

**Federal Sustainability Plan 2015**  
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# **National Archives and Records Administration**

## **Introduction**

# National Archives and Records Administration



## 2015 Strategic Sustainability Performance

**June 26, 2015**

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## **Agency Policy Statement**

The National Archives and Records Administration (NARA) is committed to meeting statutes, regulations and Executive Orders (EOs) pertaining to the environment, energy and sustainability. NARA has exceeded those requirements to date, and continues to improve, as evidenced by awards for Leadership in Federal Energy Management (2008), and for outstanding achievement in building energy efficiency and renewable energy development and deployment (2010). NARA surpassed agency goals for water conservation and established green building requirements for all new construction projects. NARA's first new building constructed under the requirements (W. J. Clinton Presidential Library) is certified LEED Platinum U.S. Green Building Council's rating system. The latest addition is the George W. Bush Presidential Library (dedicated on April 25, 2013), also certified LEED Platinum.

Last year, NARA reduced its energy intensity 30.2%, compared to the FY2003 baseline. NARA continues to improve energy intensity year over year, and is a leader among federal agencies. We have also implemented highly innovative measures to reduce our carbon footprint. For example, we installed an in-vessel composting system at the College Park facility. We collect and compost our cafeteria food waste, paper towels from restrooms, yard waste and other waste, turning them into a usable product. We use some of the compost on our community garden plots. The compost system has reduced solid waste generated by 50% and eliminates over half of the tipping fees and trips to the landfill, thus reducing Scope 3 greenhouse gases. We also installed additional solar/PV and Combined Heat and Power (CHP) systems that produce electricity on-site, eliminate transmission losses, and use the heat from power generation to preheat feed water to the boiler. Building on our successes, this year's Strategic Sustainability Performance Plan (SSPP) outlines an expanded set of sustainability goals. NARA is redoubling its efforts on GHG reduction, renewable energy production, and water conservation. In addition, the agency has expanded the scope of its sustainability goals to include: regional and local climate adaptation planning, and more emphasis on pollution prevention, waste reduction, sustainable acquisition, and electronic stewardship.

To help meet our new goals, NARA is undertaking the following measures for FY2016:

- Continue to improve energy conservation at all facilities, based on lessons learned.
- Expand on-site energy generation via renewable energy and other sources.
- Improve internal energy audit procedures to address sustainability goals and climate change.
- Complete a multiple site ESPC project at all Presidential Libraries and the National Archives at Atlanta.
- Complete the College Park Archives ESPC to include several additional ECM's.

These measures demonstrate sustained commitment by NARA, and reflect the dedication of significant staff time. These investments will help NARA meet the intent of Executive Order 13693, save taxpayer dollars, and improve our carbon footprint, thus further strengthening NARA's reputation as a sustainability leader. This plan helps maintain dialogue on how NARA can become more sustainable, and further raise the bar on energy, water, and GHG reductions. We look forward to input and feedback on NARA's Sustainability Plan.



Mark D. Sprouse  
Agency Chief Sustainability Officer

**National Archives and Records Administration  
2015 Strategic Sustainability Performance Plan  
Executive Summary**

The National Archives and Records Administration (NARA) serves American democracy by safeguarding and preserving Government records, to ensure that citizens may continue to discover, use, and learn from this documentary heritage. We provide continuing access to essential documentation of the rights of Americans and the actions of our Government. By ensuring the maintenance and preservation of these documents and artifacts, we support democracy, promote civic education, and facilitate historical understanding of our national experience.

NARA owned and operated seventeen separate facilities in 2014, all dedicated to the preservation, storage, display, and use of historical documents and artifacts. In April 2013, an additional Presidential Library, George W. Bush, was dedicated and opened to the public. NARA's documents and artifacts must be maintained in a controlled environment (temperature, humidity and air quality) 24 hours per day, 365 days per year. Due to the stringent requirements for storage and display (found in 36CFR, Chapter XII, Part 1234), all NARA-owned facilities are excluded from the energy reduction requirements of the National Energy Conservation Policy Act (NECPA), as amended by the Energy Policy Act of 2005. Conventional performance measures are rendered meaningless by the overwhelming proportion of process-dedicated energy required for NARA's "stack" space, which represents the largest percentage of the agency's gross square footage. Despite the exempt status of these facilities, NARA has continued to:

- Complete and file all necessary annual energy management reports.
- Comply with all energy efficiency requirements.
- Aggressively pursue energy and water conservation projects.

