Assistant Secretary of the Army for Civil Works

US Army Corps of Engineers®

# 2013 Strategic Sustainability Performance Plan

## 28 June 2013

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MEMORANDUM FOR DEPUTY COMMANDING GENERAL, US ARMY CORPS OF ENGINEERS, 441 G STREET, N.W. WASHINGTON, DC 20314

SUBJECT: U.S. Army Corps of Engineers Sustainability Policy

1. References:

a. Executive Order (E.O.) 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

b. E.O. 13423, Strengthening Federal Environmental, Energy, and Transportation Management.

c. Energy Independence and Security Act of 2007 (EISA 2007).

d. Energy Policy Act of 2005 (EPAct 2005).

e. Presidential Memorandum -- Federal Fleet Performance, 24 May 2011

f. Presidential Memorandum -- Implementation of Energy Savings Projects and Performance-Based Contracting for energy savings, 02 December 2011

g. Presidential Memorandum -- Driving Innovation and Creating Jobs in Rural America through Biobased and Sustainable Product Procurement, 21 February 2012

h. U.S. Army Corps of Engineers Sustainability Plan (SP).

2. Purpose. This memorandum establishes policy regarding sustainability and the implementation of E.O. 13514.

3. Applicability. This policy applies to all aspects of U.S. Army Corps of Engineers activities to include contracted work; however, the sustainability outcomes supported on behalf of Federal customers will be accounted under those customers' reporting procedures.

4. Policy.

a. As a prominent Federal entity, a key participant in the use and management of many of the Nation's water resources, a critical team member in the design, construction, and management of military and civil infrastructure, and as responsible members of the Nation's citizenry, the U.S. Army Corps of Engineers (USACE) strives to protect, sustain, and improve the natural and manmade environment of our Nation and is committed to compliance with applicable environmental and energy statutes, regulations, and EOs.

b. Executive Order 13514, states that sustainability means "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." The EO emphasizes that sustainability should not

only be a natural part of all USACE decision processes, but should also be part of our organizational culture. USACE is a steward for some of the Nation's most valuable natural resources, and we must ensure our customers receive products and services that provide for sustainable solutions that address short and long-term environmental, social, and economic considerations.

c. Focus areas for Fiscal Years 2013 and 2014 are the following.

- Completing energy and water audits at all EISA Sec 432 Covered Facilities
- Implementing energy and water conservation measures identified by the audits
- Implementing the USACE Non-Tactical Vehicle Fleet Management Plan
- Issue policy on Sustainable Buildings
- Leverage alternative financing tools to the maximum extent practicable
- Influencing visitors' behavior at USACE recreational facilities to reduce energy and water consumption

d. To achieve our sustainability goals, USACE will employ a systems approach, through the development of sustainability plans, execution of those plans, performance reviews at all levels of Command, and course adjustments as directed by the USACE Strategic Sustainability Committee. The key to success will be the assignment and acceptance of personal responsibility for achieving a sustainable future by all members of the organization.

5. I am confident that we can both meet these goals and set standards for others to emulate. I believe that excelling in sustainability is not only good for the Nation and our posterity, but a sound business practice that will ease some of our future operations and maintenance expenses. I have every confidence that we will be successful.

Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

CF:
LTG Thomas P. Bostick, Commanding General, US Army Corps of Engineers (USACE)
MG Michael J. Walsh, Deputy Commanding General for Civil and Emergency Operations
MG Kendall P. Cox, Deputy Commanding General for Military and International Operations
Mr. Steven L. Stockton, Director of Civil Works, USACE
Mr. Lloyd C. Caldwell, Director of Military Missions, USACE

# Executive Summary

## Vision

The mission of the U.S. Army Corps of Engineers (USACE) is to provide vital public engineering services in peace and war to strengthen the Nation's security, support the economy, and reduce risks from disasters. To achieve this mission, USACE must contribute to the national welfare and serve the public by providing quality and responsive services to the Nation, the Army, and other customers in a manner that is environmentally, economically, and socially sustainable.

USACE unveiled its seven Environmental Operating Principles (EOPs) on March 26, 2002. These principles, updated and reintroduced in August 2012, provide direction on achieving better stewardship of air, water and land resources while showing the connection between managing those resources and protecting environmental health. The EOPs make evident the direction the organization is taking to achieve greater synergy between sustainability and execution of programs. The first principle, "Foster sustainability as a way of life throughout the organization," epitomizes USACE's commitment to become more sustainable.

USACE must meet its sustainability challenges and move its sustainability scorecard from red to green. Currently USACE is not meeting several of its progress goals, having started late on all aspects of the federal sustainability requirements and programs. Having established the program, educated the leadership and execution team, integrated requirements into the Civil Works Budget, and addressed gaps and errors in prior year data, USACE is now positioned to make rapid progress in meeting its sustainability and energy goals.

Sustainability is important from a workforce satisfaction perspective. People want to work in an organization that reflects their values and sustainability is of increasing importance. Further, as budgets are shrinking, the more USACE can insulate itself against rising energy costs and costly outages, the more it can spend on the mission and other priorities.

Continued integration of sustainability into the USACE mission and organizational culture is essential to success in achieving federal sustainability goals. USACE will employ a systems-based, continual improvement approach to integrate sustainability into its mission and organizational culture, with an ultimate goal of assignment and acceptance of personal responsibility for achieving a sustainable future by all members of the organization. USACE will use -- at all levels of command -- a recurring cycle of planning, execution, measurement, performance review, and annual course-correction/redirection, that will advance the integration of sustainability more deeply into the mission and the organizational culture with every passing year.

Given its importance, sustainability plays a prominent role in the USACE Campaign Plan (UCP). UCP Objective 1c, "Support the Nation and the Army in achieving our energy security and sustainability goals," is organized into three lines of operation:

- Action 1: Achieve federal sustainability and energy goals and targets within USACE's internal operations and infrastructure.
- Action 2: Support the Nation and the Army in achieving our energy security and sustainability goals.
- Action 3: Deliver solutions for contingency bases and operations.

This USACE 2013 Sustainability Plan (SP) is focused on Action 1 and describes USACE's past sustainability performance and the priority strategies the Command will employ through fiscal year (FY) 2014 to maintain or improve performance. This plan meets the Executive Order (EO) 13514, Federal Leadership in Environmental, Energy, and Economic Performance, Section 8 requirement to annually update an integrated Strategic Sustainability Performance Plan. The format of the SP is prescribed by the White House Council on Environmental Quality (CEQ).

# Leadership

The Assistant Secretary of the Army for Civil Works (ASA(CW)) is the Senior Sustainability Officer and the Senior Point of Contact for Climate Change Adaptation for USACE. The ASA(CW) works with the Deputy Commanding General, USACE, Civil Works leadership and the Environmental Community of Practice to lead the Strategic Sustainability Committee (SSC) in driving improved sustainability performance. Quarterly SSC meetings provide collective review and strategic direction/redirection for the Sustainability Program. Sustainability performance is tracked through the UCP and the Army Campaign Plan using the Army Strategic Management System and existing management review processes.

# Performance Review

## Goal 1-1: Greenhouse Gas (GHG) Reduction, Scope 1 & 2

### *Integration*

USACE has integrated its Scope 1 & 2 GHG goal (23.1% reduction by FY2020 relative to the FY2008 baseline) into its overarching, internal strategic plan, which is known as the USACE Campaign Plan (UCP). Also integrated into the UCP are other federal goals that directly support the overarching Scope 1 & 2 GHG goal: Energy Intensity, Water Intensity, and Non-tactical Vehicle (NTV) Petroleum Reduction. (Each of these federal goals is discussed in its own subparagraph within Section 3 of the Executive Summary.) In addition to the federal goals, USACE has also established an internal goal to reduce petroleum consumption in its vessel fleets – a fleet of roughly 2,800 vessels including dredges, tugs, barges, and a variety of smaller boats. Sustainability and energy efficiency investments are also integrated into the annual Civil Works Operation and Maintenance (O&M) budget when they are life cycle cost effective and can be funded within the funding limits established by USACE leadership and the Assistant Secretary of the Army for Civil Works.

### *Evaluation Measures*

USACE tracks Scope 1 & 2 GHG reduction directly on an annual basis using the federal scorecard. It also tracks federal goals for facility energy (60% of USACE annual Scope 1 & 2 GHG emissions) and NTV petroleum (15% of USACE annual Scope 1 & 2 GHG emissions), and the internal USACE goal for vessel petroleum reduction (25% of USACE annual Scope 1 & 2 GHG emissions).

### *Successes*

USACE's most significant success story for FY12 was improving from negative 3.6% progress on Scope 1 & 2 GHG emissions in FY11 to positive 5.8% in FY12 – a total improvement of 9.4% in a single year. This earned USACE an AMBER scorecard rating for the Scope 1 & 2 GHG goal for FY12. Reductions in GHG emissions from facility energy and NTV petroleum led the way to this achievement, but USACE progress was also significantly impacted by a Corps-wide data clean-up and re-baselining effort conducted between June and December 2012. After completing the data clean-up, USACE reported the resulting changes to the appropriate Administration and Federal Energy Management Program (FEMP)

representatives, and then worked collaboratively with them to adjust the USACE Scope 1 & 2 GHG baseline.

### *Challenges*

The most significant systemic issue impairing USACE progress on the Scope 1 & 2 GHG goal is the inability to invest appropriated funds in facilities that operate on revolving fund accounts. This issue arises from statutory limitations, and it is not likely to be eliminated. However, this issue does not stop USACE progress on Scope 1 & 2 GHG emissions reduction. Rather, it merely slows progress because the revolving fund facilities are self-supporting, and they need to carefully control their overhead costs – including facility energy efficiency investments -- to avoid increasing the fees they charge to their customers.

### *Lessons Learned*

The Corps' primary lesson-learned to date is the fundamental importance of maintaining complete and accurate energy and petroleum consumption data. Since facility energy and petroleum consumption collectively account for virtually 100% of USACE Scope 1 & 2 GHG emissions, it is imperative that energy and petroleum consumption data be reported accurately and reviewed for data quality and completeness issues. USACE must continually exercise rigorous data quality assurance and quality control procedures at all levels of command.

### *Planned Actions*

In FY13-14, USACE will focus primarily on reducing facility energy and non-tactical vehicle (NTV) petroleum consumption to reduce its Scope 1 & 2 GHG emissions. Specific actions include completing energy and water audits at the largest energy-consuming facilities, investing in the energy conservation measures identified in the audits, and reducing NTV fleet size while increasing alternative fuel consumption and the overall fuel efficiency of the NTV fleet. USACE will also initiate a Corps-wide effort to improve utility metering – and to meet federal advanced metering requirements -- at it largest energy consuming facilities as a means to inform improvements in operational controls and procedures to reduce facility energy consumption.

## Goal 1-2: Greenhouse Gas (GHG) Reduction, Scope 3

### *Integration*

The USACE Scope 3 GHG goal (5% reduction by FY2020 relative to the FY2008 baseline) is integrated into USACE mission activities through centrally-directed policies and procedures to reduce business travel and increase workplace flexibility through telework and alternative work schedules. These initiatives impact USACE's largest sources of GHG Scope 3 emissions, business air and ground travel and employee commuting.

### *Evaluation Measures*

USACE tracks Scope 3 GHG reduction on an annual basis using the federal scorecard. Since employee commuting practices are difficult to measure directly, USACE conducts an employee commuting survey every 2-3 years to update data on employee commuting practices and evaluate policy options. USACE uses data from the Defense Travel Management Office (DTMO) to estimate Scope 3 emissions from business (air and ground) travel.

### *Successes*

In FY12 USACE achieved its FY2020 target of a 5% reduction in Scope 3 GHG emissions. The USACE Scope 3 GHG emissions reduction at the end of FY12 was 5.7% relative to the FY08 baseline. As was the case with Scope 1 & 2 GHG emissions, USACE performance on the Scope 3 GHG emissions goal was the result

of a combination of Scope 3 GHG emissions reduction and a correction of the Scope 3 GHG baseline. USACE achieved a reduction in Scope 3 GHG emissions of nearly 13,000 $MTCO_2e$ between FY11 and FY12, the majority of which resulted from reductions in business air and ground travel. The Scope 3 GHG baseline correction was required to account for changes in DTMO travel data that occurred between FY08 and FY10.

### *Challenges*

Having achieved its FY2020 goal in FY12, the primary challenge for USACE will be to maintain its performance – particularly with regard to reductions in business travel -- and to identify and implement new initiatives to further reduce Scope 3 emissions.

### *Lessons Learned*

The Corps' primary lesson-learned to date with regard to the Scope 3 GHG emissions goal is the fundamental importance of maintaining complete and accurate travel data, and accounting for the data consistently year after year.

### *Planned Actions*

In FY13-14, USACE will focus primarily on updating its commuter survey and determine whether additional policy or guidance may be required to increase employee participation in authorized telework or alternative work schedule programs. USACE is also kicking-off in FY13-14 a new Recreation Program Sustainability and Energy initiative targeting visitor energy conservation in USACE campgrounds and day-use areas.

## Goal 2: Sustainable Buildings

### *Integration*

USACE views Sustainable Buildings as an inherently integrated goal, as it brings together under a single goal the facility energy intensity (30% reduction from the FY03 baseline by FY2015) and the water intensity (26% reduction from the FY07 baseline by FY2020) goals, as well as the Guiding Principles for High Performance and Sustainable Buildings. USACE has integrated the facility energy intensity and potable water intensity goals into the UCP to get USACE started on the path toward the Sustainable Buildings goal. Efforts to meet the energy and water intensity goals will support GHG reduction, as well as the associated energy and water efficiency requirements of the Guiding Principles. As discussed under Goal 1, sustainability and energy efficiency investments are also presented in the annual Civil Works Operation and Maintenance (O&M) budget when they are life cycle cost effective and can be funded within the funding limits established by USACE leadership and the Assistant Secretary of the Army for Civil Works.

### *Evaluation measures*

USACE tracks on an annual basis its progress toward the facility energy intensity and potable water intensity goals as "lagging" indicators of its progress on the Sustainable Buildings goal. USACE is also tracking internally, on a quarterly basis, a set of "leading" metrics focused on execution of audits and implementation of energy and water conservation measures at USACE's largest energy consuming facilities. The leading metrics are tracked at the HQ and Major Subordinate Command levels, and they are designed to drive the kinds of actions facilities need to be taking to improve performance on the Sustainable Buildings goal.

### *Successes*

Through the end of FY12, USACE achieved 11.5% progress (RED) on its energy intensity goal, and 12.3% (GREEN) on its potable water intensity goal. In spite of the RED rating for energy intensity, USACE made

considerable progress between FY11-12 in both energy and water intensity. USACE attributes its progress on these goals to a combination of leadership emphasis on energy and water conservation and employees' behavioral (as opposed to infrastructure) changes, together with the results of the FY12 data clean-up and the subsequent energy and water intensity baseline corrections. USACE also believes that the relatively warm winter weather in FY12 had a significant (positive) influence on its energy intensity performance.

### *Challenges*

Through FY12, a lack of funding for energy and water audits at many of the Corps' largest energy consuming facilities delayed the audits into FY13. Accordingly, a lack of audit results has impeded USACE progress in identifying and budgeting strategically for life-cycle cost effective energy and water conservation measures. Another systemic issue impairing progress on the Sustainable Building goal is the inability to invest appropriated funds in facilities that operate on revolving fund accounts. As mentioned under Goal 1, this issue arises from statutory limitations, and it is not likely to be eliminated. However, this issue does not prevent USACE investments in facility energy and water conservation. Rather, it merely slows progress because the revolving fund facilities are self-supporting, and they need to carefully control their overhead costs – including facility energy and water efficiency investments -- to avoid increasing the fees they charge to their customers. Finally, application of federally-authorized alternative financing tools (such as Energy Savings Performance Contracts (ESPCs)) has been, and remains, a challenge – in part because of limited experience with use of alternative financing tools at USACE-owned facilities, and because of the small size and geographic dispersion of the vast majority of USACE facilities.

### *Lessons Learned*

The primary USACE lesson-learned for Sustainable Buildings is that energy manager training and rigorous facility-level audits are essential prerequisites to maximize return on investment for sustainability and energy efficiency funds.

### *Planned Actions*

For existing facilities, USACE will focus on completing energy and water audits at the largest energy-consuming facilities and investing strategically in the energy conservation measures identified by the audits. USACE will also initiate a Corps-wide effort to improve utility metering – and to meet federal advanced metering requirements -- at its largest energy consuming facilities as a means to inform improvements in operational controls and procedures to reduce facility energy and water consumption. For new construction and renovation work, USACE will focus on issuing policy and guidance for implementing (within USACE-owned facilities) the updated DoD Unified Facilities Criteria (UFC) for High Performance Sustainable Buildings. Implementation of the UFC at USACE facilities will advance performance on the Sustainable Buildings Goal, Guiding Principles implementation, and energy and water conservation.

## Goal 3: Non-Tactical Vehicle (NTV) Fleet Management

### *Integration*

The USACE Optimal Fleet Management Plan, as required by Presidential Memorandum (Federal Fleet Performance, 24 May 2011), integrates the fleet management requirements of EO 13514, EO 13423, Energy Independence and Security Act, the Energy Policy Act, and the Presidential Memorandum into one document. It describes the strategies that USACE will implement to right-size the fleet and reduce petroleum consumption, two metrics tracked as part of the UCP. The Optimal Fleet Management Plan also supports Goal 1, GHG reduction.

### *Evaluation Measures*

USACE has multiple fleet metrics, such as fleet size and petroleum consumption. While petroleum consumption is tracked quarterly, the information is reported externally on an annual basis. Fleet size is also being tracked on a quarterly basis as a "leading" metric. This leading metric helps USACE focus on vehicle composition (correct number of alternative fuel vehicles, smaller vehicles and higher average mileage vehicles) and total number of vehicles. The leading metrics are tracked at the HQ and Major Subordinate Command (MSC) levels, and they are designed to drive the kinds of actions the USACE Fleet Manager needs to be taking to improve performance on the Sustainable Fleet goal.

### *Successes*

At the end of FY12, USACE achieved progress in the deployment of the Federal Fleet Management System (FedFMS) and was ahead of schedule in reducing fleet size. USACE also reduced its NTV fuel consumption by over 12% between FY11 and FY12.

### *Challenges*

Through FY12, there was a challenge in getting all MSCs to comply with statutory requirement to use a Fleet Management Information System. The Transportation Division and the Fleet Manager have identified fleet management deficiencies during the FY12 Annual Assurance Period. The use of FedFMS will correct these deficiencies and capture USACE-owned fleet data (fuel consumption, cost and inventory) which has previously been non-existent or not inclusive of the entire USACE-owned fleet. However, this is a struggle to implement and educate MSCs and all fleet handlers of the importance of using FedFMS regularly.

### *Lessons Learned*

There are two primary lessons learned with regard to fleet. 1) Closer scrutiny of the Vehicle Allocation Methodology (VAM) which is submitted annually by MSCs to the Transportation Division and then rolled up as one Master USACE VAM submitted to GSA and DOE. The VAM and the Optimal Fleet Management Plan is USACE's Master Plan to reduce fleet size, right size fleet composition and reduce petroleum consumption while increasing alternative fuel consumption. 2) The Transportation Division must update fleet management policies to incorporate all federal mandates.

### *Planned Actions*

The USACE Fleet Manager will work on the following actions: Decreasing the fleet inventory by greater than 10% by 2014; the Transportation Division will begin reporting non-compliance with use of FedFMS in third quarter of Fiscal Year 2013; the Transportation Division will monitor vehicle acquisitions and disposals to ensure they are in-line with District Fleet Management Plans; and the Transportation Division is currently coordinating with U.S. General Services Administration (GSA) to develop *ad hoc* comprehensive fleet reports that will be available to all MSCs, which will ensure standardized reporting within USACE for fleet management.

## Goal 4: Water Use Efficiency & Management

Because of the similarities inherent to management of energy, water and sustainable buildings requirements for federal facilities, as well as the associated FEMP guidance, the information that would be presented under Goal 4 (sub-sections 4.a. – 4.f.) is already included in the analogous sections under Goal 2, Sustainable Buildings.

## Goal 5: Pollution Prevention & Waste Management

### *Integration*

It is USACE policy to comply with all applicable statutory and legal requirements, Executive Orders, and policies pertaining to pollution prevention, waste management, and EPCRA reporting. USACE has implemented an Environmental Management System (Engineer Regulation (ER) 200-2-3), for Civil Works facilities. The guidance requires each USACE organization to conduct informal assessments of activities on a day to day basis, and periodic formal internal and external compliance assessments. In order to achieve the 2015 non-hazardous solid waste and the construction and demolition materials and debris diversion goals, USACE determined that a centrally directed program that enables quantification, tracking of waste streams, and upward reporting is necessary. USACE encountered several challenges in implementing a centrally directed program at its Civil Works facilities which are discussed below. Future strategies will focus on implementing policies and directives for solid waste management and diversion programs where the local infrastructure and services support it. USACE is in the early stages of developing and implementing a Sustainable Recreation Program which will focus on visitor related energy and water consumption and solid waste disposal practices at campgrounds and day use areas. Once policies are established, they will be integrated with sustainable buildings requirements, sustainable acquisition requirements, and greenhouse gas reduction strategies.

