (combined 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

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	7%	9%	11%	13%	15%	15%	15%	15%	15%	15%
RESULT	**0.06%**										

Goal 7 Responsible OSD Offices

Sub-Goal 7.1: AT&L/Defense Procurement and Acquisition Policy
Sub-Goal 7.2: AT&L/I&E

PROCURING SUSTAINABLE GOODS AND SERVICES

Status

The Office of Federal Procurement Policy requires all federal agencies to report information on contract actions to the Federal Procurement Data System (FPDS) - Next Generation. The system collects, stores and disseminates data on all federal government contracts over $3,000. The Department is not able to

reliably report on its compliance with sustainable procurement requirements until the FPDS is updated to allow sustainable procurement to be tracked.

The objective of the DoD Green Procurement Program is to achieve 95% compliance with mandatory federal green procurement programs in procurement transactions. Today's acquisition and procurement decisions have resource and environmental implications during the useful life of goods and weapons, and beyond. These decisions directly impact a wide array future outcomes, from the amount of energy and water consumed, the use and release of toxic and hazardous materials, the amount of solid waste generated, to the need for personal protective equipment.

To alert DoD users of this impact, in FY 2010 the Department updated its Green Procurement (CLC 046) course, one of its online Continuous Learning training modules on contracting, and provided the update to the Defense Acquisition University, for publication on its website. The update is geared for all types of users and provides information on the actions required to be in compliance with sustainable procurement requirements. For example:

- requirements staff will understand the steps needed when building a requirement;
- buyers will learn which questions to ask vendors and what suggestions to give customers;
- contract administrators will know what to look for when checking performance; and
- managers will understand how their performance is being monitored.

The Department requires that information technology electronic equipment either meet sustainable procurement requirements or qualify for one of the exemption categories identified in EO 13423: mission critical systems, emergency-support systems, and security systems. Procurement of such systems follow the information technology planning and life cycle management procedures of their respective Program Management Offices.

In December 2010, the Army updated its Installation Green Procurement Program Implementation Guide and disseminated it to the entire Army contracting community. Also in 2010, the Army developed a protocol for conducting Green Procurement Program Reviews, and developed a planning document titled *Department of the Army Green Procurement Program Strategy - Promoting Sustainable Procurement Practices throughout the Department of the Army*, which is currently in review.

Implementation Methods

In FY 2010, the Department issued over 3.6 million contracts (counting only those over $3,000), amounting to approximately $366 billion in resource obligations. It is not currently feasible for the Department to assess 5% of these contracts as suggested by OMB guidance on sustainable procurement. Rather, in the interim until GSA and the Office of Federal Procurement Policy finish updating the FPDS, the Department will audit a smaller sample of its contracts for their compliance with sustainable procurement requirements. DoD's Defense Procurement and Acquisition Policy (DPAP), in coordination with the DUSD(I&E), tasked the Military Departments and DLA with reviewing a representative sample of 100 contract actions each (over $3,00) from the first half of FY 2011 to determine if the contract actions include requirements for sustainable products. As the reporting process matures, the Department will expand the reporting requirement to other defense agencies in future fiscal years. The schedule for the review is shown in Table II.14.

Procuring goods and services that are sustainable presents an enormous opportunity for the Department to make better decisions on matters that often have long lasting environmental impacts and improved operational capabilities. For this reason, DoD has identified a wide range of enhancements it plans to make to its procurement system and the training of DoD personnel with procurement responsibilities.

Table II.14. Planned DoD Contract Review in FY 2011 for Sustainable Procurement Compliance

	1st Quarter	2nd Quarter	3rd Quarter (Planned)[a]	4th Quarter (Planned)[a]
Total # Agency Contracts Awarded in FY 2010	3,611,088			
Total Contracts Reviewed	0	0	200	200
# of Compliant Contracts	n/a	n/a	tbd	tbd
Total % of Compliant Contracts	n/a	n/a	tbd	tbd

[a]Refers to contracts from the first and second quarters reviewed during the third and fourth quarters

The Department is in the process of developing a DoDI, for issuance late in FY 2012, that designates lead offices for oversight of the Green Procurement Program, and defines responsibilities, requirements, and procedures for establishing and implementing sustainable procurement programs across DoD functional areas and organizations. Once FPDS is updated to allow sustainable procurements to be tracked automatically, DPAP will develop an annual reporting requirement of specific green procurement policy implementation to ensure success with the goal of conducting 95% of procurement sustainably. Until then, DPAP and DUSD(I&E) will continue reviewing a representative sample of contracts from the Military Departments and Other Defense Agencies to assess compliance with the goal of 95% of procurements conducted sustainably. The Department will also explore the option of establishing a multi-discipline working group to develop a value engineering approach (see Federal Acquisition Regulation [FAR] Part 48) in the procurement conducted for sustainability products and services on the part of contractors.

By FY 2012, the Department will develop standard contract language to reflect the need for products and services (excluding weapon systems, their components and spare parts) to be energy-efficient, water-efficient, bio-based, environmentally preferable, non-ozone depleting, and to contain recycled content or non-toxic or less toxic alternatives, where such products and services meet DoD performance requirements. For example, contract language will include the requirement to acquire copier paper containing at least 50% postconsumer recycled fiber for use at DoD facilities, in accordance with 10 U.S.C. §2378. The Department intends to incorporate standard contract language into all new contract actions by the end of FY 2012.

The Department will modify contract planning and development tools and forms to alert users—especially specification writers and requirements developers—to comply with green purchasing requirements. These modifications will also give consideration to greening products and services associated with the contract beyond current mandates. In addition, DoD will modify tools, forms, and checklists used by contracting officers and contract specialists to ensure that contract documents such as requests for proposals and solicitations comply with green procurement requirements.

DoD will request or initiate revisions to the relevant FAR or DFAR clauses for specific sustainable procurement requirements. In FY 2011, DoD will initiate Defense Federal Acquisition Regulation Supplement (DFARS) Cases and appropriate guidance to the Procedures, Guidance and Information in DFARS Parts 212, 214, 215 and Part 237, to add sample evaluation factor language to address and encourage the acquisition of green procurement products and services for commercial items, in sealed bids, contracting by negotiations, and service contracting.

To further enhance the guidance it provides on green procurement, by FY 2012 the Department will develop and disseminate instructions on how to address green product mandates and other sustainability requirements in procurement and contract audits, in conjunction with Small Business Set-Asides. The Department will also add guidance to the Procedures, Guidance and Information on approaches to green service and supply contracts (excluding those for facilities), and it will provide guidance on integrating

Sub-Goal 7.1: DoD Success Stories with Sustainable Procurement

Defense Logistics Agency: Bio-Based Cutlery

DLA is working to transition DoD to 100% bio-based cutlery. DLA Troop Support just purchased another $16 million of 50% bio-based content cutlery from LC Industries, the long term National Institutes for the Blind supplier of cutlery to the DoD and GSA. Meanwhile, U.S. Army Natick has just finished evaluating and testing 100% bio-based prototype cutlery from LC Industries, and it is anticipated that the 100% bio-based product will be ordered in late FY 2011 or early FY 2012. The Subsistence Directorate has identified other DoD supply chain items for conversion to 100% bio-based content, all of which are presently being evaluated. These items include the J-spoon or Meal Ready to Eat plastic spoon, Unitized Group Rations plastic serving utensils and heater tray, and Arctic Meal Module clamshell.

U.S. Marine Corps: Sustainable Procurement Initiatives at MCB Hawaii

MCB Hawaii developed a site-specific Green Procurement Plan to set up a framework to ensure compliance with procurement requirements for daily purchases. The framework spans Energy Star products, EPA's Water Sense standards for water-efficiency products, products registered with EPEAT, alternative fuels, alternative fuel vehicles, and a variety of green products such as low volatile organic carbon paints, cleaning products and carpeting. MCB Hawaii purchases recycled ceramic tiles and Energy Star appliances, and uses a carpet contractor that recycles carpet. The base has phased out plastic bags and purchases recycled-content grocery bags. It provides awareness level training for all people in the process, including contracting officers and specialists, purchasing personnel, and credit card holders, and it distributes Green Products Compilation updates. MCB Hawaii is developing web-based training for all sustainable procurement product areas, and it requires refresher training every two years. Audits identify inappropriate purchases and implement corrective actions such as suspension of credit card privileges and re-training prior to card reactivation.