**Vision:**

NARA has consistently demonstrated long-range thinking and implementation for energy, water, and GHG reduction. The agency has realized year after year, significant reduction in energy and greenhouse gas emissions. NARA was one of four Government agencies to win a FY2008 Presidential Award for Leadership in Federal Energy Management. In 2010, NARA won the GreenGov Presidential Award. NARA was recognized as the winner of the "Lean, Clean, and Green" Award, for outstanding achievement in building energy efficiency and renewable energy development and deployment. In November 2013, NARA was recognized and awarded with the Energy Star Combined Heat and Power award by the EPA. NARA continues to build on its efficiency via additional ESPC projects, capital funded projects, and by implementing "lessons learned" on prior projects. NARA intends to stay on the forefront of new technologies and increase renewable energy use.

**Leadership:**

Besides attaining the awards listed above, NARA continues to lead the Federal community by example. Although we are a small agency, with very limited resources, and an energy intensive mission, senior management understands the importance and benefits of meeting energy, water, GHG, and sustainability challenges to meet the ultimate goal of agency resiliency. Sustainability



and resiliency (to Climate Change) is ultimately met by following and meeting or exceeding requirements of Executive Orders 13423, 13514, 13653, and 13693, EPACT, EISA, agency standards, and LEED. By meeting all of these requirements, NARA is poised to be ready for climate change challenges and opportunities. NARA is ahead of schedule to meet sustainability, energy, GHG, and water goals described and outlined in the above referenced requirements. NARA's team is moving beyond energy and water reduction, and is now poised to exceed waste reduction requirements by implementing an on-site compost system, to complement recycling strategies. The compost system at Archives II in College Park, Maryland alone is producing about 1000 lbs of compost daily which is used on site, thus reducing the need for purchasing mulch and hauling the waste offsite.

NARA recognizes that resiliency can only be met through regular scrutiny of changes made to meet sustainability goals, and being aware and poised to move forward based on observations and collaboration with other parties on any significant climate changes in progress, or yet to happen.

NARA's Chief Sustainability Officer (CSO), along with a small dedicated team of professionals, will move NARA towards attainment of the goals outlined herein. The CSO is responsible for the implementation of goal achievement and is accountable to the Executive for Business Support Services who will provide executive leadership and representation to the agency management team.

**Performance Summary/Review:**

Between FY 2006 and FY 2014, NARA invested millions of dollars in energy efficiency projects. The two most innovative and successful projects are a \$5.7M Energy Savings Performance Contract (ESPC) project (with 8-year ROI) at Archives II and a \$5.8M ESPC project (with 7-year ROI) at Archives I. NARA worked directly with the Energy Services Company to develop and implement energy conservation measures (ECMs) at each facility:

- Upgrade and optimize energy management control systems;
- Improve heating plants;
- Reduce steam distribution losses;
- Rebalance HVAC systems;
- Re-set condenser water temperature;
- Reduce water usage;
- Reduce bathroom exhaust fans run times;
- Retrofit lighting and controls; and
- Upgrade building envelopes.

NARA's energy intensity and greenhouse gas (GHG) reductions are summarized below:

- In FY 2014, NARA's intense effort to reduce energy use has continued to yield exceptional savings.
- Energy intensity (126,497 Btu/GSF) is down 30.2% compared to FY2003 baseline (181,189 Btu/GSF).
- Scopes 1&2 GHG emissions of are down 19.9% (53,096 tons CO<sub>2e</sub>) as compared to FY2008 baseline (66,303 tons CO<sub>2e</sub>).

- Scope 3 GHG emissions are down 16.2% (12,198 ton CO<sub>2e</sub>) compared to FY2008 baseline (14,557 ton CO<sub>2e</sub>).

Since FY2008, the Archives II facility, has contributed the greatest reduction toward agency energy use. Archives II utility consumption has resulted in a noticeable reduction in annual utility costs as well. The sustained reduction in Archives II energy use and costs is attributed to both aggressive conservation measures included in the Archives II's ESPC project, and excellent collaboration between NARA employees, ESPC and O&M contractors.

NARA is moving toward using self-generated energy. Photovoltaic solar panels at Clinton Library produced 58,922 KWH in FY2014. The new Photovoltaic solar system at the G. W. Bush library produced 25,850 KWH. Photovoltaic solar panels at Archives II produced 197,338 KWH in FY2014. NARA purchased 6,190,237 KWH of renewable energy credits of wind power through the GSA area-wide contract. This year, NARA's renewable energy use was 8.3%. NARA installed an additional 335 KW of solar PV capacity at Archives II in February 2015.