### *Evaluation Measures*

USACE has not yet implemented evaluation measures for Goal 5.

### *Successes*

None.

### *Challenges*

Civil Works project facilities are often located in rural areas where solid waste management services are limited to collection, transportation, and disposal. The availability of solid waste management and diversion services at Civil Works projects is another significant issue. At many Civil Works project locations, solid waste quantification (mass or volume) and recycling services are not available. Further, based on estimates of solid waste generation by USACE employees and visitors, more than 200,000 tons are generated at USACE facilities annually, more than 90% of which is generated by visitors -- both day-use visitors and campers. These varying local conditions create a challenge in the development and issuance of centralized polices and have hampered the development of a solid waste management and diversion policy.

### *Lessons Learned*

None.

### *Planned Actions*

The planned actions for this goal include issuing a solid waste management and diversion policy and developing awareness training for USACE employees. The awareness training will focus on changing the view of visitor-generated solid waste from a "disposal burden" to a "resource stream." It will also focus on ways that USACE facilities can leverage the Public Law 104-52 (Section 608) authority to retain proceeds from sales of recyclable materials.

USACE will continue to ensure that integrated pest management is included in operations management plans and to look for opportunities to improve chemical management through the Environmental Compliance Program.

## Goal 6: Sustainable Acquisition

### *Integration*

In order to achieve the 95% sustainable acquisition goal, USACE must integrate and apply sustainable acquisition principles throughout the life cycle of projects from planning through construction. USACE has integrated sustainable acquisition requirements into the UCP, USACE Acquisition Instruction, Engineering Regulation 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews, the "Model Request for Proposal" for Design-Build vertical construction projects, and the specification review process. Sustainable acquisition requirements are being integrated into awareness and technical training for both requirements generators and acquisition personnel. It will be further integrated with the federal sustainable buildings and materials and waste management policies and criteria.

### *Evaluation Measures*

Through the Federal Procurement Data System (FPDS), USACE tracks on a quarterly basis the percent of applicable contracts that contain sustainable acquisition clauses as required by the Federal Acquisition Regulation. During FY12, USACE did not achieve 95% compliance with sustainable acquisition requirements. However, USACE is making progress in putting the programmatic elements in place to drive improvement in the near future.

### *Successes*

None.

### *Challenges*

The current federal system available to track sustainable acquisition compliance, FPDS, does not have adequate capability to complete federal reporting requirements.

A manual review of contracts is required to accurately determine if an "applicable" contract (as defined by the FAR) actually requires a sustainable acquisition FAR clause. These manual reviews are labor intensive and USACE has not yet established a sampling methodology in line with current resource constraints.

Of the approximately 848 Unified Facilities Guide Specifications (UFGS), USACE manages 399 as part of the Department of Defense Tri-Service Unified Facilities Criteria Program, aimed at developing uniform facilities criteria across all DOD agencies. For those specifications, not managed by USACE, USACE can only recommend specifications updates to the Tri-Service Working Groups for consideration and final implementation.

### *Lessons Learned*

Sustainable acquisition is a complex requirement that calls for cross-functional awareness and teamwork across a variety of organizations. Consequently, much of USACE's effort to improve sustainable acquisition will be focused on changing the culture to incorporate sustainability considerations into the earliest phases of the acquisition process. USACE has also learned the challenges of reporting and capturing data with the operating systems available.

### *Planned Actions*

USACE is developing sustainable acquisition and procurement training for the acquisition community and refining training for the requirements generating communities. Several webinars are planned for FY13. This training will be mandatory for acquisition teams and purchase card holders and available to all USACE employees.

As performance tracking matures, USACE will be identifying corrective actions for specific contract types and for specific commodities and services purchased. Successful corrective actions will be integrated into appropriate policies and procedures.

USACE will revise the construction specifications that it manages to ensure inclusion of bio-based and other federally designated environmentally preferable products.

## Goal 7: Electronic Stewardship & Data Centers

### *Integration*

Electronic stewardship & data center efficiency is integrated into USACE mission activities by centrally-directed policies and procedures in concert with Army policies for acquiring, managing and disposing of information technology and other electronic products.

USACE uses the Army's Computer Hardware, Enterprise Software Solutions (CHESS) program, under PEO EIS. It is the mandatory source for commercial IT purchases and includes Energy Star and EPAEAT requirements.

The USACE Directorate of Corporate Information (CIO) policy was issued November 2010 to cover power management and duplexing requirements. This policy was updated in July 2012, in accordance with the 30 May 2012, Army ALARACT 145/2012 - HQDA EXORD 199-12, Apply and Enforce Energy Efficiency and Management Capabilities of Information Technology. USACE actions related to data centers is included in the Army Data Center Consolidation Plan (ADCCP) and the DoD Sustainability Plan and is not included in this Sustainability Plan.

Surplus or end-of-life electronics are sent to the Defense Logistics Agency (DLA) for proper disposal in accordance with GSA BULLETIN FMR B-34, Disposal of Federal Electronic Assets.

### *Evaluation Measures*

USACE tracks performance on information technology purchases, power management, and duplexing, on an annual basis as required by the OMB Sustainability and Energy Scorecard process.

### *Successes*

USACE has met the electronic stewardship requirements as reflected on the OMB Sustainability and Energy Scorecard.
An example of a particular success is USACE's Server Consolidation project to reduce the number of physical servers that operate at each USACE Installation Processing Node (IPN). Currently the project has surpassed the goal that was set for FY13 by 50 servers and has turned off a total of 1,802 physical servers. By turning these servers off, USACE has eliminated 128 server racks, saved 495.55 Kilowatts (power) and saved 2,657,950 BTUs (heat) per hour across the Enterprise.

### *Challenges*

Application Rationalization is a project that is part of the Army Data Center Consolidation Plan (ADCCP). Application Rationalization completes an inventory of server applications operating on the USACE network (CorpsNet) and does an analysis on whether to consolidate, delete or modernize an application. USACE was working with Army on a discovery effort to verify and populate the latest information on server applications that operate on CorpsNet. Due to funding constraints, this discovery effort was cancelled causing USACE to fall behind on this effort. USACE has begun to plan and implement its own discovery efforts.

### *Lessons Learned*
None.

### *Planned Actions*
USACE will procure a discovery tool such as BMC Software's Atrium Discovery and Dependency Mapping (ADDM). After the discovery tool is implemented, USACE will populate an inventory and conduct analysis to determine the best approach with regard to consolidating, deleting or modernizing applications.

## Goal 8: Renewable Energy

### *Integration*
As the nation's #1 generator of hydropower, USACE has a long-standing interest in renewable energy. Since the inception of the USACE Sustainability Program in FY2010, USACE has emphasized increased on-site generation and use of renewable energy, particularly renewable electricity, to achieve the federal goal of having 7.5% of USACE total annual electricity consumption generated by renewable energy sources. USACE has taken a multi-faceted approach involving the Federal Energy Regulatory Commission (FERC), existing and prospective FERC licensees, programming and execution of ARRA funding, and the USACE Hydropower Modernization Initiative to support this goal. Facility-level renewable energy and hydropower investments are also included in the Civil Works budget development process.

### *Evaluation Measures*
USACE tracks the Renewable Energy goal at the agency level on an annual basis using the federal scorecard. USACE also tracks renewable energy generation and consumption on an annual basis in the FEMP Sustainability-GHG report for each USACE facility reporting renewable energy purchases or on-site renewable energy generation and use.

### *Successes*
USACE has achieved the federal renewable energy goal for each year (FY08, and FY10-12) that it has reported renewable energy consumption to FEMP and the Administration. Not surprisingly, USACE success is a result of its long-term, systematic investments in modernization of USACE hydropower generation capabilities.

### *Challenges*
Having achieved its renewable energy goal for each year that USACE has been reporting as a scorecard agency, the primary challenge for USACE will be to maintain its performance.

### *Lessons Learned*
After consultation with FEMP, USACE adopted a methodology developed by Department of Interior (Bureau of Reclamation) for calculating its consumption of renewable hydropower generated on-site at USACE hydropower dams. USACE's primary lesson-learned: Interagency collaboration and sharing can result in benefits that advance both the individual agency's performance and the Nation's renewable energy goals.

### *Planned Actions*
USACE will continue the kinds of actions that have enabled it to achieve its renewable energy goals to date. Specifically, USACE will continue investing in cost effective projects to increase on-site generation and consumption of renewable electricity, with emphasis on USACE and FERC hydropower. USACE will also look into ways to leverage alternative financing tools such as ESPCs and Power Purchase Agreements to increase on-site generation and use of renewable energy.

## Goal 9: Climate Change Resilience

### *Integration*

USACE continues to mainstream climate change adaptation into its missions and operations as required by the Climate Change Adaptation Policy Statement established by Senior Adaptation POC Ms. Jo-Ellen Darcy, Assistant Secretary of the Army for Civil Works, on June 3, 2011. Mainstreaming means to integrate and incorporate climate change and variability considerations in all phases of the project lifecycle, for both new and existing projects, to help enhance the resilience of USAEC's built and natural water-resource infrastructure and reduce its potential vulnerabilities to the effects of climate change and variability.

### *Evaluation Measures*

USACE tracks adaptation through annual metrics in the USACE Campaign Plan and the Army Campaign Plan. These address external collaboration, improving knowledge about climate impacts and adaptation at the district and division level, progress against a planned three-year schedule of policy and guidance, and progress in refining vulnerability assessments.

### *Successes*

USACE has four strategies to achieve its objective to mainstream climate adaptation:

1. Focus on Priority Areas
2. External Collaboration
3. Improving USACE Knowledge
4. Developing Policy and Guidance

Progress to date to support mainstreaming climate change adaptation has focused on understanding climate change impacts and vulnerabilities so that USACE can develop new policy and guidance to support adaptation implementation. USACE is applying its strategic approaches to the priority areas identified in previous years, with a heavy emphasis on external collaboration and pilot tests to help improve knowledge.

One result of this approach is USACE's first technical guidance for adaptation, "Procedures to Evaluate Sea-Level Change Impacts, Responses, and Adaptation," completed a wide internal and external review on June 1, 2013. This adaptation implementation guidance was drafted by an extensive, interagency, international and multi-disciplinary team, incorporating team members from USACE, partner agencies, and other experts in academia and the private sector. Other successes are detailed in the 2013 Adaptation Plan.

### *Challenges*

USACE continues to work closely with science agencies, the US Global Research Program, the Federal Agency Adaptation Community of Practice, the Climate Change and Water Working Group, and others to identify future challenges and develop solutions to these challenges.

### *Lessons Learned*

USACE has a wide variety of lessons learned, which are described more fully in the Adaptation Plan. Some general lessons learned to date:

- All agencies benefit from collaboration around climate change adaptation issues.
- Stakeholders benefit when agencies with aligned missions and operations develop consistent approaches to adaptation.
- Close coupling of science and engineering agencies helps us effectively aggregate and translate science into actionable engineering information supporting adaptation policy and actions.

- Adaptation does not always require a “shovel in the ground” - impact and vulnerability assessments may reveal that some projects may be robust to future changes.

### *Planned Actions*

USACE will continue implementing its strategy to improve resilience and reduce vulnerabilities through adaptation to climate change. USACE will continue to expand the incorporation of climate uncertainty considerations into planning, design, construction, operation, and management of new or modified infrastructure. USACE expects that its priority areas will evolve as it gains understanding and experience in adapting to climate change.

# Progress on Administration Priorities

## Climate Change Adaptation Plans

USACE continues to make progress in mainstreaming adaptation to climate change as described in previous Adaptation Plans (September 2011 and June 2012). USACE progress benefits from external collaboration and an active program to improve knowledge about climate change and adaptation so USACE can develop policies and guidance to support adaptation planning and implementation.

## NTV Fleet Management Plans

USACE has made progress on the Optimal Fleet Management Plan by reducing the fleet size by 6.58% in FY12 in accordance with (IAW) the Presidential Memorandum dated May 24, 2011 and EO 13514. USACE reduced petroleum consumption by 12.30% between FY11 and FY12 but is falling short of the 14% target reduction from the FY05 baseline. USACE will continue an acquisition strategy to increase the purchase of alternative fuel vehicles while concurrently decreasing the overall size of the fleet.

## Energy Savings Performance Contracts

Under the December 2, 2011 Presidential Memorandum, Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings, USACE committed to leverage $2.5M of investment using performance-based contracting for energy and water savings.

Traditional ESPCs have proven to be a challenge for USACE for several reasons: (1) small geographically dispersed facilities; (2) uncertainty surrounding committing to a long-term contract of up to 25 yrs; (3) inability to allow a contractor to maintain critical mission infrastructure as part of a performance-based contract; (4) previous implementation of low-cost, high pay back energy conservation measures; and (5) lack of energy savings because of free hydropower provided by USACE dams.

Despite these challenges, USACE has initiated three Energy Savings Performance Contract (ESPC) Projects. Two of the projects are traditional large-scale projects and one project is piloting the Federal Energy Management Program’s (FEMP) small-scale ESPC process called ENABLE. Additionally, each Major Subordinate Command was required to develop alternative financing plans to identify future opportunities.

## Bio-Based Purchasing

USACE has made progress on many of the strategies identified in response to the President's Memorandum of 21 February 2012, Driving Innovation and Creating Jobs in Rural America through Bio-based and Sustainable Product Procurement.

In FY 2012 USACE reviewed 212 US Guide Specifications and proposed updates to incorporate bio-based and environmentally preferable product language in approximately 50 applicable specifications. Those updates are pending review and acceptance by the DOD Tri-Services Working Group.

USACE reviewed and modified its "Model Request for Proposal" for Design-Build vertical construction projects to ensure that it includes all appropriate sustainable acquisition FAR clauses.

USACE conducted one webinar for the Civil Works Operations Community to begin to develop awareness of the sustainable acquisition requirements. The webinar was recorded and is available online for those not available for the live training. Further training is being developed for the Acquisition Community.

The USACE Small Business Office is engaged in supporting sustainable acquisition initiatives and promoting introductions between large prime contractors and small businesses supplying sustainable products.

A sustainable acquisition metric has been integrated into the UCP to assist in tracking performance at the MSC and District levels within USACE.

USACE updated its Acquisition Instruction document to include sustainable acquisition requirements and guidance.

# Table of Contents

# Table 1: Agency Size & Scope

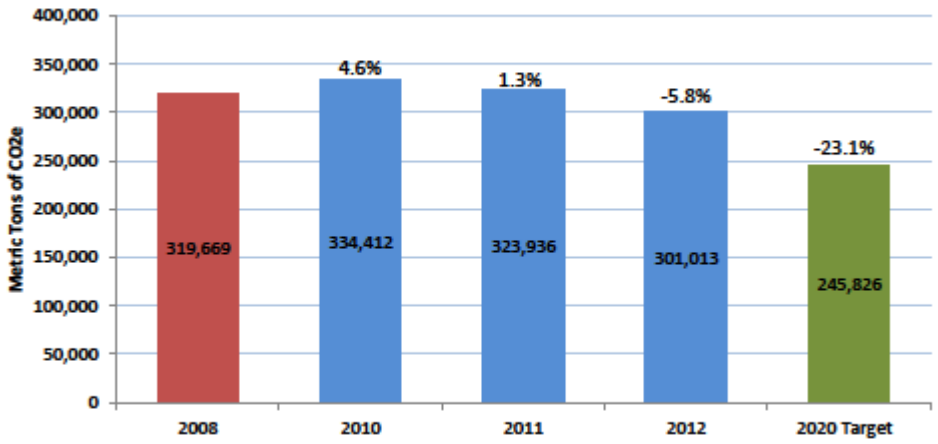
| Agency Size & Scope | FY 2011 | FY 2012 |
|---|---|---|
| Total Number of Employees as Reported in the President's Budget | 36,586 | 35,794 |
| Total Acres of Land Managed | 7,679,362 | 7,686,160 |
| Total Number of Buildings Owned | 872 | 840 |
| Total Number of Buildings Leased (GSA and Non-GSA Lease) | 142 | 126 |
| Total Buildings Gross Square Feet (GSF) | 17,658,000 | 15,588,563 |
| Operates in Number of Locations Throughout U.S. | 687 | 695 |
| Operates in Number of Locations Outside of U.S. | | |
| Total Number of Fleet Vehicles Owned | 789 | 686 |
| Total Number of Fleet Vehicles Leased | 7,845 | 7,380 |
| Total Number of Exempted-Fleet Vehicles (Tactical, Law Enforcement, Emergency, Etc.) | 0 | 0 |
| Total Amount Contracts Awarded as Reported in FPDS ($Millions) | 24,149 | 21,359 |

# Goal 1: Greenhouse Gas (GHG) Reduction

## Agency Progress toward Scope 1 & 2 GHG Goals

E.O. 13514 requires each agency establish a Scope 1 & 2 GHG emission reduction target to be achieved by FY 2020. The red bar represents the agency's FY 2008 baseline. The green bar represents the FY 2020 target reduction. The blue bars represent annual agency progress towards achieving this target. The percentage at the top of each bar represents the reduction or increase from the FY 2008 baseline. A negative percentage value indicates that the emissions have decreased compared to the 2008 baseline.

**Figure 1-1**




## Table 1-1: Goal 1 Strategies - Scope 1 & 2 GHG Reductions

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Use the FEMP GHG emission report to identify/target high emission categories and implement specific | Yes | Based on the USACE FY12 FEMP GHG emission report, the primary sources of Scope 1&2 GHG emissions in USACE are | Specific metric for FY13: Achieve 12.8% reduction in Scope 1&2 GHG emissions relative to the FY08 baseline. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| actions to resolve high emission areas identified. | | facilities (56%), vessels (29%) and non-tactical vehicles (15%). In FY13-14, USACE will continue to focus on energy and fuel efficiency in facilities, vessels and vehicles as a means to reduce Scope 1&2 GHG emissions. The key to success on this strategy is establishing Major Subordinate Command-level (MSC-level) accountability for goal performance in proportion with each MSC's contribution to USACE total Scope 1&2 GHG emissions. | |
| Ensure that all major renovations and new building designs are 30% more efficient than applicable code. | Yes | USACE will require new construction and major renovation projects to conform to applicable requirements in the newly updated (March 2013) DoD Unified Facilities Criteria for High Performance and Sustainable Buildings (UFC 1-200-02) as well as ASHRAE Standard 189.1, Standard for the Design of High-Performance Green Buildings. | Specific milestone for FY13-14: Issue policy requiring USACE new construction and major renovation projects to conform to applicable requirements of UFC 1-200-02 and ASHRAE Standard 189.1. |
| Implement in EISA 432 covered facilities all | Yes | USACE will continue executing EISA 432 audits | Specific metrics for FY13-14: Covered |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| lifecycle cost effective ECMs identified. | | at its covered facilities, documenting the audit results in the federally-mandated tracking system (EISA 432 Compliance Tracking System, (CTS)) and implementing all lifecycle cost effective energy and water conservation measures (ECMs). USACE emphasis in FY13-14 emphasis will be on completing audits of all Covered Facilities. ECM implementation will be phased-in to accommodate the timing and duration of the USACE budget cycle. | Facility audits: Complete 100% of USACE Covered Facility audits by the end of FY2014. Specific metric for ECMs in FY13-14: Implement 20% of audit-identified low and moderate cost ECMs at USACE covered facilities by the end of FY2014. |
| Reduce on-site fossil-fuel consumption by installing more efficient boilers, generators, furnaces, etc. and/or use renewable fuels. | Yes | USACE will continue executing EISA 432 audits at its covered facilities, documenting the audit results in the federally-mandated tracking system (EISA 432 Compliance Tracking System, (CTS)) and implementing all lifecycle cost effective energy and water conservation measures (ECMs). ECM implementation will be phased-in to accommodate the timing and duration of the USACE | Specific metric for FY13-14: Implement 20% of audit-identified low and moderate cost ECMs at USACE covered facilities by the end of FY2014. |

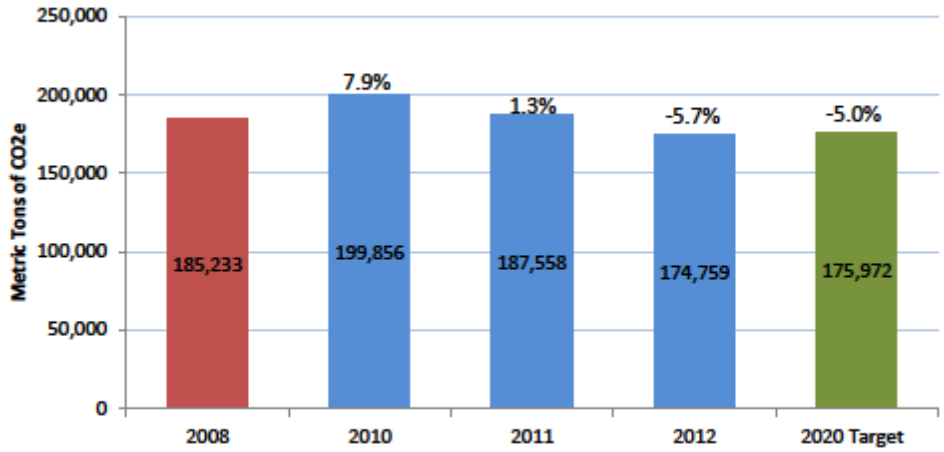
| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | budget cycle. | |
| Reduce grid-supplied electricity consumption by improving/upgrading motors, boilers, HVAC, chillers, compressors, lighting, etc. | Yes | USACE will continue executing EISA 432 audits at its covered facilities, documenting the audit results in the federally-mandated tracking system (EISA 432 Compliance Tracking System, (CTS)) and implementing all lifecycle cost effective energy and water conservation measures (ECMs). ECM implementation will be phased-in to accommodate the timing and duration of the USACE budget cycle. | Specific metric for FY13-14: Implement 20% of audit-identified low and moderate cost ECMs at USACE covered facilities by the end of FY2014. |
| Employ operations and management best practices for energy consuming and emission generating equipment. | No | USACE will continue efforts to identify, document and share best practices through organizational communication (e.g., Communities of Practice) as well as existing USACE web-based information and knowledge management capabilities. | |
| Install building utility meters and benchmark performance to track energy and continuously optimize performance. | No | In FY13-14, USACE will continue implementing advanced metering at its covered facilities as an initial strategy targeting | |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | compliance with EPAct Section 103 advanced metering requirements. | |

# Agency Progress towards Scope 3 GHG Goal

E.O. 13514 requires each agency establish a Scope 3 GHG emission reduction target to be achieved by FY 2020. The red bar represents the agency's FY 2008 baseline. The green bar represents the FY 2020 reduction target. The blue bars represent annual agency progress on achieving this target. The percentage at the top of each bar represents the reduction or increase from the FY 2008 baseline. A negative percentage value indicates that the emissions have been decreased compared to the FY 2008 baseline.