Bridge Consisting of 95% Recycled Plastic, Camp Mackall, NC

Photo: U.S. Army

green procurement or sustainability requirements with the purchase card program. Finally, DoD will examine existing procurement systems, such as the DoD Standard Procurement System and Army Acquiline PRWeb system, to ensure that sustainability considerations are incorporated into their decision criteria.

One underlying issue the Department will address is that many purchasing actions are conducted according to military specifications prepared by personnel outside of the contracting organizations. To solve this problem, the Defense Standardization Program Office (DSPO) will reassess the Specification Preparing Activities (SPAs) to ensure that specifications are in line with sub-goal 7.1 and its underlying federal requirements. DSPO will require the Military Departments to identify the specifications needing to be reviewed or updated, and it will develop a schedule by which these changes must be completed. The specifications needing to be reviewed or updated are for components and spare parts not supporting weapon systems. DoD will also develop internal metrics to track the review of specifications for application of green procurement requirements or sustainability provisions.

Another key area for promoting sustainable procurement is how exceptions are handled. The Department will provide DoD-wide guidance on how to treat exceptions to green product requirements, including specific directions on signature authority for exceptions to EPAct requirements on energy efficient products. The Department will also develop a standard form for use DoD-wide to document how and why an exception applies. The exact format of the form is yet to be determined, but it will be modeled after those already in use by some DoD Components and federal agencies.

The Department will revise the NSN system by directing that NSN items not conforming to EPAct be eliminated from the inventory by the end of CY 2012, unless justified as required. As a result, any user wanting a non-conforming NSN to remain available will have to perform the analysis and documentation for exceptions described in the preceding paragraph. Also, the Department will investigate the feasibility of revising the NSN system to distinguish those products that are bio-based or contain recycled material.

To meet the goal of 95% sustainable procurement, it will be necessary for the Department to integrate green procurement into all appropriate audit and training programs, and to ensure that training reaches the lowest level of implementation. By the end of FY 2012, DoD will have updated two additional Green Procurement training modules: Defense Subcontract Management (CLC 001) and Market Research (CLC 004). The Department will update existing procurement training courses and mandate annual training requirements for all applicable DoD personnel. The Department will also provide targeted training for the following audiences:

- Contract administrators – training will be augmented with modules on procurement conducted sustainably and the Military Departments automated requisition (such as the Army PRWeb program).
- Personnel preparing specifications – training will be provided on green procurement requirements and how to properly use contracting mechanisms with respect to green specifications.
- Purchase card holders – training will be updated to ensure green procurement provisions are adequately addressed.
- Purchase Card managers at the DoD and DoD Component level – the Department is considering requiring expanded training beyond the two hour Defense Acquisition University Green Procurement training module (CLC 046), to provide a more comprehensive understanding of green mandates and the implementation of a conforming program for the unique purchase card business area, including audit provisions tailored for sustainability.

In addition, DoD holds monthly Green Purchasing Program Work Group sessions to plan initiatives and outreach events, such as the May 2011 DoD Procurement Conference and Training Symposium to ensure sustainable purchasing practices.

Another essential component to sustainable acquisition and procurement is sustainable manufacturing. The Department of Commerce defines sustainable manufacturing as "the creation of manufactured products that use processes that are non-polluting, conserve energy and natural resources, are economically sound, and are safe for employees, communities, and consumers". This definition touches upon many concepts that already operate independently within DoD among the environmental, engineering, acquisition, logistics, financial, safety, and occupational health arenas. Sustainable manufacturing is a keystone concept that integrates sustainability practices from these different functional groups in such a way that issues can be addressed holistically and transparently. For example, if an engineer wants to install a new machine into a production process, he or she should also consider proper disposal of the old machine, energy consumption and logistics support of the new machine, the costs and benefits of the capital investment, and worker safety. The Department will seek to partner with original equipment manufacturers to incorporate sustainable manufacturing into contracted industry manufacturing activities and facilities (arsenals, depots, and shipyards) and its procurement of components and systems. It will do so by incorporating sustainable manufacturing into three guidance and directive documents pertaining to acquisition: the guidance provided in the *Defense Acquisition Guidebook*; the directions in DoDI 5000.02, *Operation of the Defense Acquisition System*; and the instructions provided by the Defense Acquisition University. Sustainable manufacturing has numerous practical benefits, including cost savings, an improved ability to comply with regulations and avoid environmental liability, and an enhanced perception of DoD with Congress and the public.

The vision of the Air Force Manufacturing Technology Program includes a strategic direction to implement sustainable manufacturing technologies at both the shop floor and enterprise level. Based on groundwork laid in FY 2010, the program launched the Sustainable Aerospace Manufacturing Initiative in FY 2011 to incorporate sustainable manufacturing into the DoD industrial base, including depots owned and operated by DoD. The Initiative developed and piloted an assessment process that evaluates sustainable topics within the aerospace manufacturing industrial base. It has enabled improved sustainability in machining processes that fabricate airframe structures and turbine engine airfoils, and changed the business case approach, increasing awareness of sustainable manufacturing in the defense industry.

DLA is the primary provider of repair parts and consumable items used by our military forces worldwide. DLA will continue to support the Department by providing product support for environmentally preferred products that have been tested and approved by the Services. DLA Energy enables the use of currently available renewable fuels (biodiesel and ethanol) by the Services, federal agencies and other customers. In addition, DLA Energy has funded several research and development renewable fuel projects and works with private industry, the Services, federal and state government agencies, and energy and other related trade associations to develop, test, and facilitate the use of promising renewable energy products and technologies (e.g. hydrotreated renewable jet fuel and marine diesel and waste-to-energy projects). While the FPDS is being updated to track and report compliance with sustainable procurement mandates, DLA will proactively promote compliance by developing an exhortatory Procurement Letter (DLA procurement policy directive) to contracting activities detailing current FAR and DFARS requirements pertaining to sustainable procurement. It will also develop and gather sample contract language to help DLA contracting officers develop compliant solicitations.

The Air Force is pursuing a two-pronged approach to improving its sustainable procurement. The first is to update the 2006 Air Force memorandum on the Green Procurement Program. Currently in coordination, the policy memorandum will require all functional offices to update procurement-related Air Force Instructions, and integrate sustainable procurement requirements into other existing Instructions rather than creating a separate Instruction on the topic. Once issued, offices have 180 days to develop and insert sustainable procurement language appropriate to implement the program. The memorandum also requires key personnel involved in the acquisition process to be trained on sustainable

procurement and acquisition. The second approach is for Air Force Contracting to provide guidance to contracting officials on the use of EPA designated products and recovered material, and to update the 2005 Contracting Officer's Primer on Green Procurement.

In the Army, planned initiatives include developing and providing training on sustainable procurement to instructors that teach basic contracting courses, and incorporating sustainable procurement assessments into its existing Contract Management Review Toolkit. DON will be updating its 2004 memorandum on sustainable procurement, as well as its 2009 *DON Green Procurement Program Implementation Guide*, to reflect the requirements of the Green Procurement DODI currently being prepared. Additionally, DON has begun developing some specific purchasing guidance for both the afloat and shore-based procurement communities. This information will not only facilitate identification of sustainable products, but will serve as a reminder that DON will incorporate sustainable purchasing to the maximum extent possible.

The DIA acquisition system currently provides provisions and contract clauses to help its personnel comply with sustainable procurement requirements, including bio-based products and EPA designated items, and estimating and certifying the amount of recovered material in EPA designated items. DIA will improve the system so it tracks and monitors green purchasing procurements; its release is estimated to be FY 2012. MDA is developing a database to track green attributes of products purchased, and is working to identify appropriate measures to further increase MDA's sustainable procurements by collecting and analyzing purchase data. MDA is also requiring all purchasing personnel and credit card holders to complete additional green procurement training, and it is requiring employees to take environmental awareness training that discusses the need to reduce MDA's environmental footprint through sustainable procurement.

HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS

Status

The Department faces a daunting task with sub-goal 7.2, given that its inventory of buildings over 5,000 square feet numbered 72,663 as of the end of FY 2010. So far DoD has evaluated 87 of these for their conformance to the Guiding Principles, or an equivalent standard, with 43 of these meeting the criteria. The current number of DoD buildings meeting Guiding Principles criteria is limited, but will mushroom in the near future. One illustration of this is the number of Navy LEED-certified buildings: only 14 are certified now but 314 are LEED registered, and this value does not include buildings that are certifiable but not yet registered with LEED due to funding constraints.