Strong water conservation measures were exercised at NARA. In FY2012, due to extreme drought at several of our sites, NARA water consumption was 23.5 gallons per GSF, an increase compared to the previous two years, but still 11.4% less than the FY2007 baseline of 26.6 gallons per GSF. In FY2013, NARA water consumption was 21.4 gallons per GSF, down 19.6% compared to the FY2007 baseline. In FY2014, water consumption was 21.3 gallons per GSF, down 19.9% compared to FY2007 baseline.

Holdings at NARA facilities must be maintained in a controlled environment 24 hours per day, 365 days per year (for temperature, humidity and air quality). It is not lifecycle cost effective to design NARA facilities to 30% below ASHRAE Standards. NARA strives to meet the intent of this requirement but given the sensitive nature of its holdings, it is not always possible to attain 30% below ASHRAE recommendations.

NARA-owned facilities have standard and advanced electrical meters, and standard meters for gas, steam, and water. Advanced metering helps NARA comply with its precise measurement requirements. NARA Directive 1571, and The Architecture and Design Standards for Presidential Libraries outline building requirements for storage and safekeeping of archival materials. New Presidential Library facilities are built to the above standards, and also to LEED Platinum certification, thus meeting energy, water, GHG, and sustainability requirements. The Presidential Library Design Standards were also revised to comply with EPACT 2005, Executive Orders 13423, 13514, 13653, and 13693 requirements.

NARA has typically funded all non-ESPC energy savings projects with existing Operations and Maintenance appropriations. With the significant sequestration budget cuts and those anticipated in the out years, existing O&M appropriations are severely impacted and sufficient only to fund present operations. Similarly, the Repair and Restoration appropriation has been reduced to levels that preclude using it for any energy savings projects. While the ESPC mechanism is still in place and being utilized, these dwindling direct appropriations streams force the agency to

finance longer term payback measures which were typically funded by direct appropriations. These direct appropriations keep the finance terms and pay back terms at reasonable levels.

**Progress on Administrative Priorities:**

As part of the Energy Independence and Security Act (EISA) section 432 requirements, NARA continues to perform energy audits and building condition reports at all 17 facilities. The audits identify low cost/no cost Operations and Maintenance problems easily corrected and cost effective infrastructure improvements to be incorporated into future renovation or capital improvement projects. Many low cost/no cost measures e.g. “sequence of operation” errors were identified and corrected immediately by on-site personnel. Other measures were incorporated into projects. Most NARA-owned facilities have up-to-date or adequate HVAC equipment. Additional ECMs can be implemented to achieve greater energy and water reductions. These ECMs are being investigated under a comprehensive ESPC project inclusive of all Presidential Libraries and the National Archives at Atlanta (15 sites). NARA and the ESCO are currently working on the construction phase of the current ESPC projects.

NARA recognizes its need to continually improve the Climate Change Adaptation Plan, Fleet Management Plan and Bio-based Purchasing Strategies. The Climate Change Adaptation Plan is improved by collaboration and attendance at Climate Change Adaptation Meetings, sharing ideas and information, and making best use of available resources.

NARA’s mission continues to expand. As a new Presidential Library is built, additional vehicles are required to support it. As available records storage space dwindles, particularly in the mid-west, more records are being moved from facility to facility via truck to meet demands. These factors and others have increased NARA’s fuel use. Despite this expansion, the agency has made major strides to improve its Fleet Management Plan by reducing the number of vehicles in the fleet, evaluating appropriate vehicles for each situation, reducing idle time and fuel use by installing comprehensive GPS monitors, providing suggestions for reducing fuel use to users, switching to alternative fuels whenever feasible, and purchasing hybrid, electric, or higher mpg vehicles to perform like tasks. The agency plans to rent special use vehicles when needed, rather than purchase them for only limited use. These changes have significant potential fuel savings, and save the agency significant money on vehicle leases. NARA’s baseline fleet started at 76 vehicles and has been reduced to 60 in FY2014.

NARA continues to improve its Bio-based Purchasing Strategies by looking first at bio-based products when making purchases, ongoing training of purchasers to buy bio-based, attendance at Strategic Acquisition and Materials Management meetings, and an ongoing push to make NARA meet all OMB Scorecard requirements. NARA has included and updated language to meet all FAR clause requirements.