**Figure 1-2**



# Table 1-2: Goal 1 Strategies - Scope 3 GHG Reductions

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Reduce employee business ground travel. | Yes | Based on the USACE FY12 FEMP GHG emission report, 90% of USACE Scope 3 GHG emissions are generated by two sources: employee commuting (69%) and business travel (21%). USACE will implement the travel-related requirements of Executive Order 13589, "Promoting Efficient Spending," (November 9, 2011), and the OMB memo, "Promote Efficient Spending to Support Agency Operations," (11 May 2012), to support reductions of USACE' second largest Scope 3 GHG emissions source – business travel. | Specific metric for FY13-14: Spend at least 30% less on travel expenses covered by the OMB memo than in FY 2010. |
| Reduce employee business ground travel. | NA | | |
| Reduce employee business air travel. | Yes | USACE will implement the travel-related requirements of Executive Order 13589, "Promoting Efficient Spending," (November 9, 2011), and the OMB memo, "Promote Efficient Spending to Support Agency Operations," (11 May 2012), to support reductions of USACE' second largest Scope 3 GHG | Specific metric for FY13-14: Spend at least 30% less on travel expenses covered by the OMB memo than in FY 2010. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | emissions source – business travel. | |
| Develop and deploy employee commuter reduction plan. | No | While this is not a priority strategy, USACE will continue to provide encouragement, incentives to the extent feasible, and support for commuters to use alternative modes of transportation (such as cycling, ridesharing, public transit and telework), alternative work hours, and other carbon-efficient transportation options. | |
| Use employee commuting survey to identify opportunities and strategies for reducing commuter emissions. | Yes | USACE will execute a commuter survey every 2-3 years to identify opportunities and to establish or update strategies for reducing commuter emissions and to improve accounting for USACE Scope 3 GHG emissions. | Specific target for calendar year 13: Complete commuter survey and analysis by 30 December 2013. |
| Increase number of employees eligible for telework and/or the total number of days teleworked. | Yes | USACE issued a Telework Policy on 16 August 2011 and will continue to encourage increasing the number of employees eligible for and approved for participation in the Telework Program to achieve reductions in Scope 3 GHG emission. | Specific target for FY13: Establish by 30 Sep 2013 baselines (as appropriate) for various indicators of employee commuting practices, such as number of annual employee telework days, percent of employees telecommuting on an average day, and number of annual days-off due to compressed work schedules. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Develop and implement bicycle commuter program. | No | While USACE does not plan to develop a program, it is evident that bicycle commuter travel occurs. An employee commuter survey conducted in Dec 2010 indicates 1.5 million miles of commuter travel by bicycling and/or walking. Each subordinate command has the ability to promote and support some aspects of such a program if feasible. Some USACE office locations may be more suited for bicycle commute than others. Consequently a local determination of the practicality and feasibility of such a program is required. | |
| Provide bicycle commuting infrastructure. | No | Due to fiscal constraints, putting in place the infrastructure, i.e. visible, secure and accessible parking, shower and changing facilities, to support a program is not feasible at this time. | |
| Develop and deploy initiatives to reduce Scope 3 GHG emissions associated with visitor energy consumption at USACE recreation facilities. | Yes | USACE data from FY08-FY12 show that roughly 40% of the USACE total annual electric bill (FY08-FY12) is attributed to visitor-controlled consumption – primarily in USACE campgrounds. Accordingly, USACE is | Specific Target for FY13: design, produce and deploy at 50% of USACE-owned and operated campsites a visible (graphics and text) and semi-permanent reminder of ways that visitors can conserve energy and water in USACE campgrounds. |

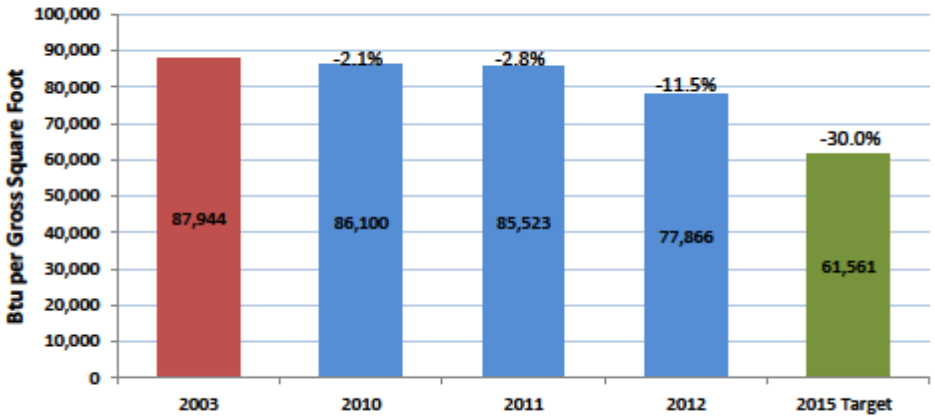
| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | initiating a Sustainable Recreation Initiative to influence visitor behavior as a means to conserve energy and water at USACE campgrounds and other recreation areas. | |

# Goal 2: Sustainable Buildings

## Agency Progress toward Facility Energy Intensity Reduction Goal

E.O. 13514 Section 2 requires that agencies consider building energy intensity reductions. Further, the Energy Independence and Security Act of 2007 (EISA) requires each agency to reduce energy intensity 30 percent by FY 2015 as compared to the FY 2003 baseline. Agencies are expected to reduce energy intensity by 3 percent annually to meet the goal. The red bar represents the agency's FY 2003 baseline. The green bar represents the FY 2015 target reduction. The blue bars show annual agency progress on achieving this target. The percentage at the top of each bar represents the reduction or increase from the FY 2003 baseline. A negative percentage value indicates that the energy intensity has been decreased compared to the FY 2003 baseline.

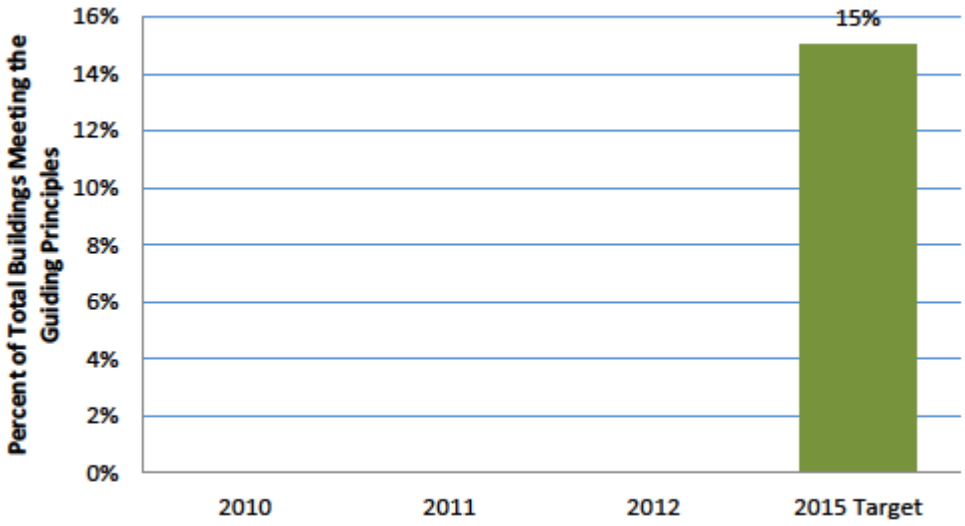
**Figure 2-1**




## Agency Progress toward Total Buildings Meeting the Guiding Principles

E.O. 13514 requires that by FY 2015, 15 percent of agencies' new, existing, and leased buildings greater than 5,000 square feet meet the Guiding Principles. In order to meet the FY 2015 goal, agencies should have increased the percentage of conforming buildings by approximately 2 percent annually from their FY 2007 baseline. The green bar represents the FY 2015 target. The blue bars represent annual agency progress on achieving this target.

**Figure 2-2**




# Table 2: Goal 2 Strategies – Sustainable Buildings

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Incorporate green building specifications into all new construction and major renovation projects. | Yes | USACE will require new construction and major renovation projects to conform to applicable requirements in the newly updated (March 2013) DoD Unified Facilities Criteria for High Performance and Sustainable Buildings (UFC 1-200-02) as well as ASHRAE Standard 189.1, Standard for the Design of High-Performance Green Buildings. | Specific milestone for FY13-14: Issue policy requiring USACE new construction and major renovation projects to conform to applicable requirements of UFC 1-200-02 and ASHRAE Standard 189.1. |
| Redesign or lease interior space to | Yes | Reduce administrative space across USACE by: | Identify MSCs and Districts that are currently Red on |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| reduce energy use by daylighting, space optimization, sensors/control system installation, etc. | | consolidating areas to meet reduction standards; co-locating with other federal agencies to reduce the footprint; initiating work space studies with GSA; and employing more teleworking and alternative work schedules to assist in reconfiguring the current space. | the Administrative Space Utilization Report (ASUR), as defined by exceeding the USACE administrative space requirement of 178 square foot per person, and target them for Amber (greater than 162 SF/PN, but less than 178 SF/PN). Begin a dialog with GSA to ascertain how to implement consolidation, co-location, and reconfiguration options for USACE space requirements. |
| Deploy CEQ's Implementing Instructions - Sustainable Locations for Federal Facilities. | Yes | USACE will implement applicable sustainable location and site development requirements of the newly released (March 2013) DoD Unified Facilities Criteria for High Performance and Sustainable Buildings (UFC 1-200-02) and ASHRAE Standard 189.1. USACE will implement CEQ Sustainable Locations for Federal Facilities to the extent that CEQ implementing instructions are consistent with analogous requirements of the UFC and ASHRAE 189.1. | Specific milestone for FY13-14: Issue policy requiring USACE facilities to conform to applicable sustainable sites/locations requirements of UFC 1-200-02 and ASHRAE Standard 189.1 |
| Include in every construction contract | Yes | USACE will implement applicable sustainable | Specific milestone for FY13-14: Issue policy |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| all applicable sustainable acquisition requirements for recycled, biobased, energy efficient, and environmentally preferable products. | | acquisition requirements of the DoD Unified Facilities Criteria (UFC) for High Performance and Sustainable Buildings (UFC 1-200-02) and ASHRAE Standard 189.1. These requirements focus on reducing the environmental impacts of materials through procurement preferences (when products are available, life-cycle cost effective, and they meet performance requirements) for recycled, biobased, energy efficient, and environmentally preferable products. | requiring USACE facilities to conform to applicable requirements of UFC 1-200-02 and ASHRAE Standard 189.1 |
| Develop and deploy energy and sustainability training for all facility and energy managers. | Yes | USACE will continue the Sustainability education and training initiative that it established over the past few years. The Sustainability education and training initiative is comprised primarily of live and recorded webinars provided on a monthly or quarterly basis by the Environmental Community of Practice and the Engineering and Construction Division. The webinars are open to all USACE personnel. In FY13, | Specific Target for FY13-14: 100% of USACE covered facilities have a trained energy manager designated in EISA 432 CTS. |

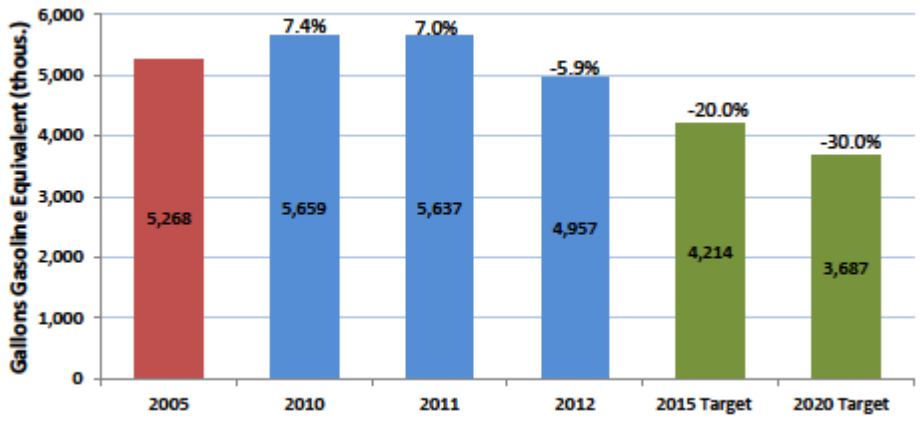
| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | USACE will continue training energy managers for USACE covered facilities using recognized and approved commercial training providers. | |

# Goal 3: Non-Tactical Vehicle (NTV) Fleet Management

## Agency Progress toward NTV Fleet Petroleum Use Reduction Goal

E.O. 13514 and the Energy Independence and Security Act of 2007 (EISA) require that by FY 2015 agencies reduce fleet petroleum use by 20 percent compared to a FY 2005 baseline. Agencies are expected to achieve at least a 2 percent annual reduction and a 30 percent reduction is required by FY 2020. The red bar represents the agency's FY 2005 baseline. The green bars represent the FY 2015 and FY 2020 target reductions. The blue bars represent annual agency progress on achieving these targets. The percentage at the top of each bar represents the reduction or increase from the FY 2005 baseline. A negative percentage indicates a decrease in fleet petroleum use.

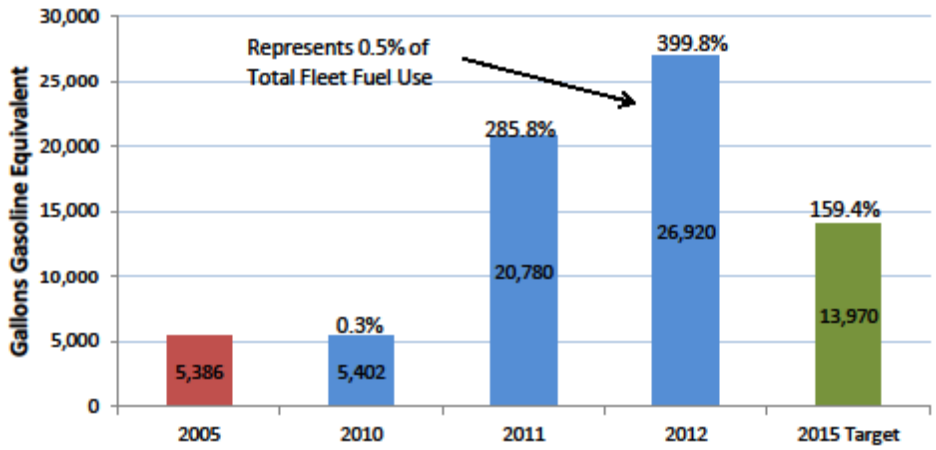
**Figure 3-1**




## Agency Progress toward NTV Fleet Alternative Fuel Consumption Goal

E.O. 13423 requires that agencies increase total alternative fuel consumption by 10 percent annually from the prior year starting in FY 2005. By FY 2015, agencies must increase alternative fuel use by 159.4 percent, relative to FY 2005. The red bar represents the agency's FY 2005 baseline. The green bar represents the FY 2015 target. The blue bars represent annual agency progress on achieving this target. The percentage at the top of each bar represents the reduction or increase from the FY 2005 baseline. A negative percentage indicates a decrease in fleet alternative fuel use.

**Figure 3-2**




# Table 3: Goal 3 Strategies – NTV Fleet Management

| **(A) Will the agency implement the following strategies to achieve this goal?** | **(B) Top 5? Yes/No/NA** | **(C) Strategy Narrative** | **(D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months** |
|---|---|---|---|
| Optimize/Rightsize the composition of the fleet (e.g., reduce vehicle size, eliminate underutilized vehicles, acquire and locate vehicles to match local fuel infrastructure). | Yes | Strategy requires reducing/optimizing fleet size during the annual acquisition cycle. | Reduce fleet by a total of 10% by FY2015 in accordance with USACE Optimal Fleet Management Plan, which breaks down to an annual 2.5 % fleet reduction. Under-utilization is reported on monthly analysis and quarterly Management Reviews. |
| Reduce miles traveled (e.g., share vehicles, improve routing with telematics, eliminate trips, improve scheduling, use | No | Use of shuttle services/public transportation is not applicable to approximately 80% of USACE locations. Using centralized travel | Travel and vehicle utilization are reported on monthly analysis and quarterly Management Reviews. Vehicles must travel 2500 miles per |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| shuttles, etc.). | | management, trips are being eliminated using WEBINARS and/or online meeting services and government vehicles are shared when employees are traveling to the same location. | quarter or 85% of 2500 miles to achieve an acceptable rating and if not, documentation for retention must be approved by the District Commanders and retained on file. |
| Acquire only highly fuel-efficient, low greenhouse gas-emitting vehicles and alternative fuel vehicles (AFVs). | Yes | Strategy requires acquiring Low Greenhouse Gas Emitting Vehicles (LGHG) and Alternative Fuel (AF) vehicles during the annual acquisition cycle. Partner with U.S. General Services Administration (GSA) and Department of Army (DA) to accomplish this objective. Use acquisition strategy developed by Department of Energy (DOE) where there are no negative impacts on USACE mission. | Monthly analysis and quarterly Directorate Management Reviews. Increase Alternative Fuel Vehicle (AFV) inventory -- 30% by Dec 2015. |
| Increase utilization of alternative fuel in dual-fuel vehicles. | Yes | Continue to educate employees on use of Alternative Fuel (AF) when available and train personnel at all levels on how to meet federal mandates and the sustainability goals. Assist with future locations of an AF infrastructure. | Monthly analysis and quarterly Directorate Management Reviews. Target is to increase alternative fuel by 10% annually. |
| Use a Fleet Management Information System to | Yes | Implement the Federal Fleet Management System (FedFMS) to track (fuel, | Monthly and quarterly status reports. Target date is 1 Oct 2013 for |

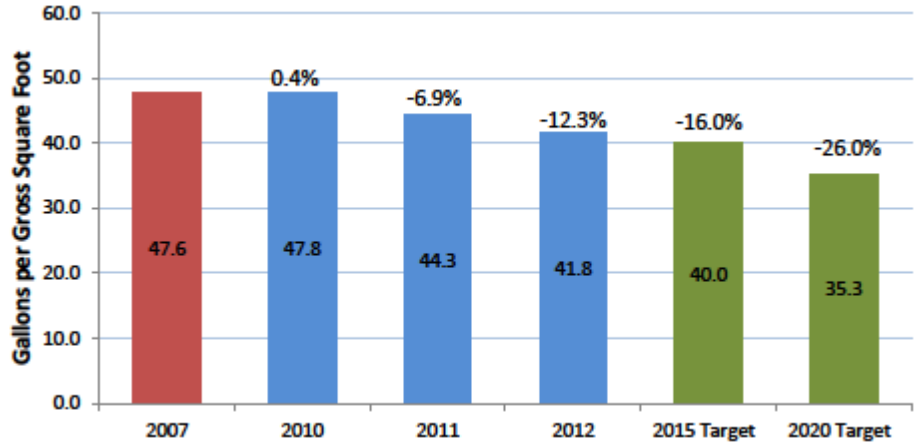
| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| track fuel consumption throughout the year for agency-owned, GSA-leased, and commercially-leased vehicles. | | utilization, and costs) for the USACE-owned fleet. | full implementation. |
| Increase GSA leased vehicles and decrease agency-owned fleet vehicles, when cost effective. | Yes | Ensure total life cycle cost analysis is performed on purchasing vice leasing from U.S. General Services Administration (GSA). Working with GSA/Department of Army (DA) to accomplish this effort. | Track agency owned vehicles using Federal Fleet Management System (FedFMS) and applying fleet inventory reductions to agency owned/GSA leased vehicles |

# Goal 4: Water Use Efficiency & Management

## Agency Progress toward Potable Water Intensity Reduction Goal

E.O. 13514 requires agencies to reduce potable water intensity by 2 percent annually through FY 2020 compared to an FY 2007 baseline. A 16 percent reduction is required by FY 2015 and a 26 percent reduction is required by FY 2020. The red bar represents the agency's FY 2007 baseline. The green bars represent the FY 2015 and FY 2020 target reductions. The blue bars represent annual agency progress on achieving these targets. The percentage at the top of each bar represents the reduction or increase from the FY 2007 baseline. A negative percentage value indicates that portable water use intensity has decreased compared to the FY 2007 baseline.