DoD policy to build, operate, maintain, reuse, demolish or deconstruct DoD buildings in a sustainable manner has already been established in DoDI 4170.11 on Installation Energy Management (from 2005) and the December 2007 version of UFC 4-030-01 on Sustainable Development. In October 2010, the Department established supplementary DoD Sustainable Buildings Policy on new buildings and major repair or renovation projects, specifying that: 1) all such buildings must be designed, built and certified (as appropriate) as LEED Silver (or its equivalent) or higher; 2) new buildings that are in the planning stage as of FY 2012 must have 40% of credits for LEED Silver (or its equivalent) come from energy and water efficiency; and 3) life cycle and cost-benefit analyses must be incorporated into design decisions for new construction and renovation/repair projects.

In October 2010, the Army issued *Memorandum for Sustainable Design and Development Policy Update (Environmental and Energy Performance)*. The detailed policy addresses a broad range of topics pertaining to the new construction and major renovations of high performance buildings: energy and water efficiency (including updating energy and water standards to ASHRAE 189.1), metering, siting, cool roofs, solar hot water heating, stormwater management, irrigation, and the use of enhanced commissioning for the building, stormwater runoff, water treatment, and the building's information

Sub-Goal 7.2: DoD Success Stories with Sustainable Buildings

U.S. Air Force: Tyndall AFB LEED Platinum Fitness Center

The 75,000 square foot fitness center at Tyndall AFB, FL opened in the fall of 2010, with a Platinum LEED certification. The center uses 40% less energy and water than a typical building of the same size, and 9% of the facility's energy is provided from solar panels on the roof. More than 40% of the materials purchased for the project have recycled content and more than 35% of the materials purchased for the project were extracted, processed, and manufactured within 500 miles of the base. The building was constructed to withstand a Category 3 hurricane with winds of 130 miles per hour.

U.S. Navy: LEED Silver Hangar

Hangar 511 at NAS Jacksonville is the Navy's largest active hangar, consisting of a 137,000 ft^2 maintenance hangar, more than a million ft^2 of aircraft apron and taxiway, and a 140,000 ft^2 administrative office building. It is the largest Navy project so far to achieve a Silver LEED Green Building Council rating, and one of only three hangar projects in the world to achieve this rating. The project designers used the LEED rating system as a tool to guide the many decisions required to create a sustainable facility. The design emphasized energy efficiency: the hangar space is heated with gas-fired infrared that heats by warming the floor slab; sun screens shade south-facing office windows; and translucent panels on the upper portion of the building façade let in ambient light. Stormwater runoff is minimized with pervious pavers and grass block paving, and the heat island effect of the concrete aircraft apron and taxiways is minimized by the very light color of the concrete.

U.S. Army: LEED Gold Child Development Center

Fort Irwin's new Child Development Center was certified LEED Gold in January 2011. The fast track project was completed from final design to construction in just 11 months. It features a central plant and efficient HVAC system that offers energy savings over the range of heating and cooling cycles, while filtering outside air and supplying air flow in a way that enhances occupant comfort. The building features a highly reflective "cool" roof that reduces the need for air conditioning. Exterior lighting is photocell-controlled and interior lighting is high-efficiency fluorescent lamps. Windows are not only dual-pane but low emissivity, meaning they are coated with a transparent glazing that reflects heat from the outside during warm weather and reflects heat back inside during cold weather. Materials from the region made up 41% of project materials, and 97% of construction debris was recycled. With dual-flush toilets and low-flow aerator faucets, the facility cut in half its potable water consumption. Almost every room and all classrooms have views to the outside, boosting the moods of employees and children alike. The site has designated parking for fuel-efficient vehicles and carpools. (Photo: U.S. Army Corps of Engineers)

U.S. Marine Corps Recruit Depot San Diego

San Diego is in the process of completing a $56 million project including two new Recruit Support Barracks over 100,000 ft^2 and a new 33,000 ft^2 Recruit Reconditioning. The project uses sustainable design principles from start to finish in an effort to reduce consumption of non-renewable sources, minimize waste, and reduce energy usage. In FY10, the project accomplished diversion of over 75% of C&D waste. The building is on track to meet the requirements for achieving a LEED Gold rating.

technology systems. The policy requires new construction and comprehensive renovations to achieve LEED Silver certification (or equivalent overseas third-party green building rating system), and requires lifecycle cost analysis to be used for design decisions.

Air Force Instruction 32-1021, *Planning and Programming Military Construction Project*s, was substantially revised in June 2010, including a section on "Sustainable Design and Development" that directs all eligible MILCON projects to achieve a minimum of LEED Silver certification and incorporate the UFC for LID into project designs.

On behalf of DON, NAVFAC issued policy in the 2011-01 issue of the Engineering Construction Bulletin (20 December 2010) requiring that all new buildings and major renovations costing over $750,000, and all repairs and alterations to existing buildings, comply with the December 2008 High Performance and Sustainable Buildings Guidance. The policy was accompanied by guidance on project planning and budgeting and on energy building standards for new construction, existing buildings, and O&M; also included was a list of resources and tools on sustainable building.

Photo: U.S. Navy

In November 2010, DLA issued an update to its February 2010 policy on sustainable design and development in the form of a policy memorandum entitled *Defense Logistics Agency (DLA) Sustainability and Energy Efficiency Policy Update*. The documents lays out requirements for sustainable design and development in all DLA MILCON projects and Sustainment, Restoration and Modernization projects, plus all minor construction projects that exceed 25% of the current replacement value. Exemptions are allowed only if a lifecycle cost analysis can demonstrate and document that a given requirement is not cost-effective. For a project whose requirements are not deemed cost-effective on a lifecycle basis, the design agency and DLA Installation Support Staff Director will determine through a lifecycle cost analysis the highest level of cost effectiveness feasible for that requirement. The policy provides detailed direction across a broad range of sustainability requirements, including that no potable water will be used for irrigation, designs will improve upon ASHRAE energy efficiency Standard 90.1 (2007) by at least 40%, and all DLA buildings will be LEED Gold by 2015. DLA also issued directed policies in FY 2010 and 2011 to drive improvements in energy and water efficiency. These covered: 1) vending machines (July 2010); 2) fire exit lighting (August 2010); 3) outdoor lighting (included in the November 2010 Sustainability and Energy Efficiency Policy Update), and 4) waterless urinals (May 2011).

Implementation Methods

As of October 2010, DoD policy requires all newly constructed buildings to conform with the Guiding Principles for high performance buildings as outlined in the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding. Additionally, DoD will construct all new buildings to meet LEED (or equivalent third-party green building rating system) Silver standards, or higher. DoD encourages LEED (or equivalent) certification of new buildings, but allows the Military Services the freedom to determine the appropriate number of certifications.

For the existing building inventory, the October 2010 policy requires Guiding Principle compliance for all work performed on DoD buildings. This fiscally prudent approach recognizes building systems do not deteriorate at the same rate. For example, it is not fiscally prudent to achieve Guiding Principle compliance by tearing out and replacing building system components such as HVAC systems, roofs and windows that still operate as designed. Rather, DoD's approach replaces systems when they no longer perform as designed. We have committed to implementing the Guiding Principles, thus more of our buildings will contribute to the success of sub-goal 7.2 as their life cycles progress. Since DoD will not expend funds replacing systems that do not yet need to be replaced, the overall effect of this approach ensures that the DoD building inventory will move toward 100% conformance with the Guiding Principles criteria. Our existing building policy also encourages LEED (or equivalent) certification of existing buildings.

The Air Force is participating in a U.S. Green Building Council pilot program to develop a portfolio-wide approach to installation sustainability through the continuous improvement of building sustainability performance. The Portfolio Partnership Program gives the Air Force the opportunity to develop a Green Building Council program that may become a standard in the future, much like LEED is today. Organizations participating in the pilot are required to:

1) establish a baseline performance of five to ten buildings using the LEED standard for Existing Buildings O&M;
2) define specific goals for each LEED Existing Buildings O&M category;
3) enroll the buildings in Energy Star Portfolio Manager; and
4) create an annual improvement plan to achieve the established goals.