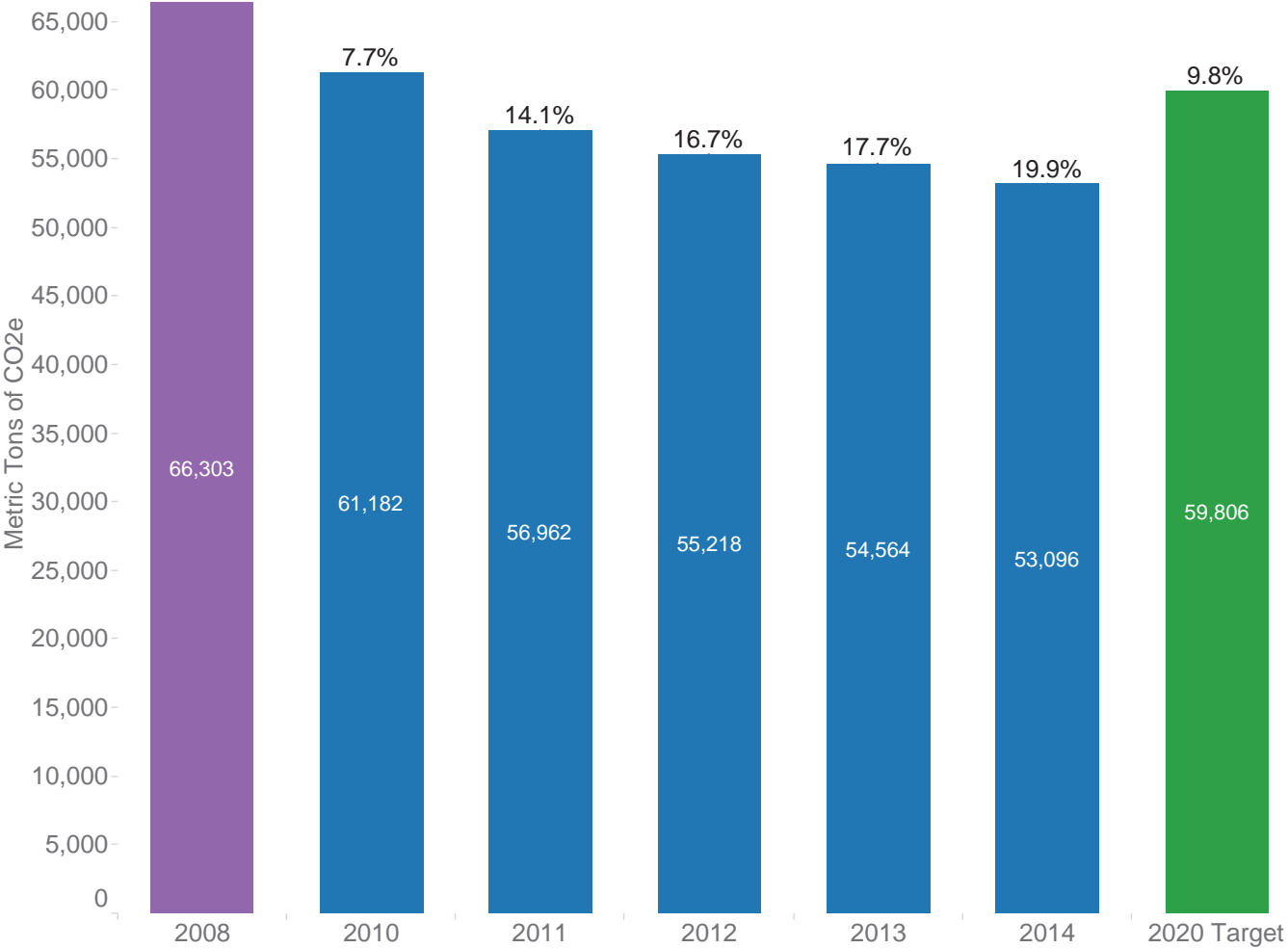
**Table 1: Agency Size & Scope**

<b>Agency Size and Scope</b>	<b>FY 2013</b>	<b>FY 2014</b>
Total Number of Employees as Reported in the President's Budget	3,254	3,048
Total Acres of Land Managed	169	169
Total Number of Buildings Owned	17	17
Total Number of Buildings Leased (GSA and Non-GSA Lease)	29	27
Total Building Gross Square Feet (GSF)	4,356,152 (owned SF)	4,356,152 (this is NARA owned SF)
Operates in Number of Locations Throughout U.S.	46	44
Operates in Number of Locations Outside of U.S.	0	0
Total Number of Fleet Vehicles Owned	1	1
Total Number of Fleet Vehicles Leased	61	59
Total Number of Exempted-Fleet Vehicles (Tactical, Law Enforcement, Emergency, Etc.)	0	0
Total Amount Contracts Awarded as Reported in FPDS (\$Millions)	170	162