### Figure 4-1




## Table 4: Goal 4 Strategies – Water Use Efficiency & Management

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Purchase and install water efficient | Yes | USACE will continue executing EISA 432 audits at its covered facilities, documenting the audit results in the | Specific metric for FY13-14: Implement 20% of audit- |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| technologies (e.g., Waterwise, low-flow water fixtures and aeration devices). | | federally-mandated tracking system (EISA 432 Compliance Tracking System, (CTS)) and implementing all lifecycle cost effective energy and water conservation measures (ECMs). ECM implementation will be phased-in to accommodate the timing and duration of the USACE budget cycle. Also, as mentioned in Goal 1 (Table 1-2), USACE is initiating a Sustainable Recreation Initiative to influence visitor behavior, particularly in campgrounds, as a means to conserve water. | identified low and moderate cost ECMs at USACE covered facilities by the end of FY2014. |
| Develop and deploy operational controls for leak detection including a distribution system audit, leak detection, and repair programs. | Yes | USACE will continue to use its energy and water consumption tracking/reporting capability (CRAFT/Tableau) to enable facilities and Districts to identify potential potable water leaks using water consumption data that is recorded on a quarterly basis. | Specific metric for FY13-14: Achieve a 12% reduction in potable water intensity relative to the FY07 baseline by the end of FY2013; achieve a 14% reduction in potable water intensity relative to the FY07 baseline by the end of FY2014. |
| Design, install, and maintain landscape to reduce water use. | Yes | USACE will implement applicable sustainable location and outdoor/landscape water conservation site development requirements of the newly released (March 2013) DoD Unified Facilities Criteria for High Performance and Sustainable Buildings (UFC 1-200-02) and ASHRAE Standard 189.1. USACE will implement CEQs Sustainable Locations for Federal | Specific milestone for FY13-14: Issue policy requiring USACE facilities to conform to applicable requirements of UFC 1-200-02 and ASHRAE Standard 189.1. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | Facilities to the extent that CEQs implementing instructions are consistent with analogous requirements of UFC 1-200-02 and ASHRAE Standard 189.1. | |
| Design and deploy water closed-loop, capture, recharge, and/or reclamation systems. | Yes | USACE will implement applicable outdoor water protection and conservation requirements of the newly released (March 2013) DoD Unified Facilities Criteria (UFC) for High Performance and Sustainable Buildings (UFC 1-200-02) and ASHRAE Standard 189.1. | Specific milestone for FY13-14: Issue policy requiring USACE facilities to conform to applicable requirements of UFC 1-200-02 and ASHRAE Standard 189.1. |
| Install meters to measure and monitor industrial, landscaping, and agricultural water use. | Yes | USACE water consumption data gathered over the period FY08-FY12, shows that potable water accounts for about 98% of USACE total metered water consumption. Therefore, USACE' primary opportunity for water conservation is potable water. Accordingly, USACE modified this strategy to focus on potable water as opposed to industrial/landscaping/agricultural water. This strategy would result in increased accuracy and completeness of potable water consumption data, but it would not necessarily contribute directly to water conservation. | Specific metric for FY13-14: Achieve a 12% reduction in potable water intensity relative to the FY07 baseline by the end of FY2013; achieve a 14% reduction in potable water intensity relative to the FY07 baseline by the end of FY2014. |

# Goal 5: Pollution Prevention & Waste Management

## Agency Progress toward Pollution Prevention & Waste Reduction

E.O. 13514 requires that federal agencies promote pollution prevention and eliminate waste. The E.O. requires agencies to minimize the use of toxic and hazardous chemicals and pursue acceptable alternatives. It also requires agencies minimize waste generation through source reduction, increase diversion of compostable materials, and by the end of FY 2015 divert at least 50% of non-hazardous and 50% of construction and demolition debris.

## Table 5: Goal 5 Strategies – Pollution Prevention & Waste Reduction

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Eliminate, reduce, or recover refrigerants and other fugitive emissions. | No | Fugitive emissions make up a very small proportion of USACE's GHG emissions. Priority has been placed on USACE's largest GHG emission categories such as facility energy use and fuel use in vehicles and vessels. | |
| Reduce waste generation through elimination, source reduction, and recycling. | Yes | USACE has no centrally-managed solid waste reduction program, however, many, if not all, facilities are engaged in some manner of solid waste reduction activities, including recycling. The majority of solid waste is generated by visitors at USACE's recreational facilities. | Issue Solid Waste Management Policy. As solid waste disposal and recycling contracts come up for renewal at DOL/ULA managed facilities include in the new contract requirements specifying quantification of solid waste generation and recycling rates, where practicable and cost |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | | effective. Establish an environmental management program within the environmental management system at DOL/ULA managed facilities to track the implementation of sustainable solid waste management practices as well as performance of solid waste reduction and recycling programs. To the extent allowed by law, implement Qualified Recycling Programs (QRP) DOL/ULA managed facilities in accordance with DoD QRP guidance. |
| Implement integrated pest management and improved landscape management practices to reduce and eliminate the use of toxic and hazardous chemicals/materials. | Yes | In accordance with ER/EP 1130-2-500, ER/EP 1130-2-540, 2 June 2009 USACE Invasive Species Policy Memo, and direction of the Corps Invasive Species Leadership Team, projects conducting pest management or invasive species management activities will use standard integrated pest management practices. Projects collect GIS data (where applicable), use spot spray techniques, mechanical/biological control methods and ecological modifications (where | Ensure projects have invasive species management activities identified in operations plans/OMPs; ensure project is using integrated pest management. |

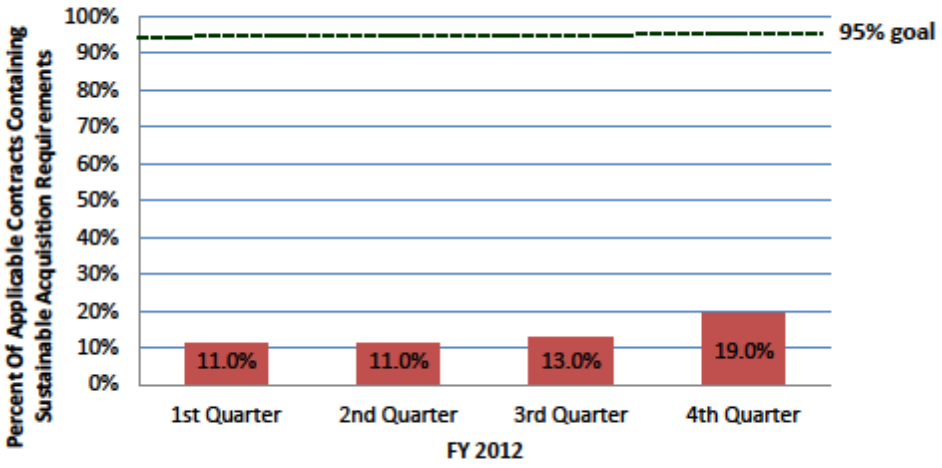
| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | applicable) to balance pesticide usage with other control methods. Applicators and/or contractor oversight shall be properly trained and certified to apply pesticides. Ensure projects using pesticides have properly trained personnel and are documenting project usage of integrated pest management. | |
| Establish a tracking and reporting system for construction and demolition debris elimination. | Yes | For new construction and major renovation projects, USACE tracks construction and demolition debris diversion statistics as part of its pursuit for the associated LEED points. Demolition projects (not associated with new construction or major renovation) are centrally executed through the Facilities Reduction Program (FRP), managed by the Engineering and Support Center, Huntsville. The FRP program tracks demolition debris rates for each project. | Issue policy addressing UFC for Sustainable Buildings, LEED and ASHRAE 189.1 requirements, including construction and demolition debris diversion, and ensure demolition of USACE property utilizes the FRP Program. |
| Develop/revise Agency Chemicals Inventory Plans and identify and deploy chemical elimination, substitution, and/or management opportunities. | Yes | USACE's policy for hazardous materials management is included in Chapter 7 of ER 200-2-3 (http://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_200-2-3.pdf). | Continue to find opportunities to eliminate, substitute, or improve management of chemicals through USACE's Environmental Compliance Assessment Program (ERGO). |

# Goal 6: Sustainable Acquisition

## Agency Progress toward Sustainable Acquisition Goal

E.O. 13514 requires agencies to advance sustainable acquisition and ensure that 95 percent of applicable new contract actions meet federal mandates for acquiring products that are energy efficient, water efficient, biobased, environmentally preferable, non-ozone depleting, recycled content, or are non-toxic or less toxic alternatives, where these products meet performance requirements. To monitor performance, agencies perform quarterly reviews of at least 5 percent of applicable new contract actions to determine if sustainable acquisition requirements are included.

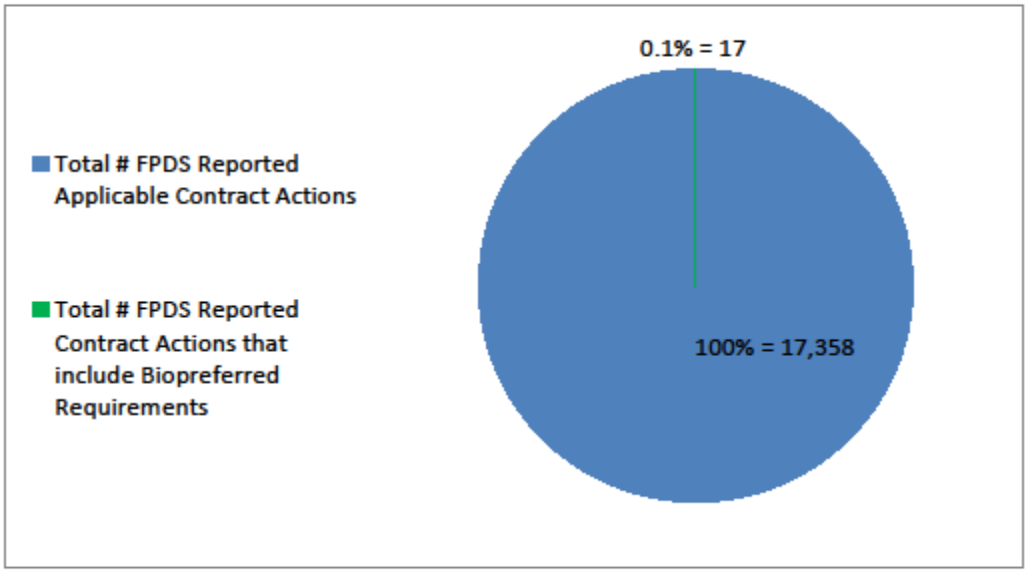
**Figure 6-1**




## Federal Procurement Data System Standard Reports on Biopreferred Procurement Actions

The Federal Procurement Data System (FPDS) is used by federal agencies to record and manage contract actions. On the pie chart below, the blue area represents the total number of contract actions reported by the agency in FPDS in FY 2012 that are "applicable" to the sustainable procurement requirements. Applicable contract actions are new domestic contracts, task and delivery orders, excluding weapons systems and those actions that are unlikely to use biobased products (e.g., research and social development contracts, education and training, social services, and the lease or rental of equipment). The green area represents the total number of applicable contract actions that the agency reported in FPDS as containing biobased product requirements.

**Figure 6-2**




## Table 6: Goal 6 Strategies – Sustainable Acquisition

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Update and deploy agency procurement policies and programs to ensure that federally-mandated designated sustainable products are included in all relevant procurements and services. | Yes | USACE has integrated sustainable acquisition requirements into the USACE Acquisition Instruction and is developing and deploying awareness training for employees. | USACE will continue to improve existing policy by issuing interim policy alerts as required and then integrating all relevant policy alerts into the USACE Acquisition Instruction according to the regular annual update schedule. |
| Deploy corrective actions to address identified barriers to | Yes | As performance tracking matures, USACE will be identifying corrective actions | The first round of corrective actions will be identified by the end of |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| increasing sustainable procurements with special emphasis on biobased purchasing. | | for specific contract types and for specific commodities and services purchased. Successful corrective actions will be integrated into appropriate policies and procedures. | FY13 for implementation in FY14. |
| Include biobased and other FAR sustainability clauses in all applicable construction and other relevant service contracts. | Yes | USACE has integrated sustainable acquisition requirements into Engineering Regulation 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews and the "Model Request for Proposal" for Design-Build vertical construction projects. USACE will continue to integrate the requirements into other construction and policies and procedures as appropriate and will pay particular attention to construction contracts in its compliance reviews. | Increase compliance on bio-based purchasing to 50% of applicable contracts by the end of FY14. |
| Review and update agency specifications to include and encourage biobased and other designated green products to enable meeting sustainable acquisition goals. | Yes | USACE is responsible for 399 of the roughly 848 US Guide Specifications. Proposed updates to the US Guide Specification language goes through a tri-service review process by the appropriate Discipline Working Groups (DWG) before it is finalized. | Complete biobased and green products evaluation and submit to the Discipline Working Group recommendations for updates to Army managed specifications by the end of FY 13. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | USACE is determining which products designated by federal programs are applicable to the Army engineering and construction specifications and will recommend language for incorporation into the specifications. If not adopted by 31 Dec 2013, USACE will request Army tailored specifications to implement biobased and green products language. | |
| Use DoD/Army Strategic Sourcing Initiatives, such as Blanket Purchase Agreements (BPAs) for office products and imaging equipment, which include sustainable acquisition requirements. | Yes | USACE is required to participate in DoD and Army Strategic Sourcing Initiatives. For example, purchase card holders are required to use DoD EMALL which has the capability to flag sustainable products for users. Another example is the Army CHESS contract described under Goal 7. | Continue to use DoD Strategic Sourcing Initiatives and seek opportunities to leverage additional strategic sourcing initiatives. |
| Report on sustainability compliance in contractor performance reviews. | No | USACE's sustainable acquisition program is not yet at a level of maturity conducive to reporting contractor performance on sustainable acquisition requirements. | |

# Goal 7: Electronic Stewardship & Data Centers

## Agency Progress toward EPEAT, Power Management & End of Life Goals

E.O. 13514 requires agencies to promote electronics stewardship by: ensuring procurement preference for EPEAT-registered products; implementing policies to enable power management, duplex printing, and other energy-efficient features; employing environmentally sound practices with respect to the disposition of electronic products; procuring Energy Star and FEMP designated electronics; and, implementing best management practices for data center operations.

**Figure 7-1**

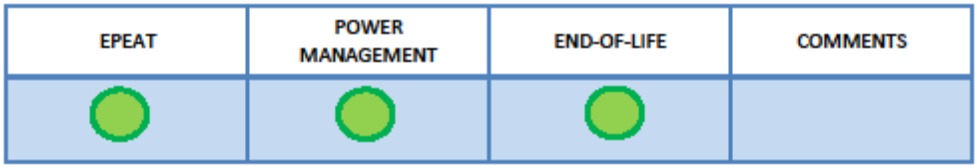
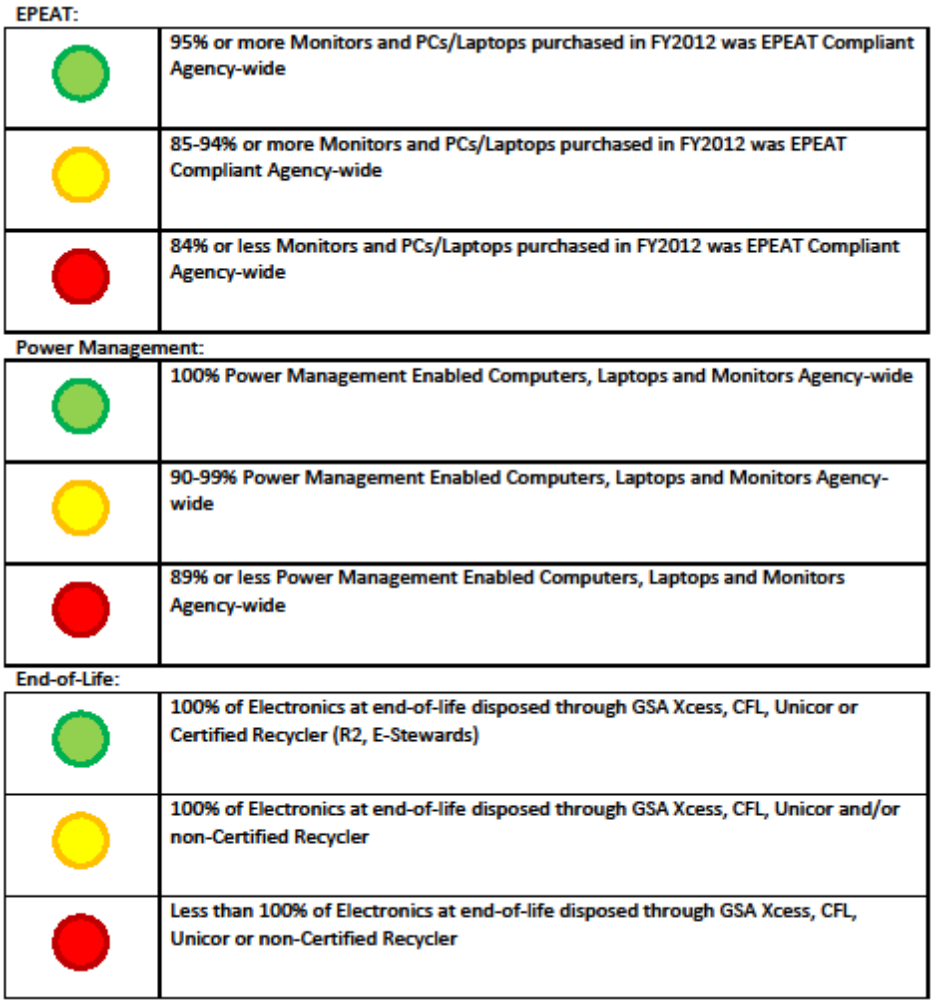


**Figure 7-1 Legend**



| EPEAT: | |
|---|---|
| | 95% or more Monitors and PCs/Laptops purchased in FY2012 was EPEAT Compliant Agency-wide |
| | 85-94% or more Monitors and PCs/Laptops purchased in FY2012 was EPEAT Compliant Agency-wide |
| | 84% or less Monitors and PCs/Laptops purchased in FY2012 was EPEAT Compliant Agency-wide |
| **Power Management:** | |
| | 100% Power Management Enabled Computers, Laptops and Monitors Agency-wide |
| | 90-99% Power Management Enabled Computers, Laptops and Monitors Agency-wide |
| | 89% or less Power Management Enabled Computers, Laptops and Monitors Agency-wide |
| **End-of-Life:** | |
| | 100% of Electronics at end-of-life disposed through GSA Xcess, CFL, Unicor or Certified Recycler (R2, E-Stewards) |
| | 100% of Electronics at end-of-life disposed through GSA Xcess, CFL, Unicor and/or non-Certified Recycler |
| | Less than 100% of Electronics at end-of-life disposed through GSA Xcess, CFL, Unicor or non-Certified Recycler |

# Table 7: Goal 7 Strategies – Electronic Stewardship & Data Centers

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Identify agency "Core" and "Non-Core" Data Centers. | NA | Data Center Consolidation is being reported through the Army Data Center Consolidation Plan (ADCCP) | |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | and the Department of Defense Sustainability Plan. | |
| Consolidate 40% of agency Non-Core Data Centers. | NA | Data Center Consolidation is being reported through the Army Data Center Consolidation Plan (ADCCP) and the Department of Defense Sustainability Plan. | |
| Optimize agency Core Data Centers across total cost of ownership metrics. | NA | Data Center Consolidation is being reported through the Army Data Center Consolidation Plan (ADCCP) and the Department of Defense Sustainability Plan. | |
| Ensure that power management, duplex printing, and other energy efficiency or environmentally preferable options and features are enabled on all eligible electronics and monitor compliance. | Yes | Policy has been in effect since 2010 with a July 2012 update based on Army policy. Power management settings are managed and monitored using SCCM at the Enterprise Level. | Continue to monitor power management using SCCM; update duplex printing policy with current date and resend out to service provider. This strategy will ensure 100% compliance on all eligible electronics. |
| Update and deploy policies to use environmentally sound practices for disposition of all agency excess or surplus electronic products, including use of certified eSteward and/or R2 electronic recyclers, and monitor compliance. | Yes | Surplus or end-of-life electronics are sent to the Defense Logistics Agency (DLA) for proper disposal in accordance with GSA BULLETIN FMR B-34, Disposal of Federal Electronic Assets. | Working with DLA to obtain better data on electronics disposal. |

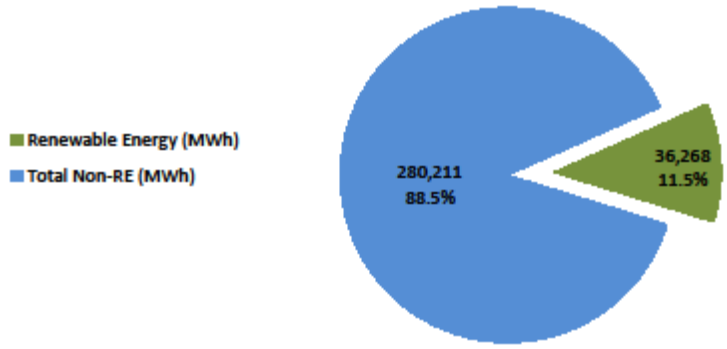
| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Ensure acquisition of 95% EPEAT registered and 100% of ENERGY STAR qualified and FEMP designated electronic office products. | Yes | USACE uses the Army's Computer Hardware, Enterprise Software Solutions (CHESS) program, under PEO EIS. It is the mandatory source for commercial IT purchases. CHESS contracts provide IT products and services that comply with NETCOM, Army and DoD policy and standards in accordance with AFARS Subpart 5139.1. USACE must use CHESS to satisfy their IT requirements by utilizing CHESS contracts and DoD Enterprise Software Initiative agreements first, regardless of dollar value. The CHESS contract for hardware includes Energy Star and EPAEAT requirements. | Continue to follow Army policy to use the CHESS contract which will ensure acquisition of 100% EPEAT and Energy Star qualified electronic office products. |

# Goal 8: Renewable Energy

## Agency Renewable Energy Percentage of Total Electricity Usage

E.O. 13514 requires that agencies increase use of renewable energy. Further, EPACT 2005 requires agencies to increase renewable energy use such that 7.5 percent of the agency's total electricity consumption is generated by renewable energy sources for FY 2013 and beyond. For FY 2012, the required target was 5 percent of an agency's total electricity consumption.