In 2011, the Air Force initiated the use of assessments and audits to provide the basis for future investment decisions in support of sustainable installations. The assessments will examine facility conditions and look for opportunities in combined energy and water conservation, high performance sustainable buildings, and optimizing the utilization of space.

In FY 2011, MDA will publish Sustainable Building Design and Development Standard Operating Procedures to ensure that all new MDA real property acquisition projects are LEED Silver or better, with at least 40% of the LEED points representing energy and water efficiency credits. For its leased facilities, MDA will continue to inform its leasing agents of MDA's preference for facilities that are at least LEED Silver.

DIA, in April 2010, issued *DIA Sustainable Design and Development (SDD) Implementation Direction* that states DIA's intent to design MILCON projects to meet LEED Silver requirements beginning in FY 2012. DIA will issue follow-on guidance in FY 2011 to incorporate all EO 13514 and DoD goals, and will ensure these goals are included in construction, major renovation projects, and real estate transactions.

GOAL 8 Sustainability Built into DoD Management Systems

Goal 8 Sub-Goals

SUB-GOAL 8.1 All Environmental Management Systems Effectively Implemented and Maintained

Metric

Overall DoD status using the Federal Environmental Management System Scorecard Metrics as reported in the Defense Environmental Programs Annual Report to Congress. The overall DoD status is a color rating (green, yellow or red) for all DoD facilities and organizations for which an environmental management system (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

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	green	green	green	green	green	green	green	green	green	green
RESULT	**red**										

SUB-GOAL 8.2 The Sustainability of Transportation and Energy Choices in Surrounding Areas Optimized by Coordinating with Related Regional and Local Planning

Metric

Coordination by DoD, at any level, which ensured that all relevant factors, including GHG emissions, were considered in making the best decisions in the interest of sustainable development, transportation and energy choices in the area that are compatible with the base mission. This engagement can take the form of coordinating its own transportation, energy, and/or facility planning with surrounding communities, and/or participating in regional- or community-level planning related to development, transportation or energy (including environmental impact statements, environmental assessments, and growth and joint land use studies).

SUB-GOAL 8.3 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 were prepared, reviewed and updated annually by a DoD-certified pest management consultant and/or the installation pest management coordinator. 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

Fiscal year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Targets	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RESULT	**84.6%**										

Goal 8 Responsible OSD Offices

Sub-Goals 8.1 and 8.2: AT&L/I&E

Sub-Goal 8.3: AFPMB

ENVIRONMENTAL MANAGEMENT SYSTEMS

Status

Environmental Management Systems are important tools for the Department to achieve its sustainability objectives. DoD now has in place a solid guidance structure on EMSs, consisting of:

- DoDI 4715.17, *Environmental Management Systems*, issued April 2009, which sets standards and assigns responsibilities throughout the Department for EMS implementation and maintenance; and
- a November 2009 revision to the DoD Compliance Management Plan, which augments the DoDI by further clarifying how the EMS approach is used in DoD.

DoD has struggled in the past to implement and maintain its EMSs at a "green" level, but in FY 2010 it has approached the halfway mark, with 49% of its EMSs earning a green rating. However, as of January 2010, the overall rating for the Department is red.

In FY 2010, 62% of the U.S. Air Force EMS were rated green, with 90% of these in conformance and fully implemented. To improve the extent to which the EMS approach is operationalized into daily mission processes, the Air Force issued AFI 90-803, *Environment, Safety, and Occupational Health Compliance Assessments and Management Program*, that completely revamped the Air Force's ESOH assessment process. On 12 January 2011, the Air Force signed an Operationalizing Environmental Management Commitment Memorandum to ensure that environmental management is a key consideration undertaken in all Air Force activities. The memorandum stresses the use of the EMS approach to comply with environmental laws, regulations and policy; reduce risks to the mission; and continuously improve environmental management performance. It calls for ESOH Councils at all levels to use the EMS and EMS audit process to monitor and assess program performance. The Air Force also developed an updated Air Force Instruction (32-7001) on *Environmental Management*, and a *Civil Engineering Playbook* for EMS, both of which are in the late stage of coordination for final approval.

For DON EMSs, 51% were ranked green. In FY 2010, the Navy began piloting an integrated approach to external EMS audits and compliance evaluations of shore installations on a schedule of at least once per three years. This is expected to improve oversight of compliance and the implementation of corrective actions, which will allow the Navy to address the root cause of deficiencies as they arise and prevent future occurrences. EMSs are a positive approach to changing the culture from reactive to proactive, and the Navy will continue working to address the challenges it faces in fully implementing EMS in staffing, environmental funding, organizational structure and stability, and communication of roles and responsibilities.

Headquarters Marine Corps completed a major review and revision of the Marine Corps EMS criteria, using lessons learned from the past five years to simplify EMS requirements where possible. These updated EMS criteria emphasize the role of EMSs in supporting various sustainability goals outlined in EOs 13423 and 13514. The revision consolidated various Headquarters Marine Corps EMS policies and guidance documents into a single, comprehensive Marine Corps EMS policy that will be published as part of the next update to Marine Corps Order 5090.2A, *Environmental Compliance and Protection Manual*.

As of FY 2010, only 41% of the Army's EMS rated a green score, but the Army continues to make progress on EMS implementation: external EMS audits were completed at all 142 facilities for which an EMS is appropriate as of January 2011, and as of 30 September 2010, 132 facilities (93%) had declared conformance and fully implemented EMSs with nine more declaring conformance by the end of 2010.

Sub-Goal 8.1: DoD Success Stories on Environmental Management Systems

U.S. Air Force: Robins AFB EMS

Robins EMS is ISO 14001 compliant and includes all 22,000 people employed at the base, each of whom is required to take EMS training. The base's EMS has been a strong contributor to Robins' sustainability successes:

- In FY 2009, flex fuel vehicles increased 43% and alternative fuel consumption rose 10%.
- Solid waste diverted from the waste stream was 51% in FY 2009 and by 67% in FY 2010, saving more than $1 million in disposal costs in FY 2010. C&D debris diverted from disposal was 71% in FY 2009 and 54% in FY 2010.
- Water consumption has been reduced by 29% from FY 2007 through FY 2010.
- The goal of the EMS to reduce Class II ozone depleting substances 50% by CY 2015 was exceeded five years in advance, with a 93% reduction achieved by CY 2010.

U.S. Navy: Achieving Pollution Prevention via an Environmental Management System

The Naval Support Activity in Naples, Italy implemented and sustained a comprehensive EMS, reflecting the Command's commitment to environmental compliance and demonstrating that environmental management is one of the base's highest priorities. The installation worked as a team to develop and implement unique, innovative, and creative approaches to improve both protection of the environment and compliance with regulations that greatly enhanced the ability of the facility to carry out its primary mission.

Among the many accomplishments resulting from the base's efforts to implement and continually improve its EMS, there are several that particularly stand out. Hazardous waste reduction resulted from product substitution and removal of over 100 hazardous materials from the Installation's authorized use list. The Pollution Prevention Annual Data Summary shows a 27% reduction of hazardous waste (over 97,000 tons) from FY 2008 to FY 2009. Implementation of a recycling program at Naval Support Activity Naples increased solid waste recycling from 45% in FY 2009 to 58% in FY 2010.

USMC Camp Butler, Okinawa, Japan: Communicating EMS

Communication is one of the key strengths of MCB Camp Butler's EMS. Involvement of the Commanding General and his senior staff raised attention to EMS objectives and targets, which was instrumental in helping to integrate environmental management across Marine Corps units and base activities. Communications are also tailored to reach the widest audience, including Japanese civilian employees who comprise almost 70% of the workforce. For example, the recently signed environmental policy statement by the Marine Corps Bases Japan Commanding General, Lieutenant General Robling, is provided in both English and Japanese, is widely distributed and displayed, and is available on the highly-publicized EMS website. In addition, during FY 2009 and FY 2010, over 30 environmental documents were translated into Japanese.