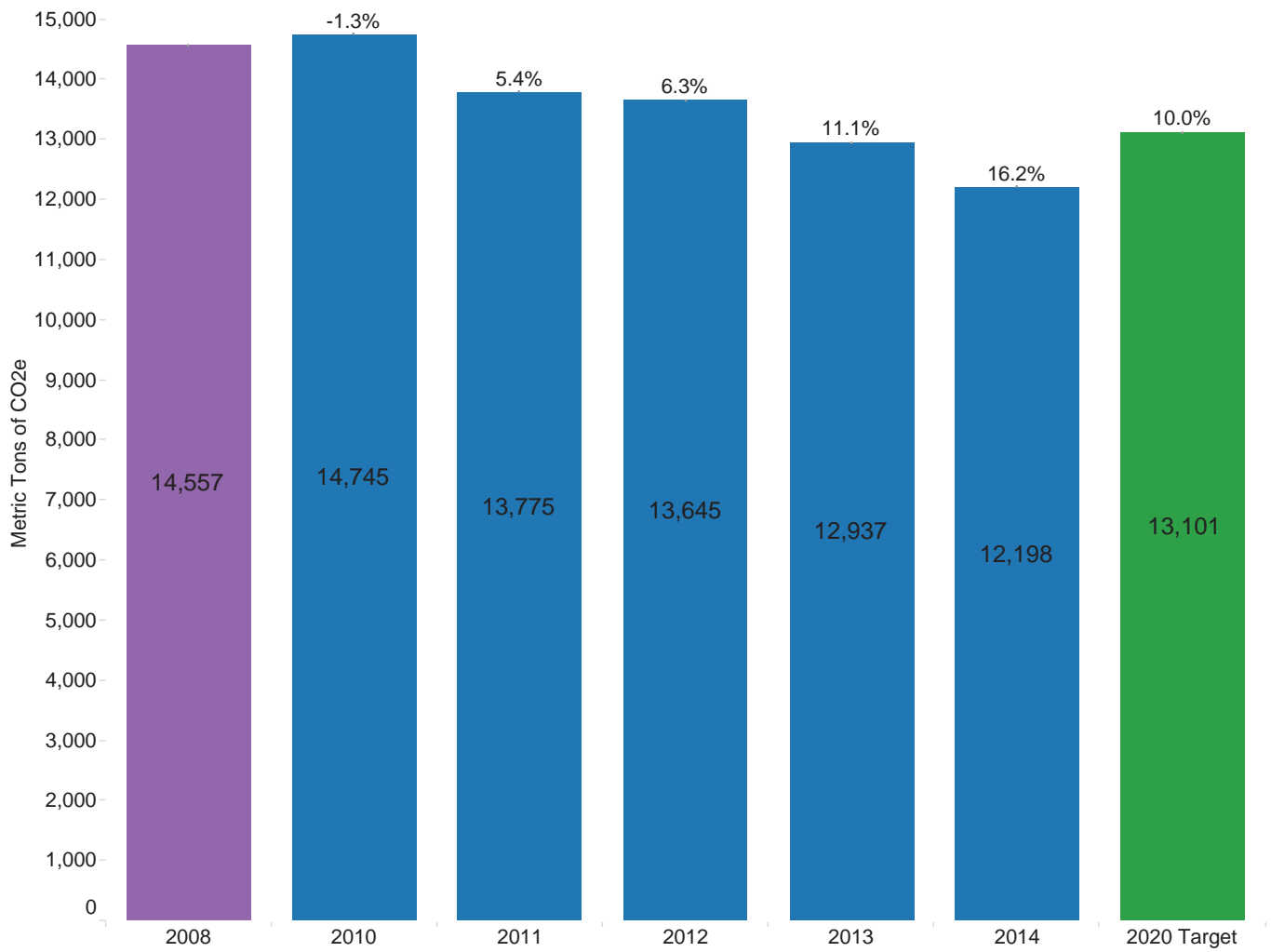
**National Archives and Records Administration**