**Figure 8-1**




## Table 8: Goal 8 Strategies – Renewable Energy

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Acquire renewable energy directly or through Renewable Energy Credits (RECs). | Yes | USACE has met its renewable energy goal in each fiscal year it has reported under EO13514. USACE does not advocate the purchase renewable electricity or RECs solely for the purpose of meeting this goal. Rather, USACE advocates (in its SP and elsewhere) for expansions in capacity, improvements in efficiency, and | Specific metric for FY13-14: Meet the federal (EPAct 2005, Section 203) 7.5% renewable electricity goal. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| | | increased on-site use of hydropower, at USACE hydropower generating facilities. USACE also supports Federal Energy Regulatory Commission (FERC) licensing to third parties for USACE dams that do not currently generate hydropower, to include negotiating FERC licenses to require the licensee to provide renewable energy or RECs to the host facility. | |
| Install onsite renewable energy on federal sites. | Yes | USACE will continue its on-going effort to use the Civil Works O&M budget process to enable individual USACE facilities to program for life-cycle cost effective renewable energy (e.g., wind and solar) systems, and for the demonstration, rehabilitation, or replacement of small hydropower (station-power) units to generate power for use on-site. | Specific metric for FY13-14: Execute 100% of CW O&M funding for renewable energy ECMs. |
| Lease land for renewable energy infrastructure. | Yes | US Army Engineering and Support Center, Huntsville (HNC) has power purchase agreement (PPA) contracting capability. USACE FY13-14 strategy for PPAs is to determine whether USACE has statutory authority to lease Civil Works land for the purpose of installation of renewable energy infrastructure. If USACE determines that it does have the necessary authority, HQ USACE and HNC will work with District(s) or individual Civil Works projects to determine the viability of executing a PPA. | Specific target for FY13-14: Verify that USACE has authority to lease Civil Works lands for renewable energy infrastructure. |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Top 5? Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| Develop biomass capacity for energy generation. | No | Development of biomass capacity is not currently a strategy that USACE plans to adopt. USACE will continue to rely primarily on on-site generation and consumption of incremental hydropower at USACE facilities as the means to achieve and maintain performance on this goal. | |
| Utilize performance contracting methodologies for implementing ECMs and increasing renewable energy. | Yes | USACE Major Subordinate Commands (MSCs) have been trained and are gaining hands-on experience with alternative financing/performance contracting approaches to identify and implement ECMs, including ECMs for increasing renewable energy. USACE will continue executing alternative financing/performance contracts where economically viable and where leadership has determined such approaches support the mission objectives and priorities of the affected facilities. | Specific target for FY13-14: Meet the ASA(CW) $2.5M alternative financing commitment. |
| Work with other agencies to create volume discount incentives for increased renewable energy purchases. | Yes | USACE will continue working with GSA to leverage volume discount incentives for renewable energy purchases at locations where leadership has determined that renewable energy purchases are consistent with local mission objectives and priorities. | Specific metric for FY13-14: Meet the federal (EPAct 2005, Section 203) 7.5% renewable electricity goal. |

# Goal 9: Climate Change Resilience

## Agency Climate Change Resilience

E.O. 13514 requires each agency to evaluate agency climate change risks and vulnerabilities to identify and manage the effects of climate change on the agency's operations and mission in both the short and long term.

## Table 9: Goal 9 Strategies – Climate Change Resilience

| **(A) Will the agency implement the following strategies to achieve this goal?** | **(B) Yes/No/NA** | **(C) Strategy Narrative** | **(D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months** |
|---|---|---|---|
| Ensure climate change adaptation is integrated into both agency-wide and regional planning efforts, in coordination with other federal agencies as well as state and local partners, Tribal governments, and private stakeholders. | Yes | Establish guidance to integrate climate change adaptation into both agency-wide and regional planning efforts for new and existing infrastructure, including collaboration with stakeholders. | Assess stakeholder understanding of how USACE integrates climate change in planning efforts. |
| Update agency emergency preparedness, response and recovery procedures and protocols to account for projected climate change, including extreme weather events. | Yes | Agency will use established forums with FEMA to address lessons learned from recent extreme weather events, update procedures and protocols as required. | Annual USACE -FEMA Remedial Action Program (winter) and USACE-FEMA Senior Leaders Seminar (summer) |
| Ensure workforce protocols and policies reflect projected human health and safety impacts of climate change. | No | Agency is awaiting more detailed information on projected human health and safety impacts of climate change before updating workforce protocols and policies. | |
| Update agency external programs and policies | NA | Strategies representing agency external | |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| (including grants, loans, technical assistance, etc.) to incentivize planning for, and addressing the impacts of, climate change. | | programs are represented by strategies 8 and 9 listed below. | |
| Ensure agency principals demonstrate commitment to adaptation efforts through internal communications and policies. | NA | Agency has already established overarching policy statement, governance structure, and annual reporting metrics that require agency principles to demonstrate commitment to adaptation efforts. | |
| Identify vulnerable communities that are served by agency mission and are potentially impacted by climate change and identify measures to address those vulnerabilities where possible. | Yes | Continue to expand use of social vulnerability information into agency missions, including identification of | Continue to assess climate change impacts to socially vulnerable populations in accordance with USACE missions. |
| Ensure that agency climate adaptation and resilience policies and programs reflect best available current climate change science, updated as necessary | NA | Agency has established programs, collaborations and networks to obtain best available climate science and has a plan to incorporate into policy and guidance. | |
| Design and construct new or modify/manage existing agency facilities and/or infrastructure to account for the potential impacts of | Yes | Continue to expand the incorporation of climate uncertainty considerations into planning, design, | Continue to implement climate change and resilience measures based on best available |

| (A) Will the agency implement the following strategies to achieve this goal? | (B) Yes/No/NA | (C) Strategy Narrative | (D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months |
|---|---|---|---|
| projected climate change. | | construction, operation, and management of new or modified infrastructure. | science. |
| Incorporate climate preparedness and resilience into planning and implementation guidelines for agency-implemented projects. | Yes | Continue to expand the incorporation of climate uncertainty considerations into planning and design criteria for new or modified infrastructure. | Continue to evolve guidance for the incorporation of climate change in guidance for new and existing infrastructure. |

# Appendix 1


**June 2013**

# *USACE 2013 Climate Change Adaptation Plan and Report*

## Executive Summary

USACE has established an overarching *USACE Climate Change Adaptation Policy Statement* and a governance structure to support mainstreaming adaptation, with an *Adaptation Steering Committee.* Our policy requires USACE to mainstream climate change adaptation in all activities to help enhance the resilience of our built and natural water-resource infrastructure and reduce its potential vulnerabilities to the effects of climate change and variability. USACE is mainstreaming climate adaptation through four strategies: with a focus on priority areas, we engage in external collaboration to improve our understanding of climate change impacts and vulnerabilities so that we can develop new policy and guidance to support adaptation implementation based on the best available and actionable science.

This USACE 2013 Adaptation Plan, prepared at the direction of the Adaptation Steering Committee, presents information about our vision, goals, and strategic approaches; progress on priority areas; and information about how we plan, integrate, and evaluate adaptation. The plan will be updated annually and will be publicly available to our staff, partners and stakeholders. USACE tracks adaptation through annual metrics that address external collaboration, improving knowledge about climate impacts and adaptation, progress assessing vulnerability, and development of policy and guidance.

In accordance with our four strategies to achieve mainstreaming of climate adaptation, we first identified adaptation ***priority areas***. Our progress on these priorities benefits from ***external collaboration*** and an active program to ***improve our knowledge*** about climate change and adaptation so we can ***develop policies and guidance*** to support adaptation planning and implementation.

One result of our strategic approach is our first technical guidance for adaptation, "*Procedures to Evaluate Sea-Level Change Impacts, Responses, and Adaptation*," which completed a wide internal and external review on 1 June 2013. This adaptation implementation guidance was drafted by an extensive interagency, international and multi-disciplinary team, incorporating team members from USACE, partner agencies, and other experts in academia and the private sector. Other successes are detailed in this 2013 Adaptation Plan and Report.

USACE will continue implementing our plan to improve resilience and reduce vulnerabilities through adaptation to climate change. We will continue to expand the incorporation of climate uncertainty considerations into planning, design, construction, operation, and management of new or modified infrastructure. We expect that our priority areas will evolve as we gain understanding and experience in adapting to climate change and identify new challenges. USACE continues to work closely with science agencies, the US Global Research Program, the Federal Agency Adaptation Community of Practice, the Climate Change and Water Working Group, and others to identify future challenges and develop solutions to these challenges.

# *USACE 2013 Climate Change Adaptation Plan and Report*

## Contents

# 1. Introduction

## 1.1. Adaptation Policy Statement

The primary and overarching policy document for USACE is the USACE Climate Change Adaptation Policy Statement[1], signed by Assistance Secretary of the Army Ms. Jo-Ellen Darcy on 3 June 2011, in accordance with the *Implementing Instructions for Federal Agency Climate Change Adaptation*[2](Council on Environmental Quality (CEQ) and Office of Management and Budget (OMB) 2011), and also the Guiding Questions contained in the companion *Support Document to the Implementing Instructions* (CEQ 2011).

The 2011 USACE Climate Change Adaptation Policy Statement remains in force in 2013 and provides the USACE policy framework for climate change adaptation. The USACE Climate Change Adaptation Policy Statement complies with Section 8(i) of *Executive Order 13514*[3] and in accordance with the *Guiding Principles* put forth in the Federal Interagency Climate Change Adaptation Task Force in its October 2010 *Report to the President*[4] and provided in Appendix A.

## 1.2. Mainstreaming Adaptation

Effective climate change adaptation is especially important for USACE because the hydrologic processes underlying water resources management are very sensitive to changes in climate and weather. Our Civil Works Program and associated water resources infrastructure represent a tremendous Federal investment that supports public safety and local and national economic growth, and hence, we have a compelling need to understand and adapt to climate change and variability.

For this reason, the USACE Climate Change Adaptation Policy Statement requires USACE to mainstream climate change adaptation in all activities to help enhance the resilience of our built and natural water-resource infrastructure and reduce its potential vulnerabilities to the effects of climate change and variability. Mainstreaming means to integrate and incorporate climate change and variability considerations for missions and operations in all phases of the project lifecycle for both new and existing projects. The policy statement also requires USACE begin adaption now based on the best available and actionable science to consider the impacts of climate change when planning for the future. Our goal is to successfully perform our missions, operations, programs, and projects despite the challenges of global and climate change.

## 1.3. Governance Framework

[1] See http://www.corpsclimate.us/adaptationpolicy.cfm

[2] Issued jointly on 4 March 2011 by the Executive Office of the President's Council on Environmental Quality/Office of the Federal Environmental Executive (CEQ/OFEE) and the Office of Management& Budget (OMB)

[3] See http://www.gpo.gov/fdsys/pkg/FR-2009-10-08/pdf/E9-24518.pdf

[4] See http://www.whitehouse.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf

The Assistant Secretary of the Army for Civil Works is the designated USACE Senior Adaptation Point of Contact responsible for ensuring implementation of the USACE Climate Change Adaptation Policy Statement issued 3 June 2011. The Statement also established the USACE Climate Change Adaptation Steering Committee (ASC), chaired by the USACE Chief, Engineering and Construction, to oversee and coordinate agency-wide climate change adaptation planning and implementation. The ASC acts as the highest level of Adaptation Authority in USACE. The ASC establishes strategic direction; reviews/monitors existing adaptation programs, activities and policy implementation; provides critical decisions related to the implementation of adaptation across USACE, and coordinates the integration of adaptation and mitigation activities with the USACE Strategic Sustainability Committee.

> *"Adaptation is not optional."*
>
> *- Mr. James C. Dalton, PE, SES, Chair of the USACE Climate Change Adaptation Steering Committee, 19 January 2012*

## 1.4. Climate Change Adaptation Plan

The USACE 2013 Climate Change Adaptation Plan represents an update of the 2012 USACE Climate Change Adaptation Plan. Our plan incorporates all actions undertaken to support our objective to mainstream climate change adaptation in all activities to help enhance the resilience of our built and natural water-resource infrastructure and reduce its potential vulnerabilities to the effects of climate change and variability. The Plan is incorporated in both the USACE Campaign Plan and the Army Campaign Plan. Based on our high-level assessments of vulnerability to climate change, the USACE Adaptation Plan employs four primary strategies to achieve our objective:

- Focus on priority areas
- Engage in meaningful external collaboration
- Improve USACE knowledge for water resources management and infrastructure resilience
- Develop policy and guidance for infrastructure resilience

Each of these strategies is described in detail below, together with a description of current status. The USACE military support activities will be guided by the DoD Adaptation Plan and Department plans, policies, and guidance.

Two programmatic efforts are the primary supporters of the USACE Adaptation Plan. These are the Interagency Performance Evaluation Task Force (IPET)/Hurricane Protection Decision Chronology (HPDC) Lessons Learned Implementation Team and the Responses to Climate Change program. These programs are charged with developing methods, tools, and guidance to improve the resilience of our built and natural infrastructure benefits through a collaborative, proactive, nationally consistent, and regionally sensitive framework and program of actions. These actions include improving our understanding of climate impacts to missions and operations, assessing vulnerabilities, and identifying specific actions to minimize risk and capitalize on opportunities to improve infrastructure resilience.

# 1.5. USACE Adaptation Plan Strategies Focus on Priority Areas

Climate change poses numerous challenges to USACE missions and operations. Based on the best available and actionable science, our high-level vulnerability analyses, and USGS Circular 1331, we identified six adaptation priority areas as requested in the 29 February 2011 *Statement on Preparing Adaptation Plans*, in the 2011 USACE Adaptation Plan and Report[5]. Focusing our energy on priority areas helps us to make progress faster and more effectively. In 2013, we added a seventh to more explicitly address the main fundamental reason for mainstreaming adaptation: infrastructure resilience. These priority areas represent core issues supporting our fundamental need to improve infrastructure resilience in changing conditions: assess vulnerability, support risk-informed decision making, develop technical information necessary to plan and design implementation measures, continue to improve our ability to assess vulnerabilities, begin to measure success, and support cross-cutting programs:

1. Infrastructure Resilience
2. Vulnerability Assessments
3. Risk-Informed Decision-Making for Climate Change
4. Nonstationarity
5. Portfolio of Approaches
6. Metrics and Endpoints
7. National Action Plan to Manage Freshwater Resources in a Changing Climate

Our progress on these priorities benefits from external collaboration and an active program to improve our knowledge about climate change and adaptation so we can develop policies and guidance to support adaptation planning and implementation. Additional priorities will be identified in the future as we gain understanding and experience in adapting to climate change.

## 1.5.1. Infrastructure Resilience

The US Army Corps of Engineers (USACE) Civil Works Program and its water resources infrastructure –built and natural, structural and nonstructural – represents a tremendous Federal investment that supports public health and safety, regional and national economic development, and national ecosystem restoration goals. The hydrologic and coastal processes underlying this water resources management infrastructure are very sensitive to changes in climate and weather. Therefore, USACE has a compelling need to understand and adapt to climate change and variability to continue providing authorized performance despite changing conditions. Our objective is to mainstream climate change adaptation in all activities to help enhance the resilience of our built and natural water-resource infrastructure and reduce its potential vulnerabilities to the effects of climate change and variability. The activities undertaken to support the climate change adaptation are planned to help improve infrastructure resilience related to climate change affecting other important USACE infrastructure programs.

## 1.5.2. Vulnerability Assessments

Climate vulnerability assessments are necessary to help guide adaptation planning and implementation so that USACE can successfully perform its missions, operations, programs, and projects in an increasingly dynamic physical, socioeconomic, and political environment. USACE has completed several activities in connection with high level assessments of

[5] See http://www.corpsclimate.us/adaptationpolicy.cfm

vulnerability to climate change. These include a preliminary assessment presented in USGS Circular 1331[6] and a high-level analysis of the vulnerability of USACE missions and operations to climate change required by CEQ[7] summarized in Appendix B.

USACE is currently conducting two nationwide screening-level assessments of the vulnerability of USACE mission, operations, programs, and projects to climate change. These screening-level vulnerability assessments are designed to be conducted in phases (so the initial assessment can be refined) using a modular approach (so new and updated information can replace initial information) and supported by district-acceptable tools and visualizations. The analyses build on existing, national-level tools and data, including specific indicators of vulnerability representing USACE business lines.

For watersheds, we completed a proof-of-concept study focused primarily on the potential exposure to climate change-induced changes in freshwater discharge at the level of HUC-4 watersheds. This is now updated to include updated information based on the latest general circulation models used for the IPCC's Fifth Assessment Report, due in 2014. The second is an initial vulnerability assessment of projects to coastal climate change, including sea level change. Future refinements and more detailed vulnerability assessments for high priority projects are planned.

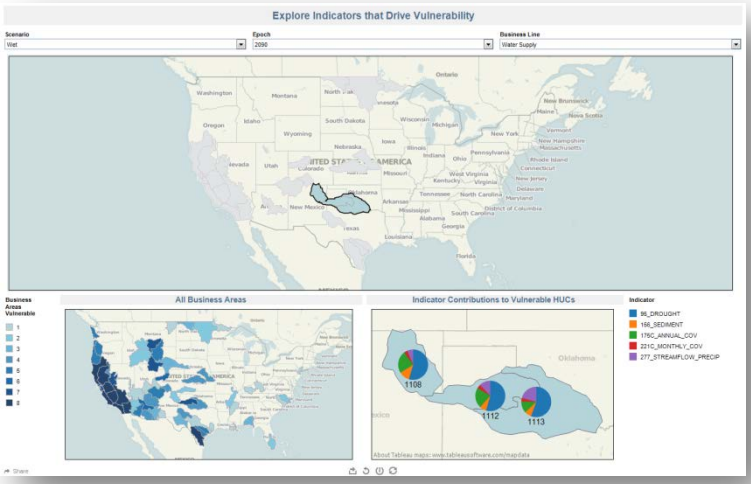



Figure 1. Example visualization of USACE nationwide screening assessment of vulnerability to climate change at the HUC-4 level. Top depiction shows the top 10% most vulnerable HUC-4 watersheds for the far future (30 year period 2070-2100) for the Water Supply business line in a wetter future. Bottom left aggregates vulnerability across all business lines. Bottom right shows contribution of indicators to vulnerabilitv for the selected

[6] See http://pubs.usgs.gov/circ/1331/

[7] In accordance with the *Implementing Instructions for Federal Agency Climate Change Adaptation* (Council on Environmental Quality (CEQ) and Office of Management and Budget (OMB) 2011), and also the Guiding Questions contained in the companion support document to the *Implementing Instructions* (CEQ 2011).

## 1.5.3. Risk-Informed Decision-Making for Climate Change

Risk-informed decision making is a critical component of USACE adaptation to climate change. Since climate change uncertainty may require making sequential decisions over time and updating design and plans to incorporate new and changing information 2011, we have been testing a draft framework that addresses the entire project life cycle, since. Risk assessment includes both consequence and likelihood assessment, and the framework recognizes the potential challenges of assigning probabilities to uncertain future conditions. Formulation of risk management alternatives under changing conditions is a critical component of the approach. The framework emphasizes the need for stakeholder involvement throughout the decision process.