Defense Commissary Agency EMS

In 2003, the Defense Commissary Agency (DeCA) developed a centralized, integrated EMS to improve the processes and actions of its commissaries and facilities worldwide, as well as its associates, vendors, and contractors. The EMS utilizes a holistic approach to plan and manage nine significant sustainability aspects. DeCA uses a web-based data network to monitor energy and water use at more than 250 facilities, which allows quick identification and response to billing anomalies and permits strategic planning of capital improvements. In FY 2009, the EMS was certified as conformant with the ISO 14001 standard—one of the few in the federal government to achieve this certification. In FY 2009 DeCA developed new programs on strategic energy conservation and Green Store Certification. DeCA was a Federal Energy and Water Management Award Winner in FY 2010 for this work.

- **FY 2009 Savings:** 90 billion Btu; 43 million gal of water; $2.7 million in utility costs

The one remaining facility is expected to declare conformance in 2011. The Army also issued updated EMS policy guidance on 12 October 2010, requiring re-auditing and re-declaration of all EMSs on a three year cycle, per DoDI 4715.17 *Environmental Management Systems*. In FY 2010, 23 Army installations were re-audited and are in the process of re-declaring conformance, and the Army completed five installation assistance visits and provided three internal auditor training classes for installation-level staff.

DLA has ten EMSs, four of which are rated green. DLA Disposition Services, which is responsible for the environmentally sound disposition of electronic waste, incorporates environmental management requirements into all of its hazardous waste and service contracts so that contractors are partners in DLA's EMSs. For example, DLA Disposition Service's Scrap Venture and Commercial Venture contractor is a full participant in DLA Disposition Service's EMS.

Implementation Methods

With the foundation described in the Status section, the Department is well positioned to continue its steady improvement in efforts to fully implement and thoroughly maintain its EMSs.

The Chief of Naval Operations is working with all affected Navy System Commands to clarify roles and responsibilities regarding EMS. The Navy believes that clearer guidance regarding participation in the EMS program would be beneficial, and it will incorporate any necessary policy changes in the major revision to the *Environmental Readiness Program Manual* (Operational Navy Instruction 5090.1D), expected to be completed in 2011. Together with the System Commands, the Chief of Naval Operations will develop and issue interim policy memoranda to disseminate EMS policy and information in advance of the manual's issuance.

Headquarters Marine Corps will publish a revised EMS policy that emphasizes the role of EMS in supporting sustainability goals. The Corps recently prepared a draft version of the revised EMS policy and is currently soliciting installation input on the revisions. Once finalized, the Marine Corps' revised EMS policy will be published as part of the next update to Marine Corps Order 5090.2A *Environmental Compliance and Protection Manual*, and will provide clearer direction to installations on integrating their EMS with sustainability efforts.

In FY 2011, the Air Force is working to implement a web-based Air Force-wide document control and information repository, called "eDASH," that allows personnel to access policy, guidance and other information on EMS and sustainability. The Air Force is also in the process of implementing a new three-tiered ESOH assessment process that includes EMS-focused external audits coupled with targeted compliance audits for areas of high risk to the mission and/or regulatory enforcement action.

In addition to conducting re-audits of EMSs in FY 2011, the Army plans to continue offering installation assistance visits and providing internal auditor training classes for installation-level staff.

LOCAL AND REGIONAL INTEGRATED PLANNING

Status

Defense Economic Adjustment Program

The Office of Economic Adjustment (OEA), through the Defense Economic Adjustment Program, assists State and local governments to plan and carry out community adjustments in response to military mission growth and to support compatible use. OEA provides this assistance to support a cooperative effort to identify and assess community impacts, and to take action to respond to these impacts and achieve compatibility between the military mission and neighboring civilian communities.

In response to the growth of military missions, OEA guides a participatory stakeholder process involving

the installation and officials from state and local government to develop a growth management plan that responds to community impacts. OEA uses the Joint Land Use Study process to prevent incompatible civilian development that may impair the military mission, for example by diminishing the availability of resources in the vicinity of a military installation, such as air, land, water, and the electromagnetic spectrum. The OEA Joint Land Use study process promotes a partnership among the military and host communities through an open, continuous dialogue to address community impacts while ensuring that community activities and development are compatible with the DoD mission.

Photo: U.S. Air Force

Air Force training on the Barry M. Goldwater range, AZ

The need to ensure that community development does not interfere with military installation missions can pose important challenges and opportunities for communities in ways that cross jurisdictional boundaries. However, many regions lack sufficient staff and other resources to undertake cooperative, long-term, strategic regional planning. Through the Defense Economic Adjustment Program, the Department provides technical and financial assistance to enhance the planning capacity of local communities. This support enables the region, with DoD input, to develop land use and transportation plans that promote mixed-use development, centralize public infrastructure, and support housing diversity and multi-modal transportation, especially regional rapid transit. The Department has provided technical and financial assistance to state and local government to support regional transportation planning in response to major DoD activities.

OEA currently works with 25 installation mission growth communities across the country and has over 60 projects underway addressing compatible use. As installations and host communities work cooperatively and coordinate their efforts to address issues of installation growth and compatible development, they ensure sustainability in their region by guiding growth and development while planning for community infrastructure, transportation requirements, and natural resources. OEA's program of assistance for communities has led to the implementation of growth management plans, transfer of development right programs, unified develop ordinances, transportation infrastructure plans, and alternative energy compatibility analyses. These cooperative efforts have resulted in communities developing some promising planning practices, illustrated by the following four examples:

- The City of Kingsville, TX received the American Planning Association Federal Planning Division's 2010 award for Outstanding Federal Planning Program. The City's Joint Land Use Plan and Implementation Program used a comprehensive, multi-stakeholder planning process that can serve as a model for regional-scale planning involving military and community entities. The City's efforts focus on safeguarding the quality of life for residents, providing for growth planning, and protecting the military mission at Naval Air Station Kingsville. To ensure implementation of the joint land use study recommendations, the City created a Joint Airport Zoning Board to coordinate future planning efforts between the City of Kingsville and Kleberg County to promote compatible development around Naval Air Station Kingsville.
- Ocean and Burlington Counties in New Jersey collaborated with Joint Base McGuire-Dix-Lakehurst to develop a Joint Land Use Study that begins to plan in a manner that supports both the military mission and the civilian population. The study identifies appropriate locations for development, redevelopment and transportation infrastructure consistent with base operations. The recently completed Joint Base Regional Transportation Mobility Study further identifies transportation

concerns within a five-mile radius of the base, and develops strategies and project concepts to alleviate the transportation concerns. Its overarching goal is to ensure safe and efficient motorized and non-motorized transportation for all, both in the short-and long-terms.

- The Low-Country Council of Governments and Marine Corps Air Station Beaufort are working alongside South Carolina's Beaufort County, the City of Beaufort, and the Town of Port Royal to develop a targeted Transfer of Development Rights program. The program will allow property owners near the base to transfer their development rights to designated receiving areas. The program also serves as a means for land preservation and a tool for directing growth and transportation infrastructure to infill projects in appropriate areas compatible with military operations. When fully implemented, the Air Station will be protected from encroachment due to incompatible development and the program can be used as a model for other county-wide programs.
- The City of San Antonio, TX adopted the North Sector Plan surrounding Camp Bullis as a component of its Master Plan. This plan is a long-range guide to coordinated patterns of growth, conservation, transportation and redevelopment. It includes a military compatibility section that lays out objectives and recommends compatible development standards and land uses. The City and Bexar County have enacted outdoor lighting and habitat protection regulations to further enhance military compatibility in the area surrounding Camp Bullis. The City is moving to enact the zoning and land use recommendations from the North Sector Land Use Plan. The City's ongoing development of the West/Southwest Sector Plan around Lackland Air Force Base will also highlight compatibility issues in the study area and illustrate a compatible future growth pattern.

Community Planning Liaison Officers

The Navy and Marine Corps have a high level of participation at those installations staffed with Community Planning and Liaison Officers (CPLOs). The purpose of CPLOs is to manage encroachment and sustain readiness for Navy and Marine Corps missions. One of many tools they use is coordinated community planning across the board for installations, ranges, and military training routes by working with federal, regional, and local planning agencies on a continuous basis. Where appropriate, installations promote compatible land use by having a current Encroachment Action Plan and/or participate in a JLUS generated by the community and funded by OEA. At air installations and ranges, DoD also uses Air Installation Compatible Use Zone plans, Range Air Installation Compatible Use Zone plans, and Range Complex Management Plans to aid in this effort.