**Goal 1: Greenhouse Gas (GHG) Reduction**

### NARA Progress toward Scope 1 & 2 Greenhouse Gas Goals



## NARA Progress toward Scope 3 Greenhouse Gas Goals

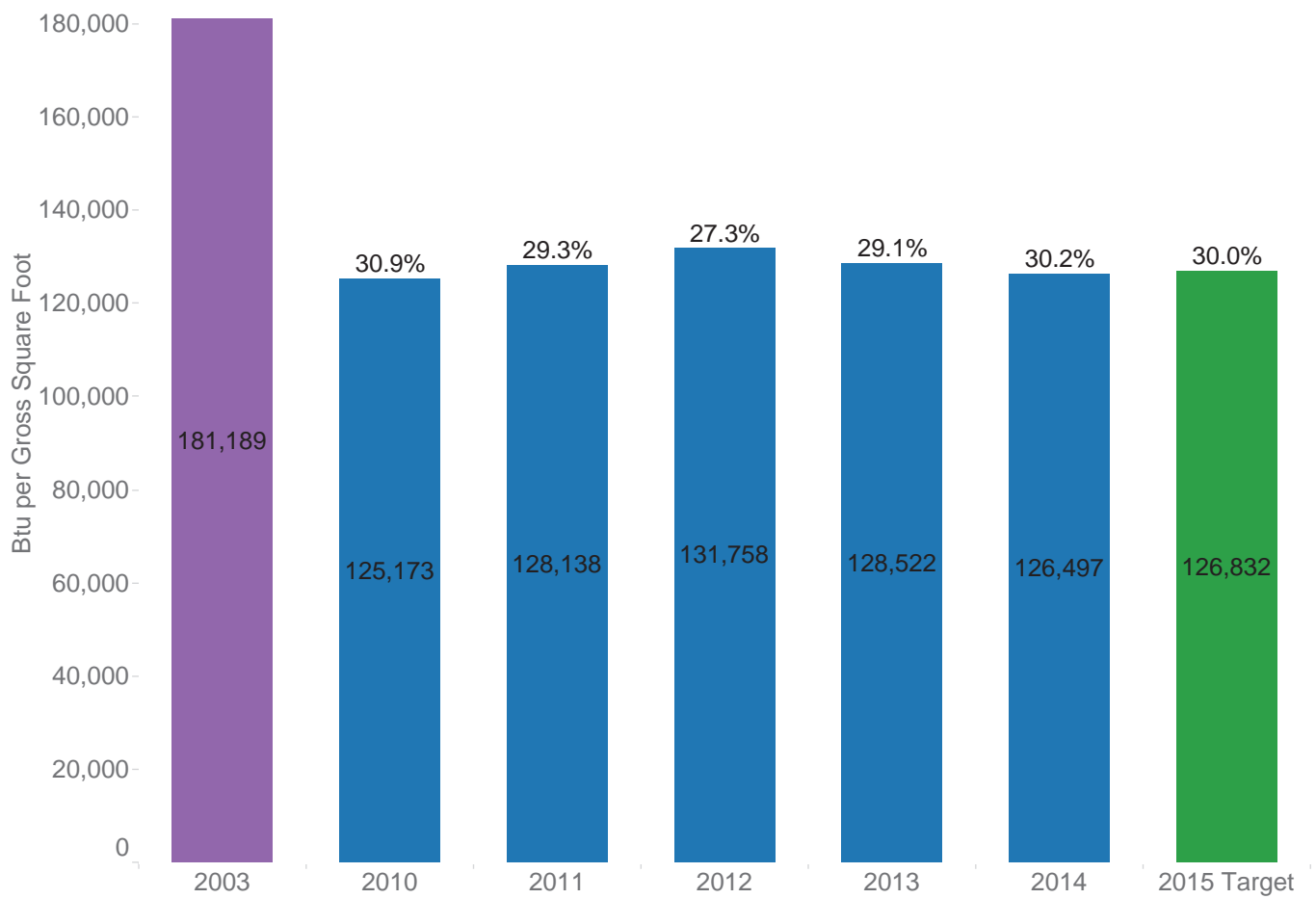


**National Archives and Records Administration**

**Goal 2: Sustainable Buildings**



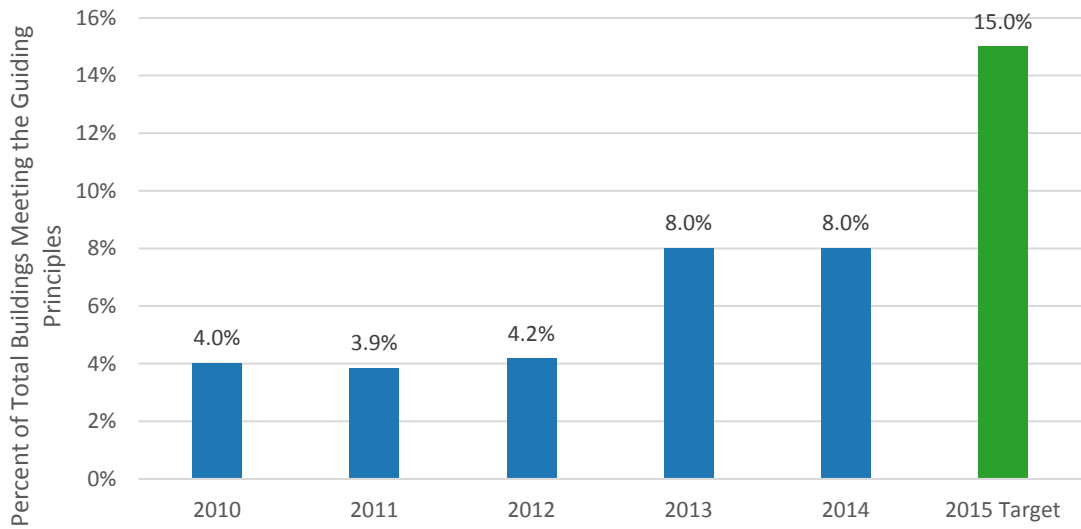
## NARA Progress toward Facility Energy Intensity Reduction Goals (FY 2014 Goal: 27%)