Several climate-change adaptation pilot projects are testing the framework. The Hamilton Wetland Restoration Project (HWRP) is testing the proposed risk framework and evaluating its application to the USACE planning phase. The West Maui Watershed Study is using the framework to collaboratively identify climate risks and to develop adaptation strategies. The Lower Columbia River Estuary pilot study is applying the framework to ecosystem restoration. The risk framework is now under revision based on preliminary results from pilot studies and an internal review. The risk management framework will be a foundation for developing strategies to incorporate climate change into the decision making processes of USACE.

## 1.5.4. Nonstationarity

Stationarity, or the assumption that the statistical characteristics of hydrologic time series data are constant through time, enables the use of well-accepted simplified statistical methods in water resources planning and design. Climate change is undermining this fundamental assumption, and as pointed out in the influential paper by Milly et al in 2008, “Finding a suitable successor is crucial for human adaptation to changing climate.”

Developing methods and procedures to address nonstationarity throughout the project life cycle is a high priority action for the USACE, since planning for

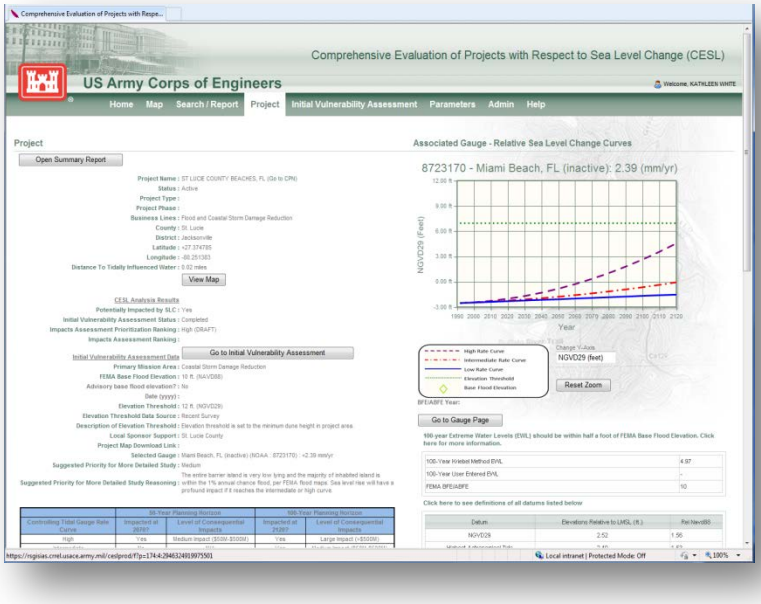



Figure 2. Example of output from USACE nationwide screening assessment of vulnerability to coastal climate change at the project level. Data is entered by USACE district staff into a web tool tied to USACE geospatial databases and NOAA tide gauge information. The tool considers a 100-year planning horizon and allows for estimates of impacts due to sea level change and extreme water levels.

continued and resilient

performance under future water resources conditions is fundamental to our missions and operations. Considerable progress has been made in this area, as highlighted in Table 2. Since our 2010 international and interagency workshop on nonstationarity, followed by a proceedings and a special collection of journal papers, USACE has made progress in the critical area of nonstationary hydrology. The team includes interagency collaborators (USGS, the Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA), DOI's Bureau of Reclamation, and the Department of Transportation (DOT) Federal Highways Administration (FHWA)) as well as academic experts. The team also includes interagency collaboration with the agencies that work under the Advisory Committee for Water Information Subcommittee for Hydrology.

Our approach to obtain external peer review for critical aspects on nonstationarity that will support policy and guidance. Two journal papers by team members have been peer-reviewed and accepted for publication in 2013. The first paper[8] assesses what general circulation models underlying the IPCC 5th Assessment Report indicate about precipitation events with annual exceedance probabilities of 0.1 and 0.01, concluding that projections indicate that the more remote probability (0.01) events may be changing more than the less remote probability (0.1) events. This is very important for flood-related planning and engineering design. In keeping with the USACE role as a provider of public water resources infrastructure, the second paper[9] looks at how societies may respond to global change. Currently, the team is near completion of an annotated bibliography of relevant peer reviewed literature on methods for detecting and attributing non-stationarity as well as methods for incorporating non-stationarity into future portrayals of hydrology.

### 1.5.5. Portfolio of Approaches

The wide portfolio of possible approaches for producing and using climate science and climate change information for water resource adaptation questions can bewilder planners and engineers because each method or analytical technique in this portfolio brings uncertainties and particular deficiencies, some of which are large or only partly characterized and poorly quantified. USACE, together with Reclamation, the National Center for Atmospheric Research (NCAR), and academic experts, began a joint 2012-2014 project to answer two questions of particular importance in making decisions about which methods are more or less appropriate for use in a particular decision environment. These are: how are the portrayals of weather impacts under climate change sensitive to downscaling method? And, how are the portrayals of hydrologic impacts sensitive to hydrologic evaluation method? The work should help operating and resource management agencies looking to use these techniques to inform their climate adaptation planning currently lack good practice guidelines for helping them assess the approaches and choose appropriate ones for particular adaptation decisions.

### 1.5.6. Metrics and Endpoints

Appropriate frameworks and metrics for assessing the efficiency and effectiveness of climate change adaptation activities are crucial for achieving our combined objectives of developing practical, nationally consistent, legally justifiable, and cost effective climate change actions, both structural and nonstructural; and reducing the vulnerabilities and improving the resilience of water-resource infrastructures at risk from climate change threats. To date, USACE has

[8] "Projections of Heavy Rainfall over the Central US based on CMIP5 Models" by Villarini, Scocciamarro, and Gualdi, accepted for publication in Atmospheric Science Letters (as of May 2013)

[9] "Likelihood of Societal Preparedness for Global Change" by Vogel, Rosner, and Kirshen, accepted for publication in Natural Hazards Earth Systems Science Discussions (as of May 2013)

instituted and is reporting annually on metrics and endpoints in the USACE Campaign Plan (Action 2d.2, Improve CW Portfolio Performance in Changing Climatic Conditions) and the Army Campaign Plan (three actions addressing external collaboration, vulnerability assessments, and policy and guidance).

### 1.5.7. The US National Action Plan to Manage Freshwater Resources in a Changing Climate

The Federal Interagency Climate Change Adaptation Task Force (ICCATF) released the *National Action Plan Priorities for Managing Freshwater Resources in a Changing Climate*[10] (NAP). The NAP makes six major recommendations, each with supporting actions led by different agencies (Appendix B). USACE is the lead agency to implement the three supporting actions for Recommendation 5, *Integrated Water Resources Management.* The team is using the definition of IWRM from the report *Building Strong Collaborative Relationships for a Sustainable Water Resources Future National Report: Responding to National Water Resources Challenges*[11] as shown in the inset box. USACE is co-leading three other actions of the NAP.

#### 1.5.7.1. USACE-Led NAP Actions

**Action 17** addresses working with States and interstate bodies (e.g., river basin commissions) to incorporate IWRM into their planning and programs with attention to climate-change adaptation issues. The goal is to develop practices supporting an IWRM framework for climate change adaptation.

- USACE is funding several climate change adaptation pilot studies that address certain aspects of IWRM. The goal of one pilot study was to collaboratively develop a climate change adaptation strategy to improve the overall quality of the West Maui Watershed, from the summit of Pu`u Kukui to the outer coral reef. Partners in the plan include USACE-Honolulu District, the State of Hawaii Department of Land and Natural Resources (DLNR) and the Department of Health (DOH) with support from NOAA and EPA. Another pilot study involves regional collaboration with the Ohio River Basin (ORB) Alliance. The alliance includes representatives from Federal agencies, States, non-governmental organizations (NGOs) and universities. The aim of the pilot study is to collaboratively develop mitigation and adaptation strategies with the ORB Alliance to counteract the anticipated water resources, ecological and infrastructure impacts of climate change. One intended product is the formation of a permanent climate change working group within the ORB Alliance.
- USACE has also agreed to do an IWRM pilot study with the Delaware River Basin Commission (DRBC). Climate change adaptation would be one component of this study. This pilot study is in the scoping phase.

[10] Interagency Climate Change Adaptation Task Force 2011, see http://www.whitehouse.gov/sites/default/files/microsites/ceq/2011_national_action_plan.pdf

[11] See http://www.building-collaboration-for-water.org/Documents/nationalreport_final.pdf

**Action 19** involves working with states to identify their flood risk and drought management "best practices" to prepare for hydrologic extremes so these can be shared among the States and Federal agencies.

- The first component consisted of a review of 50 FEMA State Hazard Mitigation Plans followed by a report describing the findings of the review with respect to a series of themes related to Action 19. The project team then reviewed the resulting materials to identify best practices and effective coordination mechanisms.
- Based on these results, the next step was to survey state flood officials to obtain their perspectives on Federal and State agency coordination and their views on innovative policies. A draft report is in review, with plans for publication as a joint USACE-FEMA report in 2013.

***Integrated Water Resources Management** is characterized by:*

- ***Sustainable outcomes**—the practice of making decisions and taking coordinated actions for outcomes and benefits that use or affect current economic, environmental and quality of life resources conditions in ways that preserve these resources for future generations.*
- ***Collaborative planning**—a process that avails collaboration to secure the input of all stakeholders about their interests and needs.*
- ***A systems perspective**—a systems approach that arrays interests and needs as input variables, modeling a system of interdependent variables with multiple outputs.*
- ***A geographic context**—a geographic perspective that examines who is doing what where at a broad geographic scale, e.g., a river basin, watershed or coastal zone.*
- ***Balanced aims**—a process that seeks to balance multiple objectives as diverse desired outputs producing multiple benefits.*

**Action 20** is to “develop benchmarks for incorporating adaptive management into water project designs, operational procedures, and planning strategies.” An interagency technical team including USACE, Department of the Interior (DOI) US Geological Survey (USGS), US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), US Environmental Protection Agency (EPA), and the National Oceanic and Atmospheric Administration (NOAA), and Forest Service, is working on this action.

- The first product is a report containing an inventory of Federal agencies’ adaptive management practices and policies that support adaptive management strategies in the Federal government. The CEQ publications policy is for NAP documents to be published by the lead agency for each action and to follow the lead agency's review process. The report, “*Federal Agency Inventory of Adaptive Management Practices and Policies*" is in review and will be published in 2013.
- The second product is a report containing recommendations for implementation of adaptive management for climate change adaptation. The report, “*Recommendations for Federal Agency Implementation of Adaptive Management for Climate Change Adaptation*" is in review and will be published by USACE in 2013.

### 1.5.7.2. USACE Participation in Other NAP Actions

USACE is co-leading three other actions concerned with climate and water data supporting Recommendation 2 (Improve Water Resources and Climate Change Information for Decisionmaking). Please ID actions and something about them. These actions will provide an opportunity to integrate other Federal sources of data and tools with the Federal Support Toolbox.

USACE is also co-lead on an action developing training for water managers on climate change supporting Action 21 "Establish a core training program on climate change science for local, Tribal, and State water resources managers" of Recommendation 6 (Support Training and Outreach to Build Response Capability). In this activity, the Climate Change and Water Working Group (CCAWWG, see section on External Collaboration) agencies in cooperation with the University Corporation for Atmospheric Research (UCAR) COMET Program and the Western Water Assessment have developed a pilot training program that includes both an online course for self-paced training, and a set of subsequent residence courses where students apply what they learned through the online training. The on-line training became available in late 2012, and the first two residential courses were conducted in January and March 2013. Two additional training modules are in development.

### 1.5.7.3. Related Cross-Cutting Action Plans

Two other cross-cutting action plans[12] have been developed by CEQ and interagency working groups: The *National Ocean Policy Implementation Plan* (NOPIP) and the *National Fish, Wildlife and Plants Climate Adaptation Strategy* (FWP). USACE staff participated in the development of both plans.

The NOPIP, authored by the National Ocean Council, includes climate change in several of its recommendations to address key ocean challenges. Among these are:

- Enhancing the Safety and Security of Ports and Waterways: Assess the vulnerability of our ports and waterways to sea-level rise and extreme weather events or other natural disasters and enable actions that more effectively reduce risks and impacts.
- Preparing for Change: Assess the vulnerability of coastal communities and ocean environments to climate change and ocean acidification and, in partnership with tribes, coastal communities and States, design and implement adaptation strategies to reduce vulnerabilities.
- Providing Tools for Regional Action: Assess the vulnerability of communities and ocean environments to climate change and ocean acidification and support and implement adaptation strategies to promote informed decisions.

Through its phased vulnerability assessments, USACE is addressing climate issues identified in the NOPIP. Our sea level guidance program represents a collaborative effort to develop and disseminate methods, best practices, and standards for assessing coastal resilience in a changing climate. Through the use of the Social Vulnerability Index[13], USACE is able to identify vulnerable populations. Several of our pilot projects have assessed the impacts of sea level

[12] See http://www.whitehouse.gov/administration/eop/oceans/implementationplan

[13] See http://www.iwr.usace.army.mil/Media/NewsStories/tabid/11418/Article/13535/usace-iwr-advances-consistent-methodological-approach-for-considering-social-vu.aspx

change on ecosystem restoration projects. Informed decision-making is at the core of the sea level change adaptation guidance.

The FWP is entirely directed at climate change, and includes seven major goals with strategies and actions to be taken over the next five to ten years. The FWP goals are:

- Goal 1: Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate.
- Goal 2: Manage species and habitats to protect ecosystem functions and provide sustainable cultural, subsistence, recreational, and commercial use in a changing climate.
- Goal 3: Enhance capacity for effective management in a changing climate.
- Goal 4: Coordinated observation, information management, and decision support systems can help management strategies to be adaptive and adjust to changing conditions.
- Goal 5: Increase knowledge and information on impacts and responses of fish, wildlife, and plants to a changing climate.
- Goal 6: Increase awareness and motivate action to safeguard fish, wildlife, and plants in a changing climate.
- Goal 7: Reduce non-climate stressors to help fish, wildlife, plants, and ecosystems adapt to a changing climate.

These goals are entirely compatible with the USACE Environmental Operating Principles[14] established in 1992, and are tied to actions of the NAP and NOPIP. Our climate change adaptation plan and its supporting strategies are aligned with FWP goals. We include focus areas that address issues of concern in the FWP goals, emphasize collaboration and improving our knowledge, and are developing policy and guidance to support adaptation, including flexible, adaptive, effective management for changing conditions.

[14] See http://www.usace.army.mil/Missions/Environmental/EnvironmentalOperatingPrinciples.aspx

## 1.6. Engage in Meaningful External Collaboration

USACE understands that close collaboration, both nationally and internationally, is the most effective way to develop practical, nationally consistent, and cost-effective measures to reduce potential vulnerabilities resulting from global changes (Stockton and White 2011). That is why we are working closely with other agencies having aligned mission areas as we work to understand climate change impacts and to develop measures to adapt to these impacts. Our appreciation for the benefits of collaboration is also why we have provided support in the form of our senior engineers and scientists to the Federal Interagency Climate Change Adaptation Task Force (ICCATF) working groups, to the ICCATF Adaptation Community of Practice, and to US Global Change Research Program, among others.

### 1.6.1. Interagency Climate Change Adaptation Task Force

The USACE has played an active role in the ICCATF since its inception in spring 2009. The Assistant Secretary of the Army for Civil Works is the USACE representative to the ICCATF, which is composed of more than 20 Federal agencies and Executive branch offices and co-chaired by the CEQ, the National Oceanic and Atmospheric Administration (NOAA), and the Office of Science and Technology Policy (OSTP). In fact, the ICCATF was described in Section 16 of Executive Order 13514[15] signed by President Obama on October 5, 2009, as "already [being] engaged in developing the domestic and international dimensions of a U.S. strategy for adaptation to climate change…"

The ICCATF formed a number of working groups to help develop recommendations to support agency climate change adaptation planning and implementation. USACE actively participated in many of these, including the Agency Adaptation Processes working group (which developed recommendations for the *Implementing Instructions* (CEQ and OMB 2011)), the Water Resources Working Group (which developed the *National Action Plan Priorities for Managing Freshwater Resources in a Changing Climate*), the Fish, Wildlife and Plants Working Group (which developed the draft *Fish, Wildlife and Plants Climate Adaptation Strategy*[16]*),* and Coasts (which provided input to the *National Ocean Policy Implementation Plan*[17]).

[15] See http://www.gpo.gov/fdsys/pkg/FR-2009-10-08/pdf/E9-24518.pdf
[16] See http://www.wildlifeadaptationstrategy.gov/
[17] See http://www.whitehouse.gov/administration/eop/oceans/implementationplan

*“Managing water resources as a collaborative endeavor is becoming increasingly crucial as society faces demographic, economic, institutional, and climate changes manifesting across the U.S. and around the globe. These changes portend a different understanding of the risks associated with the occurrence, location, intensity and impacts of extreme events—including floods and droughts..”*

*- Mr. Steven L. Stockton, Director of Civil Works, U.S. Army Corps of Engineers, in "Responding to National Water Resources Challenges"*

### 1.6.2. Federal Agency Adaptation Community of Practice

The Federal Agency Adaptation Community of Practice is a spin-off from the ICCATF's Agency Adaptation Processes working group that provides a forum for interagency collaboration on facilities and climate change adaptation. The types of knowledge sharing fostered by the CoP include staff training and capacity building, methods for agencies to evaluate or measure progress, communication strategies, approaches to integrating adaptation into existing programs, and how to apply climate change scientific information in agency decision making. The USACE serves as an active member of both the working group and the CoP, and supported information exchange workshops before and after the CoP began. The types of knowledge sharing fostered by the CoP include staff training and capacity building, how agencies are evaluating or measuring progress, communication strategies, approaches to integrating adaptation into existing programs, concrete examples of agency adaptation projects and results, how to apply climate change scientific information in agency decision making, and providing agency-specific briefings about progress under their plans.

### 1.6.3. US Global Change Research Program Adaptation Science Working Group

Since 1989, the U.S. Global Change Research Program (USGCRP) has coordinated and integrated federal research around global changes, including climate change. Though USGCRP has focused primarily on science to date, there is an increasing emphasis on supporting adaptation planning and implementation. In 2012, USACE was appointed to co-chair this Working Group along with the US Department of Agriculture. High priority activities of this working group for USACE are:

- Advancing "actionable science" and evaluation frameworks and measures for adaptation efforts. "Actionable science" is the theory, data, analysis, models, and other tools available, relevant, reliable, and understandable for supporting multiple scales of decision-making around climate adaptation and mitigation questions. Actionable science can support decisions across wide spatial, temporal, and organizational ranges, including those of time-sensitive operational and capital investment decision-making. In many cases, climate science and climate change information must undergo a translation step to maximize its visibility, relevance, and utility for decision-makers to see it as actionable and to use it. The near-term focus is on Federal science products and services and the translation of these, where necessary, to be more accessible and more actionable for consistent Federal agency decisions around climate adaptation and mitigation.
- Helping to produce and test candidate evaluation frameworks and metrics appropriate for measuring the efficiency and effectiveness of adaptation and mitigation measures, first for Federal agencies' decisions and actions, then for the wider sets of decision makers.

### 1.6.4. Climate Change and Water Working Group

The Climate Change Water Working Group (CCAWWG) is an informal federal agency group that provides engineering and scientific collaboration in support of water management under a changing climate. Founded by USACE, DOI's Reclamation and USGS, and NOAA, CCAWWG has been an effective working-level forum since 2007 among federal agencies that fosters communication, operational, and research partnerships around user needs across the water resources and science communities of practice. CCAWWG now also includes FEMA, EPA, the National Atmospheric and Space Administration (NASA), and the USDA Agricultural Research Service. Other agencies with interests in water resources also participate (e.g., DOT FHWA).

CCAWWG has established a joint web site[18] to provide information on their activities, which include examinations of user needs for climate and weather information for long (>5 yrs) and short –term water resources planning and management (described in the section on Improving Knowledge below), as well as training classes supporting the NAP.

### 1.6.5. National Climate Assessment

The National Climate Assessment (NCA) is an important and official resource for understanding and communicating climate change science and impacts in the United States. The Global Change Research Act of 1990 mandates that periodic national climate assessments be conducted. A number of USACE staff have contributed to this 3rd draft National Climate Assessment since 2010, participating in forums and workshops, contributing to technical support reports, serving on author teams, helping to shape the ongoing assessment work, providing agency review comments on the draft released for comment in February 2013, and working to resolve the public comments in the NCA chapters. Several of the technical support documents participation have or will be released as interagency reports.

## 1.7. Improving Our Knowledge for Water Resources Management and Infrastructure Resilience

USACE is improving our knowledge about climate change impacts and adaptation through the use of targeted pilot studies to test new ideas and develop information needed to develop policy and guidance, assessments of our needs for climate information in decision-making, and developing training to support staff capabilities and foster interagency relationships that will support collaborative networks to address climate challenges and opportunities.