The Navy hired ten new CPLOs in FY 2010, nine at installations and one at a regional level, for a new total of 25 Installation and eight Regional CPLOs. CPLOs can communicate Navy environmental sustainability goals alongside mission sustainability goals as they interact with government bodies at all levels. The greatest issue the Navy has in fully coordinating with communities and regions on planning is funding for staffing.

Sustainable Ranges

Another good example of DoD coordination with regional and local planning is OSD's Sustainable Ranges program. The purpose of the program is to ensure the availability of military training and testing ranges now and into the future while being an effective steward of protected natural and cultural resources. It is essential to work closely inside and outside the Department to ensure that development pressures and resource competition around installations, ranges and facilities do not compromise current or future readiness and mission capabilities. It supports education and engagement of key stakeholders—such as federal agencies, state and local governments, academia and nongovernmental organizations—and strengthens regional partnerships to affect landscape-level planning. DoD partners with these stakeholders to develop solutions to shared challenges at the regional and local levels, such as land use, energy, pollution, population growth, and economic growth. Regional partnerships convene stakeholders from federal and state governments to address natural resource management, water


Photo: U.S. Army

A sustainable range serves DoD's training needs while preserving natural resources

quantity and quality, land use, and other emerging issues like climate change in a common, collaborative framework.

One of the key components of the Sustainable Ranges program is the Readiness and Environmental Protection Initiative. The initiative works to ensure the long-term accessibility and capability of military training areas by collaborating with stakeholders to develop a framework of compatible land use efforts. The Initiative forms coordinated regional planning and community partnerships that share the costs of protecting land, for the purpose of providing continued military access to the resources necessary for training and testing while remaining excellent stewards of the environment and good neighbors to communities. Military Departments use funding from the initiative to implement partnerships and projects according to their own processes.

Implementation Methods

OEA, through the Defense Economic Adjustment Program, continues to promote consistent, ongoing outreach and integrated local and regional planning among installations, ranges, and host communities. The Army accomplishes local and regional level coordination of transportation- and energy-related considerations for new projects via the National Environmental Policy Act process. The Army regulation *Environmental Effects of Army Actions* (32 CFR Part 651) lays out the process for evaluating impacts, including transportation- and energy-related impacts, as well as requirements for public involvement in the planning process. Army Regulation *Master Planning* (AR 210-20) lays out additional planning considerations and coordination processes for stationing actions, and any other new projects that may impact local and regional energy use and transportation routes and intensity. The Army is updating AR 210-20 to incorporate additional sustainable design and development considerations. At the installation level, the Army Directorate of Public Works and Command Staff representatives routinely participate in local and regional planning boards. The Marine Corps is currently updating its National Environmental Policy Act Manual to reflect the need for Environmental Impact Statements and Environmental Assessments for proposals under the Act to consider the regional and local integrated goals contained in EO 13514.

PESTICIDE USE MANAGEMENT

Status

One of the Measures of Merit in DoDI 4150.07 states that all DoD installations will have Pest Management Plans (PMPs) prepared, reviewed and updated annually by Pest Management Professionals. This metric was initiated for FY 1993 when just over 50% of DoD installations had such PMPs in place. There has been great improvement since then, with 84.6% of installations having approved plans in FY 2010.

All DoD installation PMPs are developed in accordance with the principals of IPM, where the installations carefully evaluate all pest control options and only choose those that are the best, taking into account factors such as the biology of the pest, human and environmental safety, effectiveness, and cost.

One of the primary reasons DoD has been able to cut its annual pesticide rate nearly in half since it first started reporting such data in 1993 is because of DoD's strict adherence to IPM as delineated in the PMPs.

EPA will soon begin requiring a permit under the Clean Water Act for applying pesticides around waters in the United States, but guidance from EPA is still pending. DoD is in close communication with EPA, and all installation PMPs are in compliance with current requirements. However, it remains largely unknown how installations may have to modify their PMPs based on these new Clean Water Act requirements. Each of the Components is engaged with the EPA and state regulatory agencies to ensure they will be in compliance. The Components' Senior Pest Management Professionals will continue to assist the installations in developing and reviewing their PMPs.

PESTICIDE USE MANAGEMENT

Implementation Methods

The DoD goal of having 100% of installations with professionally prepared, reviewed and updated PMPs remains elusive. The central issue is that while installation PMPs are valid for five years, they must be updated and reviewed annually. It is this annual requirement that is the most difficult to achieve because of operational tempo in support of overseas contingency operations which continues to limit the capability of installations and headquarters to review and approve those annual updates to the PMPs.

DLA expanded its use of the Integrated Pest Management Information System, an electronic program for tracking and reporting pesticide operations. This software collects and reports information on all pest management activities while streamlining data entry and retrieval, such as DoD Measures of Merit annual reporting. Currently the software can be used only on stand-alone systems within DLA, but DLA plans to make it web-based, similar to the existing Air Force network.

Part III: Agency Self Evaluation

As requested, the Department provides Yes/No answers to the following questions regarding critical aspects of the Plan:

Does your Sustainability Plan incorporate and align sustainability goals, GHG targets and overarching objectives for sustainability with the Agency Strategic Plan?	Yes
Does it provide annual targets, strategies and approaches for achieving the 2015 and 2020 goals?	Yes
Is the Sustainability Plan consistent with the FY2012 President's Budget?	Yes
Does the Sustainability Plan integrate all statutory and Executive Order requirements into a single implementation framework for advancing sustainability goals along with existing mission and management goals, making the best use of existing and available resources?	Yes
Does your plan include methods for obtaining data needed to measure progress, evaluate results, and improve performance?	Yes

Other Key Questions for 2011

1. Did your agency meet by 12/30/10 due date and/or is it now able to demonstrate comprehensive implementation of the EO 13423 Electronic Stewardship goals?
   - Acquire at least 95% EPEAT-registered electronics
   - Enable Energy Star or power management features on 100% of eligible personal computers
   - Extends the life and/or uses sound disposition practices for its excess or surplus electronics

   Response. From the electronics stewardship plans of actions submitted by DoD Components, it is evident that the Department is showing comprehensive implementation of the four EO 13423 electronics stewardship goals. However, because DoD does not have a top-level tracking system to collect the appropriate metrics, it remains a challenge for the Department to compute percentage figures to definitively measure DoD-wide compliance. In the interim, DoD is reviewing data collection methods to establish an effective data call that would help to demonstrate full compliance of the electronics stewardship goals.

2. Is your agency tracking and monitoring all of its contract awards for inclusion of requirements for mandatory federally-designated green products in 95% of relevant acquisitions?

   Response. The Department is not able to reliably report on its compliance with sustainable procurement requirements until GSA and the Office of Federal Procurement Policy update the FPDS to allow federal agencies to track sustainable procurement. In the interim, to demonstrate the DoD's commitment to sustainable acquisition, Defense Procurement and Acquisition Policy, in coordination with the DUSD(I&E), is initiating a reporting process to demonstrate applicable procurements comply with sub-goal 7.1. The Military Services and DLA are tasked with reviewing a representative sample of contract actions from the first half of FY 2011 to determine if the contract action includes requirements for sustainable products. If the review reveals non-compliance, the Department will provide additional guidance and possible training to remedy the problems.

3. Has your agency completed energy evaluations on at least 75% of its facilities? (If agency has not met this goal, then it should describe plans for catching up on this requirement in the next 6 months.)

   Response. The Department is unable to determine its percentage of completed energy evaluations because the EISA Section 432 Compliance Tracking System evolved during 2010, and updated DoD information is not yet in the system. DOE and DoD are working together to update the 2010

information. DoD does have contracts in place to complete 100% of its building energy audits, and is continuing to execute those contracts to complete all audits by 2012.

4. Will your agency meet the deadline of 1 October 2012 (EPAact §103) for metering of energy use? (Agency should provide current status of buildings metered and plans for meeting the deadline).

   Response. Yes. Of those buildings deemed appropriate for electricity metering as of the end of FY 2010, 95% have been metered. The Department is also well ahead of schedule (a deadline of 1 October 2016) for metering natural gas and steam.

5. If your agency reports in the FRPP, will it be able to report by December 2011 that at least 7% of its inventory meets the High Performance Sustainable Guiding Principles? (If no, agency needs to provide schedule and plan for actions to be taken in the next six months.)