**Agency Progress toward Total Buildings Meeting the Guiding Principles**

Note: NARA is currently at 8.00% for above goal. There is an error in the method for extracting data from the FRPP database.

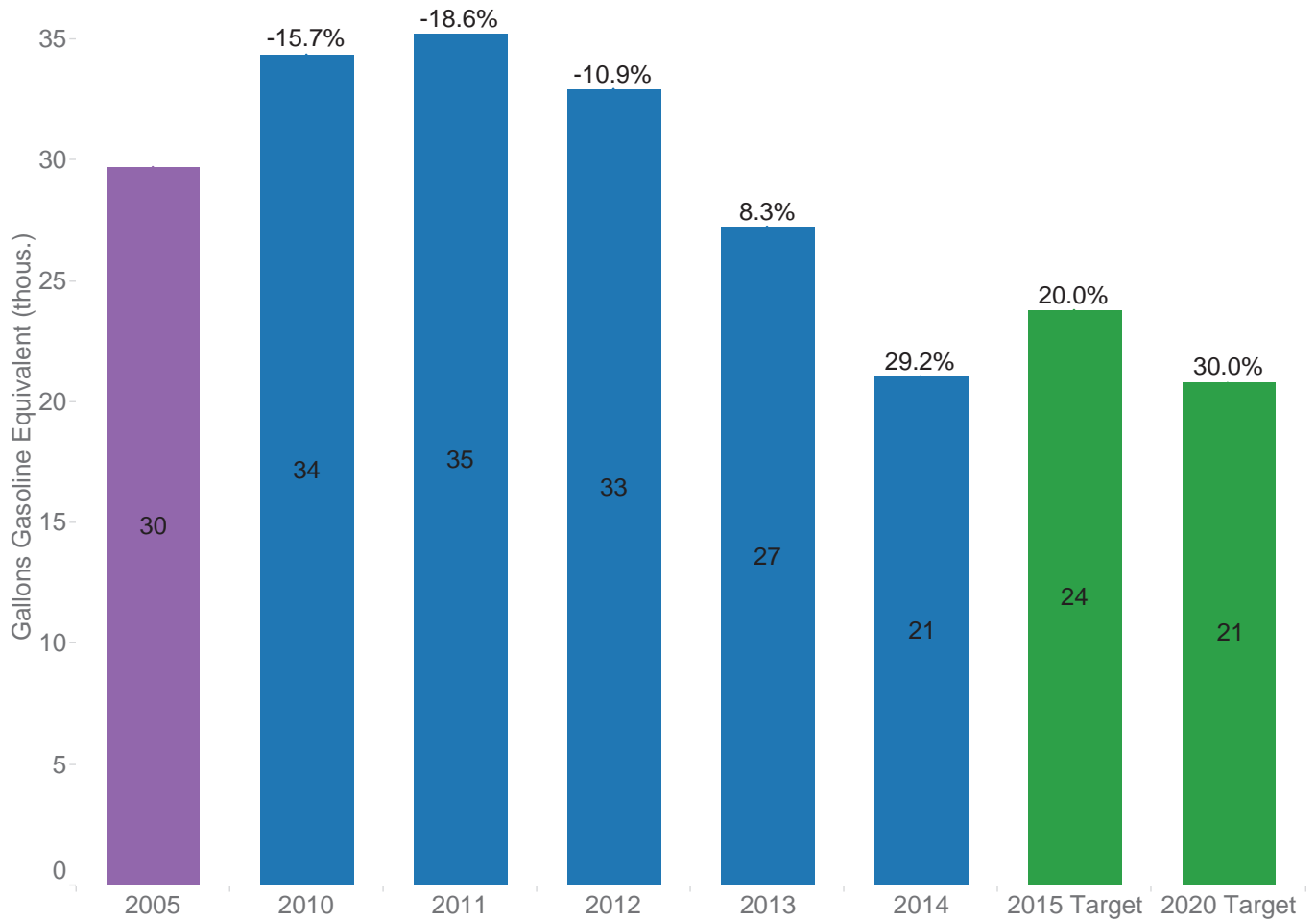
## NARA Progress toward Total Buildings Meeting the Guiding Principles