### 1.7.1. Pilot Studies

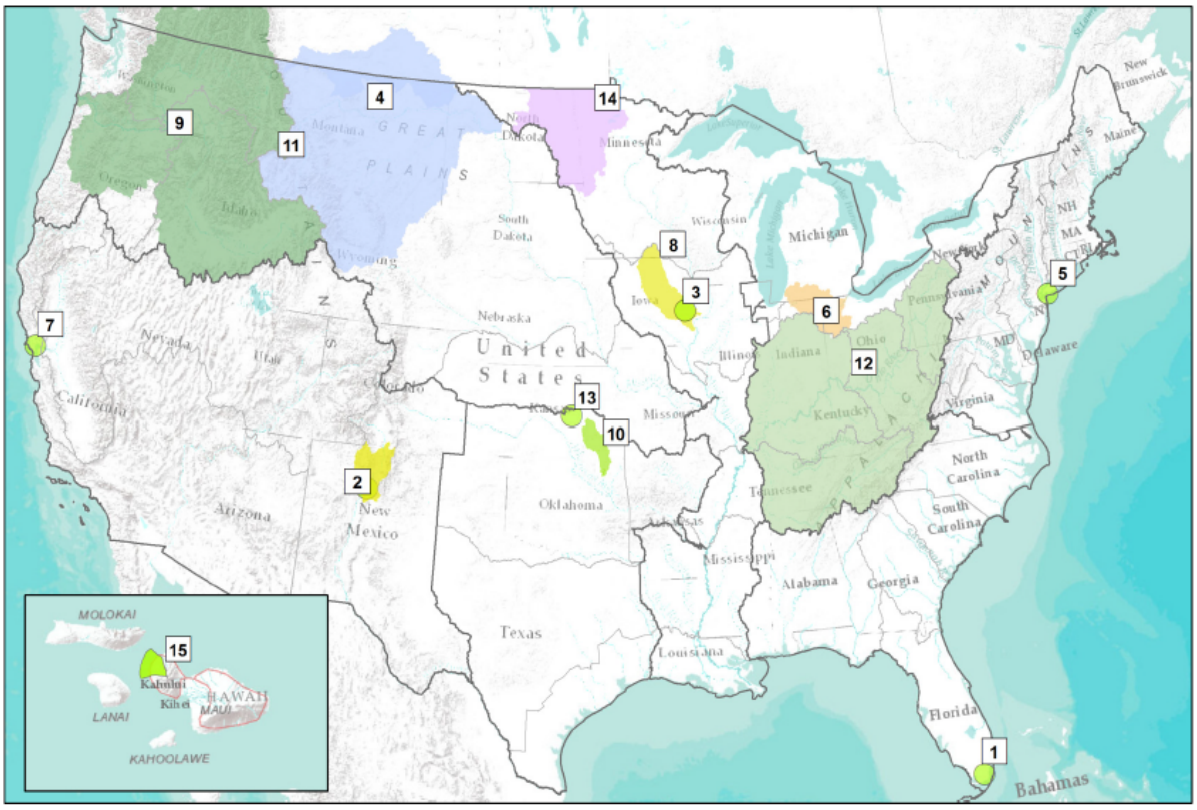
We are in our fourth year of testing methods and frameworks for adapting to climate change through the use of pilot studies[19]. These pilots help us develop and test alternative adaptation strategies to achieve specific business management decisions; identify new policies, methods, and tools to support adaptation for similar cases; learn how to incorporate new and changing climate information throughout the project lifecycle; to develop, test, and improve an agency level adaptation implementation framework; and to implement lessons learned in next pilot phase. The pilot projects span a diverse geographic and spatial scale as well as covering different business lines and functional areas. Each of these pilot studies addresses a central question that will help guide us as we develop policy and guidance to mainstream adaptation, including the following:

- How do we allow for shoreline retreat to preserve critical tidal and nearshore ecosystems in a long-term regional planning context?
- What is the relationship between changing climate conditions and reservoir sedimentation, and could this relationship shorten the lifetime of the infrastructure project or impact its flood control pool?
- How do we incorporate climate change considerations into reservoir operating policies that will be robust and adaptive to potential climate changes?

[18] See http://ccawwg.us/index.php/home
[19] See https://corpsclimate.us/rccpad.cfm for more information on the pilot studies

- How will dredging cost requirements at Great Lakes harbors vary in the future as the climate potentially changes precipitation regimes and runoff characteristics?

**Figure 3. Pilot Study Locations**




KEY

[1] Application of Sea-Level Change Guidance to **C-111 Spreader Canal**, Florida

[2] Climate Change Associated Sediment Yield Impacts on the Rio Grande, **Cochiti Dam and Lake**

[3] Climate Change Impacts on the Operation of **Coralville Lake**, Iowa

[4] Climate Change Associated Sediment Yield Impacts and Operation Evaluations at **Garrison Dam**, North Dakota

[5] **East Rockaway Inlet to Rockaway Inlet**, New York, Collaboration Framework Development

[6] Upland Sediment Production and Delivery in the **Great Lakes Region** under Climate Change

[7] Risk-Informed Decision-Making for Potential Sea-Level Rise Impacts on the **Hamilton Wetland** Restoration Project, California

[8] Climate Modeling and Stakeholder Engagement to Support Adaptation in the **Iowa-Cedar Watershed**

[9] Framework for Building Resiliency into Restoration Planning – **Lower Columbia River Estuary**

[10] Climate Change Impacts on Water Supply in **Marion Reservoir Watershed**, Kansas

[11] **Missouri River Basin** Mountain Snowpack – Accumulation and Runoff

[12] Formulating Mitigation/Adaptation Strategies through Regional Collaboration with the **Ohio River Basin** Alliance

[13] Utilization of Regional Climate Science Programs in Reservoir and Watershed Risk-Based Assessments, **Oologah Lake and Watershed**

[14] **Red River of the North** Flooding at Fargo, North Dakota

[15] Risk-Informed Decision-Making for Integrated Water Resource Management Planning, **West Maui Watershed**

- Can we develop a conceptual framework for how climate change information might be incorporated into ecosystem restoration projects?
- Is mountain snowpack and subsequent runoff changing due to changes in climate, and is the Missouri River Basin, therefore, more susceptible to droughts and floods?
- How do we facilitate well-designed and inclusive multi-stakeholder collaboration with the local decision makers for the purpose of identifying vulnerability to sea-level change

impacts, acceptable levels of risk, and the most acceptable alternatives over the project lifecycle?

The pilot projects have provided a body of knowledge and tested methods that can be used to successfully adapt projects to projected climate change. The pilots also demonstrate that in many cases, there is sufficient actionable science now to permit assessment of climate change impacts to projects and to support planning and design of measures to adapt to or avoid these impacts. Instead of waiting for highly technical adaptation guidance, broad initial policies could reduce the time and cost of adaptation by providing the legal and technical justification for action, narrowing the range of potential alternatives and guiding planning and study approaches to support the desired decisions. Lastly, the pilot projects showed that costs and benefits are dynamic and will change over time, just as climate does. Consideration of dynamic changes over time can guide adaptive management decisions.

### 1.7.2. Identifying User Needs for Adaptation

We are also improving knowledge through assessments of our needs for climate information in decision-making in association with agencies having aligned missions and operations. By providing those needs to science agencies, we can help shape science to meet our needs. In 2011, USACE and Reclamation published the report, *Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information*[20]. This report builds on the needs identified in USGS Circular 1331 and seeks to focus research and technology efforts to address information and tool gaps needed for longer-term water resources planning and management. The report concluded that there are gaps in the information and tools to help water managers understand how to use climate change information to make decisions, how to assess the responses of natural systems to climate change, and how to communicate the results and uncertainties of climate change to decision-makers. A follow-on report now being prepared by science agencies will present a strategy on how to meet the identified user needs.

In 2013, CCAWWG members USACE, Reclamation, and NOAA's National Weather Service (NWS) published a report about user needs for weather and climate information for short-term water management decisions. This report (*Short-Term Water Management Decisions: Use Needs for Improved Climate, Weather, and Hydrologic Information*[21]) describes short-term water management decision processes within USACE and Reclamation, including how assumptions of climate change and variability influence decisions. The report presents the types of monitoring and forecast information that is available from NWS and other agencies to support water resources management and discusses the characteristics and constraints on the development and use of this information. The draft report also contains a description of how information is currently used by USACE and Reclamation within its short-term water resource management activities. This report helps to identify opportunities to improve water resources management by communicating to the broad community of information providers and the research and development communities the needs of the management agencies within the mission authorities currently available. It will be followed by a science-agency prepared report laying out a strategy to meet the user needs expressed.

[20] See http://www.ccawwg.us/index.php/activities/addressing-climate-change-in-long-term-water-resources-planning-and-management

[21] See http://www.ccawwg.us/index.php/activities/short-term-water-management-decisions-user-needs-for-improved-climate-weather-and-hydrologic-information

### 1.7.3. Training to Support Adaptation

Reclamation is leading Action #21 (Establish a core training program on climate change science) of Recommendation 6 (Support Training and Outreach to Build Response Capability), of the National Action Plan Priorities for Managing Freshwater Resources in a Changing Climate. Together with USACE, NOAA, EPA, USGS, Denver Water Board, Water Utility Climate Alliance, and the University Center for Atmospheric Research's COMET Program, Reclamation has developed climate hydrology training. Two courses were offered as a pilot effort to help test and refine the curriculum: Part I is a 3-4 hour online training module that was released to the public in November 2012, and Part II is a resident course that was held at the University Corporation for Atmospheric Research (UCAR) in Boulder, CO in January 2013. 17. Course attendees are providing feedback to help us better target the course materials[22]. See http://ccawwg.us/index.php/preparing-hydro-climate-inputs-for-climate-change-in-water-resource-planning for more information. A crop water demand course was presented in March 2013, and two additional courses are in preparation.

### 1.7.4. Coupling Science and Engineering

USACE implements its Climate Change Adaptation Policy through close coupling of science and engineering to aggregate and translate science into actionable engineering information supporting adaptation policy and actions. This process allows USACE to take best advantage of the highly dynamic science of climate and climate change produced by the experts in other agencies, while leveraging and increasing our traditional capabilities in water resources engineering. USACE sets the questions, problems, and agenda of work in cooperative partnerships between scientists and engineers. Examples of this work follow:

- USACE, with support from the American Recovery and Reinvestment Act of 2009 (PL 111–5) joined with Climate Central, Lawrence Livermore National Laboratory (LLNL), Reclamation, Santa Clara University, Scripps Institution of Oceanography and USGS to support statistical downscaling of general circulation models supporting the 2007 Intergovernmental Panel on Climate Change (IPCC) known as the CMIP3 data set. The temperature and precipitation results were made available to the public in 2010 and 2011 through a web site hosted by LLNL (http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html).
- In 2012, NOAA, USGS, USACE and the Strategic Environmental Research and Development Program, published "Global Sea Level Rise Scenarios for the United States National Climate Assessment" which provides the expert consensus on how to account for sea level rise and serves as technical input to the 2013 National Climate Assessment.

## 1.8. Developing Policy and Guidance for Infrastructure Resilience

Our goal is to develop practical, nationally consistent, legally justifiable, and cost effective measures, both structural and nonstructural, to reduce vulnerabilities and improve the resilience of our water resources infrastructure impacted by climate change. Here, we categorize policy and guidance for datums, sea level change, and hydrology.

[22] See http://ccawwg.us/index.php/preparing-hydro-climate-inputs-for-climate-change-in-water-resource-planning

### 1.8.1. Policy and Guidance for Consistent Vertical Datums

The vertical datum is the base foundation for nearly all civil and military design, engineering, and construction projects in the USACE—especially those civil projects that interface with water. Elevations or depths may be referred to local or regional reference datums. The use of consistent nationwide vertical datums is a fundamental underpinning of adaptation to a changing environment, particularly where the combination of land subsidence and global sea level rise could result in rapidly changing conditions that impact USACE coastal infrastructure providing coastal storm risk reduction, flood risk reduction, navigation, and ecosystem benefits. In 2006, USACE began working to establish a consistent nationwide datum and subsidence standard to provide a foundation for all activities, but especially in coastal areas where datum conversions can be tricky and subsidence can have a large effect on project elevations. This includes a Comprehensive Evaluation of Project Datums (CEPD) and Compliance Database to ensure that all Corps projects are tied to the correct datum, and if they are not currently, require transition to current vertical datum. This program also developed the USACE Survey Marker Archive Retrieval Tool (U-SMART) Database to store project control information in a standard database referenced to the National Spatial Reference System. Following a number of interim guidance products, in December 2010, USACE published comprehensive guidance in the form of Engineer Manual 1110-2-6056, *Standards and Procedures for Referencing Project Evaluation Grades to Nationwide Vertical Datums*[23]*.*All USACE projects are working to meet a 2014 datum compliance deadline.

#### 1.8.1.1. Policy and Guidance for Sea Level Change

USACE has long recognized the potential of changing sea levels to impact our projects. Since 1986, USACE guidance has recognized the need to incorporate changing tide gauge information into planning and design of our projects. Since 2009, we have required the use of three scenarios of potential relative sea level change to be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence[24] Fluvial studies (such as flood studies) that include backwater profiling should also include potential relative sea-level change in the starting water surface elevation for such profiles, where appropriate. The guidance is used not only throughout USACE, but by other agencies as well, including the State of Florida[25]. A web-based tool enables users of the guidance to develop the three required scenarios at appropriate NOAA tide gauges[26]. EC 1165-2-212 is cited as an example of Federal policy supporting adaptation planning in several publications (e.g., Tebaldi et al 2012 and Bierbaum et al 2012).

The development of sea-level change adaptation implementing guidance is the focus of an interagency and international team developing a USACE Engineering Technical Letter (ETL) in the Global Change Series (1100): *Procedures to Evaluate Sea Level Change, Impacts, Responses, and Adaptation*. The expert team includes representatives from USACE districts, divisions, labs, and centers, and also from NOAA, USGS, Reclamation, Navy, Coast Guard, FHWA, FEMA, National Park Service, US Naval Academy, HR Wallingford (UK), University of Southampton (UK), and Moffat and Nichol Engineers. This collaborative process supports rapid incorporation of new and changing information and provides rapid knowledge transfer between agencies.

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[23] See http://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-6056.pdf
[24] See http://www.publications.usace.army.mil/Portals/76/Publications/EngineerCirculars/EC_1165-2-212.pdf
[25] See http://www.dot.state.fl.us/research-center/Completed_Proj/Summary_PL/FDOT_BDK79_977-01_rpt.pdf
[26] See http://www.corpsclimate.us/ccaceslcurves.cfm

This draft implementing guidance includes the development of thresholds and tipping points to guide adaptive, flexible adaptation and detailed implementation guidance on how to include sea-level change impacts and adaptation into USACE planning, engineering, construction, operation, and maintenance. The guidance integrates the recommended planning and engineering approach at the regional and project level necessary for understanding and adapting to impacts of projected sea-level change. A hierarchy of decisions supports an appropriate level of analysis. Key decision matrix concepts address sustainability, resilience, adaptive and anticipatory planning, and system and cumulative effects. External review was complete 1 June 2013, with comments from USGS, GSA, NOAA, Reclamation, and FHWA in addition to other comments. The team is in the process of resolving the comments prior to approval and release of the guidance.

#### 1.8.1.2. Climate Change and Inland Hydrology Guidance

Incorporating climate change considerations within our wide array of inland hydrology guidance is a priority action for USACE. Beginning in 2012 and continuing in 2013, we are developing an overarching enabling guidance document to address climate impacts to the hydrologic aspects of USACE projects and programs. This guidance builds on the core principles of scalable frameworks and scenarios to enable assessments of future project performance against the uncertainties of climate change. The scalable framework requires differing amounts and types of information, level of detail, and complexity of analyses depending on the questions being asked on a case-by-case basis (e.g., there are no “one size fits all” approaches). The scenario approach provides a range of plausible future outcomes against which project performance can be assessed.

The uncertainty associated with future climate provides an opportunity to use information from the very distant past to help frame characteristics of flood possibilities. This must be done in a manner that is consistent with USACE mission and goals as well as with considerations for the underlying assumptions associated with paleoflood information. USACE is developing policy and guidance addressing how and where paleoflood hydrology methods are relevant to USACE design and operations, including decisions such as estimating flood peak magnitudes, volumes and durations for flood damage assessments, or evaluating design criteria using the minimum essential guidelines.

# 2. Report of Progress to Mainstream Climate Adaptation

USACE has been working for five years now to identify what we know, what we don’t know, and what we can do to fill the knowledge gaps and develop the policy and guidance we need to adapt to climate change. We have analyzed our vulnerability to climate change, including identification of risks and opportunities, and continue to refine these analyses. We understand that our projects are part of a dynamic and evolving system, and that they can change continuously over time (vs. achieving and maintaining a single equilibrium state). Our experience with “wicked water resources” problems has shown us that we must be careful when we implement changes, because our incomplete understanding increases the potential for unintended consequences resulting from actions taken in isolation.

We understand the complexities of adaptation because our water resources engineers and managers — and our military staff — are already accustomed to making decisions under deep uncertainty of the kind that climate change brings. It is precisely this engineering ability to adapt to changing problems and conditions that provides a source of institutional and organizational resilience and experience to guide our climate change adaptation. For example, USACE made many difficult choices in 2011 alone in the interests of public safety – choices that were possible only because engineers in the 1920s and 1930s understood that future could bring changing conditions – and they designed options into the system that allowed us to adapt to these conditions.

### 2.1.1. Progress in the Context of the Flexible Framework for Adaptation

Our progress to date to support mainstreaming climate change adaptation has focused on clarifying our adaptation mission and goals and developing new policy and guidance to support adaptation implementation at multiple scales, from project-specific to nationwide. We are applying our strategic approaches to the priority areas identified in previous years, with a heavy emphasis on external collaboration and pilot tests to help improve our knowledge so we can make progress on the policy and guidance needed to mainstream adaptation.

USACE progress on adaptation is presented below in the context of the CEQ flexible framework for adaptation (Fig 4). All of these activities build awareness and skills within the USACE and for our partners and stakeholders.

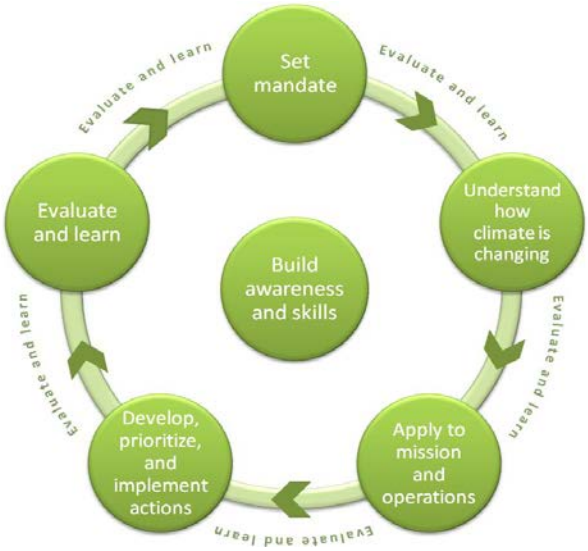


**Figure 4. CEQ's flexible framework for adaptation.**

**Table 1. USACE adaptation progress for the "Set Mandate" component of the CEQ flexible framework for adaptation.**

| Component of Flexible Framework for Adaptation | USACE Adaptation Action | Status |
|---|---|---|

| Component of Flexible Framework for Adaptation | USACE Adaptation Action | Status |
|---|---|---|
| Set Mandate | Overarching Policy Statement | 2011-present |
| | Adaptation Steering Committee | 2011-present |
| | Civil Works Strategic Plan "Sustaimable Solutions to America's Water Resources Needs." | 2011-2015 |
| | Technical Mandate - Datums: Datum and subsidence standard ER 1160-2-8160 | 2009 |
| | Technical Mandate - Coastal:<br>Extrapolate gauge record but consider change, HQ Memo<br>Extrapolate gauge and assess sensitivity to high rate of change, ER 1105-2-100<br>Consider three scenarios (lowest is extrapolate gauge) EC 1165-2-211 superceded by EC 1165-2-212<br>Adaptation to sea level and coastal change ETL 1100-2-xxx | <br>1986<br>2000<br>2009-2011<br>2013, completed review |
| | Technical Mandate - Hydrology:<br>General hydrologic approach<br>Appropriate use of paleoflood hydrology | <br>2013, draft<br>2013, in preparation |

**Table 2 USACE adaptation progress for the "Understand How Climate is Changing" component of the CEQ flexible framework for adaptation.**

| Component of Flexible Framework for Adaptation Component | USACE Adaptation Action | Status |
|---|---|---|
| Understand How Climate Is Changing | Report providing overview of climate change and variability impacts to water federal resources management, USGS Circular 1331 | 2009 |
| | Targeted climate change adaptation pilots | 2009-present |
| | Nonstationarity Workshop and proceedings to | |

| | | |
|---|---|---|
| | establish legal and scientific justification for future policy and guidance | 2010 |
| | Nonstationarity Journal Paper Special Collection, to establish scientific justification for approach | 2011 |
| | Participate in and now co-lead US Global Change Research Program Adaptation Science Working Group | 2010-present |
| | ARRA project developing statistical downscaling for public archive at Lawrence Livermore National Laboratory, leveraged Reclamation and NOAA funds | 2010-2011 |
| | Portfolio of Approaches Workshop to lay out issues in how to select and use climate information to support future science and guidance | 2011 |
| | NOAA Report: Sea Level Rise Scenarios technical support to NCA | 2011-2012 |
| | USGS Report: Water Resources technical support to NCA | 2011-2013, in publication |
| | Report on Appropriate Uses of Paleoflood Information in CW Programs | 2011-2013 |
| | Authoring chapters of National Climate Assessment (NCA) Report | 2011-present, resolving review comments |
| | HUC-4 CMIP5 BCSD VIC hydrology for CONUS – gives standard set of hydrology for use in initial adaptation decisions | 2012-2013 |
| | Annotated bibliography of nonstationarity to inform decisions and future guidance | 2011-2013, draft |
| | Interagency expert group assessing nonstationarity to support future guidance | 2012-present |