   Response. DoD policy requires all building work (new construction and renovation) to meet the Guiding Principles. DoD's new construction program is not large enough to get the Department to the 15% standard by FY 2015 (3 to 5% is a more realistic expectation from the new construction program). Therefore most of the progress to meet the 15% standard will occur by restoring and modernizing enough existing buildings. DoD intends to continue its current practice of restoring and modernizing existing buildings on a system by system basis, e.g., replacing roofs and HVAC systems (or their components) when it becomes necessary. Because building systems wear out at different rates, this practice is the most prudent use of funding. Coupled with DoD's Sustainable Buildings policy, our buildings will become more compliant with the Guiding Principles over time, as DoD continues restoration and modernization measures.

Appendix A
Acronyms

AFB	Air Force Base
AFPMB	Armed Forces Pest Management Board
ARRA	American Recovery and Reinvestment Act
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
AT&L	Acquisition, Technology and Logistics
Btu	British thermal unit
C&D	construction and demolition
CEQ	Council on Environmental Quality
CO_2	carbon dioxide
CPLO	Community Planning and Liaison Officers
CY	calendar year
DeCA	Defense Commissary Agency
DENIX	Defense Environmental Network and Information eXchange
DFARS	Defense Federal Acquisition Regulation Supplement
DLA	Defense Logistics Agency
DoD	Department of Defense
DOE	Department of Energy
DoDI	Department of Defense Instruction
DON	Department of the Navy
DPAP	Defense Procurement and Acquisition Policy
DSPO	Defense Standardization Program Office
DTMO	Defense Travel Management Office
DUSD	Deputy Under Secretary of Defense
EISA	Energy Independence and Security Act of 2007
EO	Executive Order
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPCRA	Emergency Planning and Community Right-to-Know Act
EPEAT	Electronic Product Environmental Assessment Tool
ESOH	Environment, Safety, and Occupational Health
ESTCP	Environmental Security Technology Certification Program
FAR	Federal Acquisition Regulation
FEMP	Federal Energy Management Program
FPDS	Federal Procurement Data System
FY	fiscal year
gal	gallon
GHG	greenhouse gas
GWP	global warming potential
HFC	hydroflurocarbon
HVAC	heating, ventilation and cooling

I&E	Installations and Environment
INRMP	Integrated Natural Resources Management Plan
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
ISWM	Integrated Solid Waste Management
kWh	kilowatt-hour
LEED	Leadership in Energy and Environmental Design
LID	low impact development
MCAGCC	Marine Corps Air Ground Combat Center
MCB	Marines Corps Base
MCLB	Marines Corps Logistics Base
MDA	Missile Defense Agency
MILCON	Military Construction
mmscfd	million standard cubic feet per day
MMT	million metric tonnes
MW	megawatt
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NDCEE	National Defense Center for Energy and Environment
NPDES	National Pollutant Discharge Elimination System
NSN	National Stock Number
NRSW	Navy Region Southwest
O&M	operations and maintenance
OEA	Office of Economic Adjustment
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
PMP	Pest Management Plan
PPA	power purchase agreement
PESHE	Programmatic Environment, Safety, and Occupational Health Evaluation
REACH	Registration, Evaluation, Authorisation and Restriction of Chemical Substances
REC	Regional Environmental Coordinator
ROI	return on investment
SERDP	Strategic Environmental Research and Development Program
SPA	Specification Preparing Activities
SSC	Senior Sustainability Council
SSO	Senior Sustainability Officer
SF_6	sulfur hexafluoride
TRI	Toxics Release Inventory
UFC	Unified Facilities Criteria
USAF	United States Air Force
USMC	United States Marine Corps
USN	U.S. Navy
yr	year

Appendix B

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Appendix C

Federal Requirements Driving the DoD SSPP Goals and Sub-Goals

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Sub-Goal 1.1 – Energy Intensity of Facilities *(see also Electronic Stewardship and Sustainable Buildings)*	§2(a)(i): Reducing energy intensity in agency buildings should be considered.	§2(a) "improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3% annually through the end of fiscal year 2015, or (ii) 30% by the end of fiscal year 2015, relative to" FY03. §2(f): Ensure that (i) new construction and major renovation comply with the Guiding Principles, and (ii) 15% of the existing Federal capital asset building inventory of the agency as of the end of FY15 incorporates the sustainable practices in the Guiding Principles.		EPAct §102: Agencies can keep savings from energy and water reductions (but must use them for energy efficiency projects). EPAct §103: All federal buildings must be metered for electricity by October 1, 2012. Advanced metering is to be used to the maximum extent practicable.
Sub-Goal 1.2 – Renewable Energy	§2(a)(ii): Consider increasing agency use of renewable energy and implementing renewable energy generation projects on agency property. (Note, however, that U.S.C. 10 §2911(e) requires DoD to produce or procure not less than 25% of the total energy consumed within its facilities from renewable sources during FY 2025.)	§2(b): Ensure that (i) at least half of the statutorily required renewable energy consumed by the agency in a FY comes from new renewable sources, and (ii) to the extent feasible, implement renewable energy generation projects on agency property for agency use.	§523: If lifecycle cost-effective, as compared to other reasonably available technologies, not less than 30% of the hot water demand for each new Federal building or Federal building undergoing a major renovation be met through the installation and use of solar hot water heaters.	EPAct §203: Renewable energy ≥3% in FY07-09; 5% in FY10-12; 7.5% in FY13 and beyond (compared to total electricity consumption).

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Sub-Goal 1.3 – Vehicle Fleets	§2(a)(iii): Reduce the use of fossil fuels by: (A) Using low greenhouse gas emitting vehicles including alternative fuel vehicles; (B) Optimizing the number of vehicles in the agency fleet; (C): Reducing, If the agency operates a fleet of at least 20 motor vehicles, the agency fleet's total consumption of petroleum products by a minimum of 2% annually through the end of FY20 relative to FY05.	§2(g): (i) reduce the "fleet's total consumption of petroleum products by 2% annually through end of fiscal year 2015" relative to FY05 (ii) increase the non-petroleum fuel-use annually by 10 % relative to FY05; (iii) Use plug-in hybrids (PIH) vehicles when they are commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles.	§141: Purchase only low GHG-emitting vehicles. §142: Federal agencies shall achieve a 20% reduction in vehicle petroleum use and a 10% increase in non-petroleum fuel use annually by FY15 relative to FY05. §246: Federal agencies shall obtain a renewable fuel pump for every fleet by 1/1/10. §526: Alternative fuels cannot be used if lifecycle GHG emissions are greater than from petroleum sources.	EPAct §701: Vehicles with dual fuel capabilities shall be operated on alternative fuels (unless agency qualifies for waiver based upon usage of vehicle in a specific geographic area).
Sub-Goals 2.1 and 2.2– Water Consumption Intensity	§2(d)(i): Reduce potable water use intensity by 2% annually through FY20, or 26% by the end of FY20, relative to FY07. §2(d)(iii): Consistent with State law, identify, promote, and implement water reuse strategies that reduce potable water consumption. §2(d)(ii): Reduce agency industrial, landscaping, and agricultural water consumption by 2% annually or 20% by the end of FY20 relative to FY10. §2(d)(iii): Consistent with State law, identify, promote, and implement water reuse strategies that reduce potable water consumption.	§2(c): Beginning in FY08, reduce water consumption intensity, relative to the baseline of the agency's water consumption in FY07, through life-cycle cost-effective measures by 2% annually through the end of FY15 or 16% by the end of FY15.		
Sub-Goal 2.3 – Storm Water Management	§2(d (iv): implement and achieve the objectives identified in the storm water management guidance (issued by EPA as required under §14).		EISA §438: Maintain or restore pre-development hydrology, to the maximum extent technically feasible, with regard to pre-project hydrologic conditions of temperature, rate, volume, and duration of storm water flow for development and redevelopment footprints >5,000 sq ft.	