**Table 3. USACE adaptation progress for the "Apply to Mission and Operations" component of the CEQ flexible framework for adaptation.**

| Component of Flexible Framework for Adaptation Component | USACE Adaptation Action | Status |
|---|---|---|
| Apply to Mission and Operations | Identify key vulnerabilities and adaptation options, USGS Circular 1331 | 2009 |
| | Targeted climate change adaptation pilots covering range of missions, life-cycle phases, geographic locations, and spatial scales | 2009 – present |
| | Proof of concept inland vulnerability assessment, with associated tools and methods | 2010-2012 |
| | Report on User Needs for Long-Term Water Resources Planning and Management –what information and science do we need to know so we can make better long-term decisions? | 2011 |
| | Initial screening-level coastal vulnerability assessment with associated tools and methods | 2011 – present: |
| | Screening-level inland vulnerability assessment, with updated information and enhanced tools | 2012 – present: |
| | Report on User Needs for Short-Term Water Management Decisions – –what information and science do we need to know so we can make better short-term decisions? | 2013 |

**Table 4. USACE adaptation progress for the "Develop, Prioritize, and Implement Actions" component of the CEQ flexible framework for adaptation.**

| Component of Flexible Framework for Adaptation Component | USACE Adaptation Action | Status |
|---|---|---|
| Develop, Prioritize, and Implement Actions | Datums: | |
| | Comprehensive Evaluation of Project Datums (CEPD) | 2006-2008 |
| | CEPD Compliance Tracking Tool | 2008-present |
| | All project datums in compliance | Scheduled 2014 |
| | Coastal: | |
| | Incorporate three sea level scenarios in project | 2009-present |

| | | |
|---|---|---|
| | planning, design, and implementation<br><br>Incorporate adaptation to sea level change in project planning, design, and implementation<br><br>Provide supporting tools (e.g., sea level calculator) | <br><br>Begin 2013<br><br>2011-present |
| | Hydrology:<br><br>Compile drought contingency plans, develop strategy to update to account for climate change, prioritize and conduct updates for high priority projects/systems<br><br>Compile reservoir sediment information, develop strategy to update to account for climate change, prioritize and conduct updates for high priority projects/systems | <br><br>2011-present<br><br>2011-present |

**Table 5 USACE adaptation progress for the "Evaluate and Learn" component of the CEQ flexible framework for adaptation.**

| **Component of Flexible Framework for Adaptation Component** | **USACE Adaptation Action** | **Status** |
|---|---|---|
| Evaluate and Learn | Targeted adaptation pilots to provide lessons learned learn about climate impacts and vulnerabilities and how to adapt | 2009-present |
| | Lessons Learned from applying EC 1165-2-211, including how to plan with multiple future scenarios, level of effort tied to decision and consequences, vulnerabilities and adaptation tied closely to project purposes | 2009-present |
| | Training: | 2012-present |
| | Army Campaign Plan Metrics | 2012 |
| | USACE Campaign Plan Metrics | 2013 |
| | Participation in R&D projects for DoD | 2010-present |

## 2.1.2. Selected Examples of Mainstreaming Adaptation

USACE has been working to mainstream climate change adaptation for several years so that adaptation is integrated into policy, budget, engineering design, implementation and ongoing evaluation in a way that establishes adaptation as standard practice. Adaptation encompasses a continuum of actions that may progress in a linear fashion, may involve iteration, or may end without implementation.

Examples of adaptation actions include understanding climate change impacts, assessing vulnerabilities to climate, planning various responses, engineering design of adaptation measures, and implementing adaptation. Decisions made at each step are adaptation decisions – a physical or operational change is not the only appropriate end point when mainstreaming adaptation. Example projects of where and how adaptation has been integrated into the USACE are presented here. These are both coastal and inland projects. The distinction is important because there is existing guidance supporting planning and design for coastal projects, whereas for riverine projects, guidance is not yet available.

- Neuse River Basin, NC alternatives were formulated on the historic rate of sea level rise and sensitivity analyses were conducted for the other curves. As a result, the rock sill design height is set to account for some accelerated sea level rise. Under the low and intermediate scenarios, the sill remains functional. Under the high scenario, the sill would still function as desired, but at a reduced level as higher sea levels occur.
- Walton County, FL project includes adaptation to changing sea levels through the beach renourishment cycle.
- The Fargo-Moorhead Metropolitan Area Flood Risk Management study used an interagency and academic Expert Opinion Elicitation (EOE) panel to develop a statistical approach to incorporate climate variability into the discharge-frequency curve for Fargo. The EOE was conducted using the technical guide for use of EOE developed by the Risk Management Center. The EOE identified a change in hydrology. The hydrologic information developed through this process is used in the on-going Red River Basin Feasibility study, which is developing detailed hydrologic and hydraulic models to determine the impact of various flood storage alternatives.
- Jacksonville Harbor Mile Point, FL found that the potential effects of sea level rise would be much less severe under the with-project condition. The selected plan was the only alternative capable of addressing and successfully improving the direction of the water flowing out of the Intracoastal Waterway under the existing tidal conditions while retaining adaptive capacity to preserve performance under future sea level scenarios.
- The climate change and modeling data for an analysis of sediment impacts to Cochiti Dam and Lake is being used in several ongoing studies in the Albuquerque District:
    a. Santa Clara Pueblo Watershed Assessment (Section 203) considers observed climate trends and projected climate changes to address likely future changes to watershed hydrology on the Pueblo's lands, with particular attention to flood risk and water resources development at the Pueblo.
    b. Española, NM (General Investigation) includes climate trends and projected climate projections in planning sustainable ecosystem restoration for flood risk reduction and watershed management restoration for three Tribes in the Española region of northern New Mexico.
    c. Middle Rio Grande Endangered Species Collaborative Program: Under the CESPA Collaborative Program Authority, the District is collecting and disseminating information on regional climate trends and future climate projections to the 16 member agencies of the Collaborative Program to inform

ecosystem restoration projects required by the USFWS Middle Rio Grande Water Operations Biological Opinion (2003).

- The LRD Water Management staff has been participating on a task team appointed by the International Joint Commission (IJC) to address future extreme water levels in the Great Lake-St. Lawrence River system. That task team has recently released a draft Adaptive Management Plan for public review and comment and by the end of May 2013 will be submitting a final version of the Adaptive Management Plan to the IJC for consideration. This bi-national Adaptive Management Plan responds to changing climate and the limited ability to alter lake levels through regulation of flows from Lake Superior and Lake Ontario.

### 2.1.3. Public Comment on 2012 USACE Climate Change Adaptation Plan and Report

In accordance with the March 2011 Implementing Instructions, USACE prepared and submitted a 2012 Climate Change Adaptation Plan and Report to CEQ and OMB in June 2012. This Plan and Report is included as an Appendix to the USACE FY12 Sustainability Plan. CEQ and OMB had no comments on the USACE plan, and requested that it be released to the public for a 60-day comment period beginning 7 February 2013. Two public comments were received, both of whom applauded the USACE on its proactive approach and leadership in adaptation. The public comments and USACE responses are summarized in Table 6.

**Table 6. Summary of public comments and USACE Response.**

| Commenter | Commenter's recommendation | USACE response |
|---|---|---|
| The Nature Conservancy | Include non-Federal public and private partnerships in collaborative efforts | Concur |
| | Provide web-based tools and data to share information with state, local, and NGO partners | USACE is actively doing so (e.g., sea level rise calculator, https://corpsclimate.us/ccaceslcurves.cfm) |
| | Continue and expand pilot projects | Concur, as funds permit |
| | Consider incorporating lesson learned in the Quality Management System (QMS) | USACE will examine appropriate forums for lessons learned |
| | Incorporate natural solutions in adaptation | Concur. The North Atlantic Coast Comprehensive Study emphasizes natural solutions |
| Georgetown Climate Center | Expand consideration of sea level change in the regulatory program | Concur |
| | Collaborate with other Federal agencies around sea level rise (e.g., FEMA) | Concur. USACE, FEMA, NOAA, USGCRP, and CEQ have teams to provide and integrated tool for use in considering projected sea level impacts to coastal flood zones |

# 3. Summary and Conclusions

The US Army Corps of Engineers (USACE) understands that climate change is among the major challenges of the 21st century, and can impact all areas of our missions and operations. For more than five years now, we have made progress on a comprehensive approach to climate change that incorporates new knowledge and changing conditions about vulnerabilities, risks and opportunities into our missions, operations, programs, and projects. Our approach enhances the capacity of our planning, design, construction, operations, and maintenance to adapt to changing climate and other global changes.

Our goal is to develop practical, nationally consistent, legally justifiable, and cost effective measures, both structural and nonstructural, to reduce vulnerabilities and improve the resilience of our water resources infrastructure impacted by climate change. We are taking a collaborative approach that takes advantage of different perspectives and expertise so that our progress on adaptation reflects the best available and actionable science. But in turn, we are working to help guide the science to better meet our needs and the needs of other land and water resources agencies.

This USACE Climate Change Adaptation Plan and Report provides the information requested by the Council on Environmental Quality in their *Implementing Instructions for Federal Agency Climate Change Adaptation* issued on 4 March 2011 and the 29 February 2012 statement on *Preparing Federal Agency Climate Change Adaptation Plans In Accordance with Executive Order 13514*.

We believe that this *2013 USACE Adaptation Plan and Report*, prepared at the direction of the USACE Adaptation Steering Committee, demonstrates a broad understanding of the challenges posed by climate change to our mission, programs, and operations, and a commitment to undertake specific actions in FY 2013 and beyond to better understand and address those risks and opportunities. We present information about how we plan and evaluate agency adaptation planning, describe programmatic activities supporting climate change adaptation, and describe efforts to both better understand and to address climate change risks and opportunities. We are pilot-testing adaptation methods, sharing lessons learned within and outside the agency, and refining our adaptation based on the new knowledge. Working within a risk-informed framework that considers all of the challenges facing us will enable USACE to implement integrated water resources management solutions to the impacts of climate change.

This document also provides additional information on current USACE adaptation planning and implementation progress. The scope, collaboration, and resources we have applied to understand climate change and make progress on adaptation planning and implementation. Our work demonstrates the importance we place on this critical challenge to the long-term sustainability of our mission, operations, programs and projects, which oversee and administer public water resources and associated infrastructure in every state, as well as several international river basins, and support military operations worldwide that promote peace and stability.

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# Appendix A: Guiding Principles for Adaptation

PROGRESS REPORT OF THE INTERAGENCY CLIMATE CHANGE ADAPTATION TASK FORCE - 2010

**Guiding Principles for Adaptation**

**Adopt Integrated Approaches:** Adaptation should be incorporated into core policies, planning, practices, and programs whenever possible.

**Prioritize the Most Vulnerable:** Adaptation plans should prioritize helping people, places and infrastructure that are most vulnerable to climate impacts and be designed and implemented with meaningful involvement from all parts of society.

**Use Best-Available Science:** Adaptation should be grounded in the best-available scientific understanding of climate change risks, impacts, and vulnerabilities.

**Build Strong Partnerships:** Adaptation requires coordination across multiple sectors and scales and should build on the existing efforts and knowledge of a wide range of public and private stakeholders.

**Apply Risk-Management Methods and Tools:** Adaptation planning should incorporate risk-management methods and tools to help identify, assess, and prioritize options to reduce vulnerability to potential environmental, social, and economic implications of climate change.

**Apply Ecosystem-based Approaches:** Adaptation should, where relevant, take into account strategies to increase ecosystem resilience and protect critical ecosystem services on which humans depend to reduce vulnerability of human and natural systems to climate change.

**Maximize Mutual Benefits:** Adaptation should, where possible, use strategies that complement or directly support other related climate or environmental initiatives, such as efforts to improve disaster preparedness, promote sustainable resource management, and reduce greenhouse gas emissions including the development of cost-effective technologies.

**Continuously Evaluate Performance:** Adaptation plans should include measureable goals and performance metrics to continuously assess whether adaptive actions are achieving desired outcomes.

From http://www.whitehouse.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf

# Appendix B: Climate Change Impacts to Missions and Operations.

| Projected Climate Change | Potential Impacts | Potential USACE Vulnerabilities/Opportunities |
|---|---|---|
| Increasing air temperatures | Increases to average temperature, which will vary regionally and over time; increasing frequency and intensity of extreme heat; increasing length of frost-free season; changes in form of precipitation (snow vs. rain); reduced ice volume and extent on lakes, rivers, oceans, and in glaciers; increased permafrost temperatures and permafrost thawing; changes in water and energy demand; altered habitat suitability; increasing water temperature and associated lake stratification and water quality; changes in invasive species or pest distribution; warmer sea surface temperatures and potentially altered circulation patterns; changed evapotranspiration impacting reservoirs and soil moisture; increased risk of wild fires; alterations in material properties | Increases in worker safety limitations due to extreme heat and intensified air pollution; increased heat-related illnesses; increased risk of wildfire; potential increases in the length of the ice-free shipping season; potential increases in shoreline erosion where shorefast ice no longer exists; altered environmental windows; greater uncertainty of water supply and demand affecting navigation, ecosystem restoration, hydropower, recreation, and water supply; potential changesthat affect the delineation of the waters of the US; wetland and other impacts to the regulatory mission; potential increases in energy costs for cooling facilities and potential offsets for heating; potential decreases in the reliability of energy; potential for coastal extreme high water events associated with altered ocean circulation; potential changes in vertical construction equipment, material, and operating responses to increased temperature; threatened and endangered species may be adversely affected or benefit. |
| Changing precipitation | Changes in seasonal precipitation that vary regionally and seasonally :in general, the northern US is projected to see more winter and spring precipitation and the South is projected to see less precipitation in the spring, and increased precipitation is projected for Alaska in all seasons; increase in the frequency and intensity of heavy and very heavy precipitation events, including | Increasing uncertainty in projected precipitation and/or nonstationary hydrology could alter design standards and criteria; more variable reservoir inflow, lake levels, and channel depths could impact performance of flood risk, navigation, ecosystem restoration, hydropower, recreation, and water supply missions; more intense flooding over most |

| Projected Climate Change | Potential Impacts | Potential USACE Vulnerabilities/Opportunities |
|---|---|---|
| | in the Southwest, where overall precipitation will be decreasing ( =greater potential for flash floods); increasing frequency, duration, and extent of drought; summer droughts are expected to intensify in most regions of the U.S., especially in the Southwest, Southeast, and Hawai'i in response to both rising temperatures and changes in precipitation; changes in snow volume and onset of snowmelt; more variable stream flow and lake levels; altered habitat suitability; changes in invasive species or pest distribution; change in magnitude and frequency of flooding and low flows; altered sediment regimes, streambank erosion, aggradation, and degradation; changes in stormwater magnitude and frequency and levels of pollutants in runoff; altered groundwater recharge and consumptive uses; | of the US, but especially in the Midwest and Northeast requires increased need for emergency preparedness, response and recovery; changes in the delineation of the waters of the US; wetland and shoreline impacts within the scope of the regulatory mission; increasing need for drought preparedness; potential mismatch of water supply and demand could impact existing and planned water allocation and reallocation; ; increasing very heavy precipitation may alter reservoir sediment conditions and changes in dredging requirements for rivers and harbors; increasing potential for wildfire with increased drought; changes in soil moisture could alter infiltration and impact rainfall-runoff relationships; more intense precipitation and runoff generally increase sediment, nitrogen, and pollutant loads, shifts in ecosystem structure and function may adversely impact or benefit threatened and endangered species. |

| Projected Climate Change | Potential Impacts | Potential USACE Vulnerabilities/Opportunities |
|---|---|---|
| Increases in extreme weather | Increasing variability, altered seasonality, and changing intensity or frequency of heat waves, floods and droughts, depending on location; warming sea surface temperatures are projected to result in increasing tropical storm intensity for the largest storms. | Increases in extreme weather and storms will require increased emergency preparedness, response, and recovery; increasing uncertainty in the magnitude and frequency of extreme floods could impact life safety and alter design standards and criteria; more variable reservoir inflow and lake levels could impact performance of flood risk, navigation, ecosystem restoration, hydropower, recreation, and water supply missions; impacts to wetlands shorelines that impact the regulatory missions; more intense and/or frequent heat waves will impact worker safety, potentially limiting construction and operations; increased floods, droughts, and storms impact sedimentation and shoaling, altering dredging requirements; more intense floods and droughts will impact navigation reliability; increased flooding will impact transportation, electrical power, medical, and communications infrastructure. |
| Sea level change and associated tides, waves, and surges | In Alaska and the Pacific Northwest, locations experiencing glacial rebound may be impacted by falling local relative sea levels, increasing shoreline erosion and the need for dredging. Elsewhere, rising local relative sea level will cause more frequent inundation of low-lying land; increased shoreline erosion and changes to barrier islands and inlets; increased storm waves, surges, tides; loss of or changes to coastal wetlands; changes in estuarine structure and processes; increased saline intrusion into coastal aquifers; altered sedimentation and shoaling in channels and harbors; changes in ecosystem structure and species distributions, including invasive species and | Increased need for emergency preparedness, response, and recovery for more frequent inundation; increasing uncertainty in the magnitude and frequency of storm tides and surges could alter design standards and criteria; higher average and extreme water levels could impact performance of navigation, coastal risk reduction, ecosystem restoration, and missions; changes in sedimentation and shoaling could impact dredging; decreases in harbor and port performance reliability; changes in delineation of the waters of the US; impacts to wetlands that affect the scope of the regulatory mission. |

| Projected Climate Change | Potential Impacts | Potential USACE Vulnerabilities/Opportunities |
|---|---|---|
| | pest; altered frequency and extent of harmful algal blooms and coastal hypoxia events; | |

# Appendix C. Recommendations and Actions in the National Action Plan Priorities for Managing Freshwater Resources in a Changing Climate

**Recommendation 1 Establish a Planning Process**

**Action 1** Establish a planning process with the capability to identify priority adaptation actions and promote their implementation

**Action 2** Establish an organizational framework to promote effective management of water resources in a changing climate

**Recommendation 2 Improve Water Resources and Climate Change Information for Decisionmaking**

**Action 3** Strengthen data for understanding climate change impacts on water resources

**Action 4** Create a program to align "hydroclimatic" statistics with today's climate and anticipate future changes

**Action 5** Implement surveillance system for tracking waterborne disease/health threats relevant to climate change

**Action 6** Provide coastal states/communities with information to identify areas likely to be inundated by sea level rise

**Action 7** Establish interagency effort to expedite implementation of the newly developed wetlands mapping standard

**Recommendation 3 Strengthen Assessment of Vulnerability of Water Resources to Climate Change**

**Action 8** Publish guidance on the use of modeled projections for water resources applications

**Action 9** Develop a Federal internet portal to provide information on water resources and climate change

**Action 10** Develop a pilot climate change vulnerability index for a major category of water facilities

**Action 11** Continue development of tools and approaches that build capacity for water institutions to conduct vulnerability assessments and implement appropriate responses

**Action 12** Assess vulnerability of watersheds and aquatic systems in National Forests and Grasslands

**Action 13** Promote free and open access to authoritative climate change science and water resources data

**Recommendation 4 Expand water use efficiency**

**Action 14** Develop nationally consistent metrics for water use efficiency in key sectors

**Action 15** Consider making water use efficiency an explicit consideration in the revision of Principles and Standards for water resources projects and in the new NEPA guidance on climate change

**Action 16** Enhance coordination among current Federal water efficiency programs and create a "toolbox" of key practices

**Recommendation 5 Support Integrated Water Resources Management**

**Action 17** Work with States and interstate bodies (e.g., river basin commissions) to provide assistance needed to incorporate IWRM into their planning and programs, paying particular attention to climate change adaptation issues

**Action 18** Revise Federal water project planning standards to address climate change

**Action 19** Work with States to review flood risk management and drought management planning to identify "best practices" to prepare for hydrologic extremes

**Action 20** Develop benchmarks for incorporating adaptive management into water project designs, operational procedures, and planning strategies

**Recommendation 6 Support Training and Outreach to Build Response Capability**

**Action 21** Establish a core training program on climate change science for local, Tribal, and State water resources managers

**Action 22** Focus existing youth outreach programs on climate change and water issues

**Action 23** Engage Water Resources Research Institutes at land grant colleges in climate change adaptation research

**Action 24** Increase graduate level fellowships in water management and climate change