Goal/Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Goal 3 – Scopes 1 and 2 Greenhouse Gas (GHG) Emissions	§2(a): establish and report to the Chair of the Council on Environmental Quality (CEQ Chair) and the Director of the Office of Management and Budget (OMB Director) a percentage reduction target for agency-wide reductions of scope 1 and 2 greenhouse gas emissions in absolute terms by fiscal year 2020, relative to a fiscal year 2008 baseline of the agency's scope 1 and 2 greenhouse gas emissions.			
Goal 4 – Scope 3 GHG Emissions	§2(b): in setting the Scope 3 target, consider: (i) Supply Chain - opportunities with vendors and contractors to address and incorporate incentives to reduce GHG emissions. (ii) Employee Travel - implementing strategies for transit, travel, training, and conferencing that actively support lower-carbon commuting and travel by agency staff. (iii) GHG emission reductions associated with pursuing other relevant goals in this section. (iv) Developing and implementing innovative policies and practices to address scope 3 emissions unique to agency operations. *…plus subsequent guidance from CEQ*			
Sub-Goal 5.1 – Paper Use	§2(e)(iv): reduce printing paper use and acquiring uncoated printing and writing paper containing at least 30% postconsumer fiber. §2(e)(i): Source Reduction - minimize the generation of waste and pollutants through source reduction.	§2(d)(ii): Use of paper of at least 30% post-consumer fiber content.		

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Sub-Goal 5.2 – Non-Hazardous Solid Waste	§2(e)(ii): Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris, by the end of FY15. §2(e)(vi): Organics - Increase diversion of compostable and organic material from the waste stream.	§2(e): (ii) Ensure that the agency increases diversion of solid waste as appropriate; and (iii) maintains cost-effective waste prevention and recycling programs in its facilities.		
Sub-Goal 5.3 – Construction and Demolition Debris	§2(e)(iii): Divert at least 50% of construction and demolition materials and debris by the end of FY15.			
Sub-Goal 5.4 – Biogas	§1: Federal agencies shall reduce their greenhouse gas emissions from direct and indirect activities. §2(a) Establish and report to the CEQ Chair and OMB Director a percentage reduction target for agency-wide reductions of scope 1 and 2 GHG emissions in absolute terms by FY20, relative to a FY08 baseline of the agency's scope 1 and 2 GHG emissions.			
Sub-Goal 6.1 – Toxic Chemicals	§2(e)(v): Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of. §2(e) (viii),: Increase agency use of acceptable alternative chemicals and processes in keeping with the agency's procurement policies §2(e) ix) Decrease agency use of chemicals where such decrease will assist the agency in achieving GHG targets.	§2(e)(i): Ensure that the agency reduces the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of.		

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Electronics Stewardship (Sub-Goal 6.2 and contributions to Sub-Goal 1.1)	§2(i)(i): Ensure procurement preference for EPEAT-registered products.	§2(h): Ensure that the agency (i) when acquiring an electronic product, meets at least 95% of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is none; (ii) enables the Energy Star feature on agency computers and monitors, (iii) establishes and implements policies to extend the useful life of agency electronic equipment, and (iv) uses environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.		
	§2(i)(ii): Establish and implement policies to enable power management, duplex printing, and other energy-efficient or environmentally preferable features on all eligible agency electronic products.			
	§2(i)(iii): Employ environmentally sound practices with respect to the agency's disposition of all agency excess or surplus electronic products.			
	§2(i)(iv): Ensure the procurement of Energy Star and FEMP designated electronic equipment.			
	§2(i)(v): Implement best practices in energy efficient management of servers and Federal data centers.			
Sub-Goal 6.3 – Pesticide Certification	§2(e)(vii): Pest Mngt - Implement integrated pest management and other appropriate landscape management practices.			

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Sub-Goal 7.1 – Sustainable Procurement	§2(h): Advance sustainable acquisition to ensure that 95% of new contract actions, excluding weapon systems, are: energy-efficient (Energy Star or Federal Energy Management Program); water-efficient; bio-based; environmentally preferable (e.g., certified by the Electronic Product Environmental Assessment Tool (EPEAT); non-ozone depleting; contain recycled content; non-toxic or less-toxic alternatives where such products meet agency performance requirements. §2(i): Ensure procurement preference for EPEAT products. §2(iv): Ensure the procurement of electronic equipment designated Energy Star and/or Federal Energy Management Program.	§2(h): When acquiring an electronic product, ensure that it meets at least 95% of those requirements with an EPEAT-registered electronic product, unless there is none. §2(d): Require in agency acquisitions of goods and services: (i) the use of sustainable environmental practices, including acquisition of bio-based, environmentally preferable, energy-efficient, water-efficient, and recycled-content products; and (ii) the use of paper with at least 30% post-consumer fiber content.	§524: must purchase appliances whose stand-by mode uses 1 watt or less, or the best available if <1 W not available. §525: must purchase products designated by Energy Star or the Federal Energy Management Program.	EPAct §104: Energy Star and FEMP-designated products prominently identified in any federal listing of products; GSA and DLA shall supply only such products where possible and cost-effective; 1 - 500 hp electric motors will be premium efficient motors. Encouraged to maximize efficiency of air conditioning and refrigeration equipment. §108: Amends the Solid Waste Disposal Act to increase the use of waste such as furnace slag and fly ash in cement or concrete in federal projects. Farm Bill §9002: Preference for highest bio-based content if cost >$10,000.

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Sub-Goal 7.2 –Sustainable Buildings	§2(g)(i): All new buildings entering planning in 2020 or later designed to achieve zero-net-energy use by 2030.		§431 (existing federal bldgs): 3% reduction per year in fossil fuel use from 2008 through 2015, or 30% total by 2015, relative to FY03. §433 (new or majorly renovated buildings): fossil-fuel use halved by 2030 relative to FY03, and sustainable design principles applied to their siting, design, and construction. DOE Secretary to establish a federal green certification program. In addition to water conservation required by this section, "water conservation technologies shall be applied to the extent that the technologies are life-cycle cost-effective". §434 (large capital energy investments such as HVAC): must employ "the most energy efficient designs, systems, equipment, and controls that are life-cycle cost effective". Natural gas and steam must be metered by October 16, 2016. §434 (leasing): as of 3 years after signing, all leases must be for Energy Star buildings.	EPAct §103: Buildings must be metered for electricity by October 1, 2012.
	§2(g)(ii): Ensure that all new construction, major renovation, or repair and alteration of Federal buildings complies with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*. §2(g)(iii): Ensure that at least 15 %of the agency's existing buildings (and leases) meet the Guiding Principles by FY 2015 and that the agency makes annual progress towards 100% compliance for building inventory.			
	§2(g)(iv): Pursue cost-effective, innovative strategies, such as highly reflective and vegetated roofs, to minimize consumption of energy, water, and materials.			
	§2(g)(v): Manage existing building systems to reduce consumption of energy, water, and materials, and identifying alternatives to renovation that reduce existing assets' deferred maintenance costs.			
	§2(g)(vi): When adding assets to the agency's real property inventory, identifying opportunities to consolidate and dispose of existing assets, optimize the performance of the agency's real property portfolio, and reduce associated environmental impacts.			
	§2(g)(vii): Ensuring that rehabilitation of federally owned historic buildings utilizes best practices and technologies in retrofitting to promote long-term viability.			

Sub-Goal	EO 13514	EO 13423	EISA	EPAct, Farm Bill
Sub-Goal 8.1 – Environmental Management Systems	§2(j)(i),(ii): Continue implementation of existing environmental management systems (EMSs) to achieve the performance necessary to meet the goals of this order.	§3(b)(i): Ensure use of EMS as the primary management approach for addressing environmental aspects of internal agency operations and activities.		
Sub-Goal 8.2 – Regional and Local Integrated Planning	§2(f)(i): Transportation Planning - Participate in regional transportation planning and recognizing existing community transportation infrastructure.			
	§2(f)(ii): Energy Planning - Align federal policies to increase effectiveness of local planning for energy choices.			
	§2(f)(iii): Transit-Oriented Community Planning - Ensure that planning of new Federal facilities or new leases includes consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit, and emphasizes existing central cities and, in rural communities, existing or planned town centers.			
	§2(f)(iv): New/Improved Facilities - Identify and analyze impacts from energy usage and alternatives in all EISs and EAs for proposed new or expanded facilities.			
	§2(f)(v): Regional Coordination - Coordinate with regional programs for Federal, State, tribal, and local ecosystem, watershed, and environmental management.			
Sub-Goal 8.3 – Pest Management Plans	§2(e)(vii): Pest Mngt - Implement integrated pest management and other appropriate landscape management practices.			