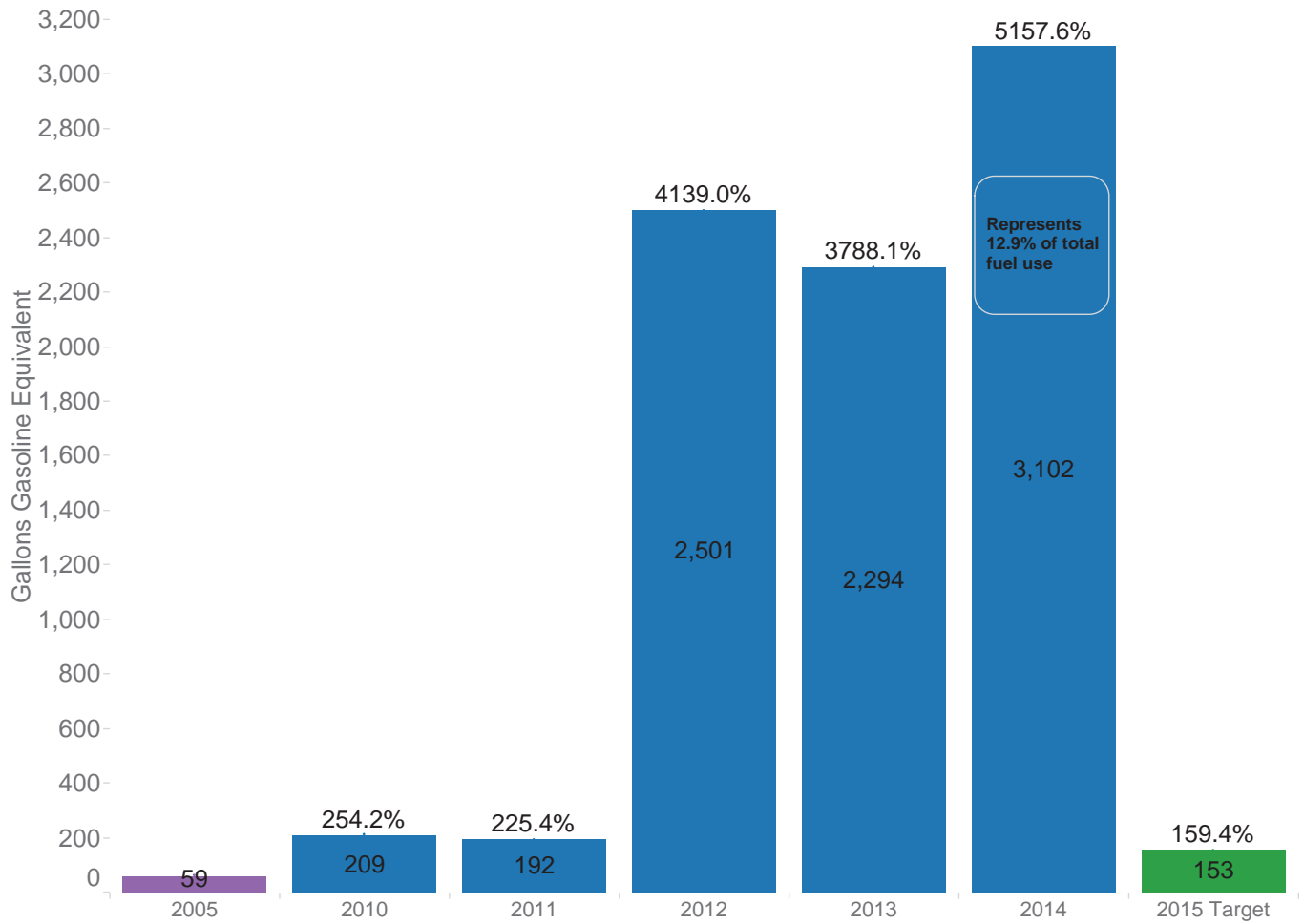
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**Goal 3: Fleet Management**

## NARA Progress toward Fleet Petroleum Reduction Goals (FY 2014 Goal: 18%)



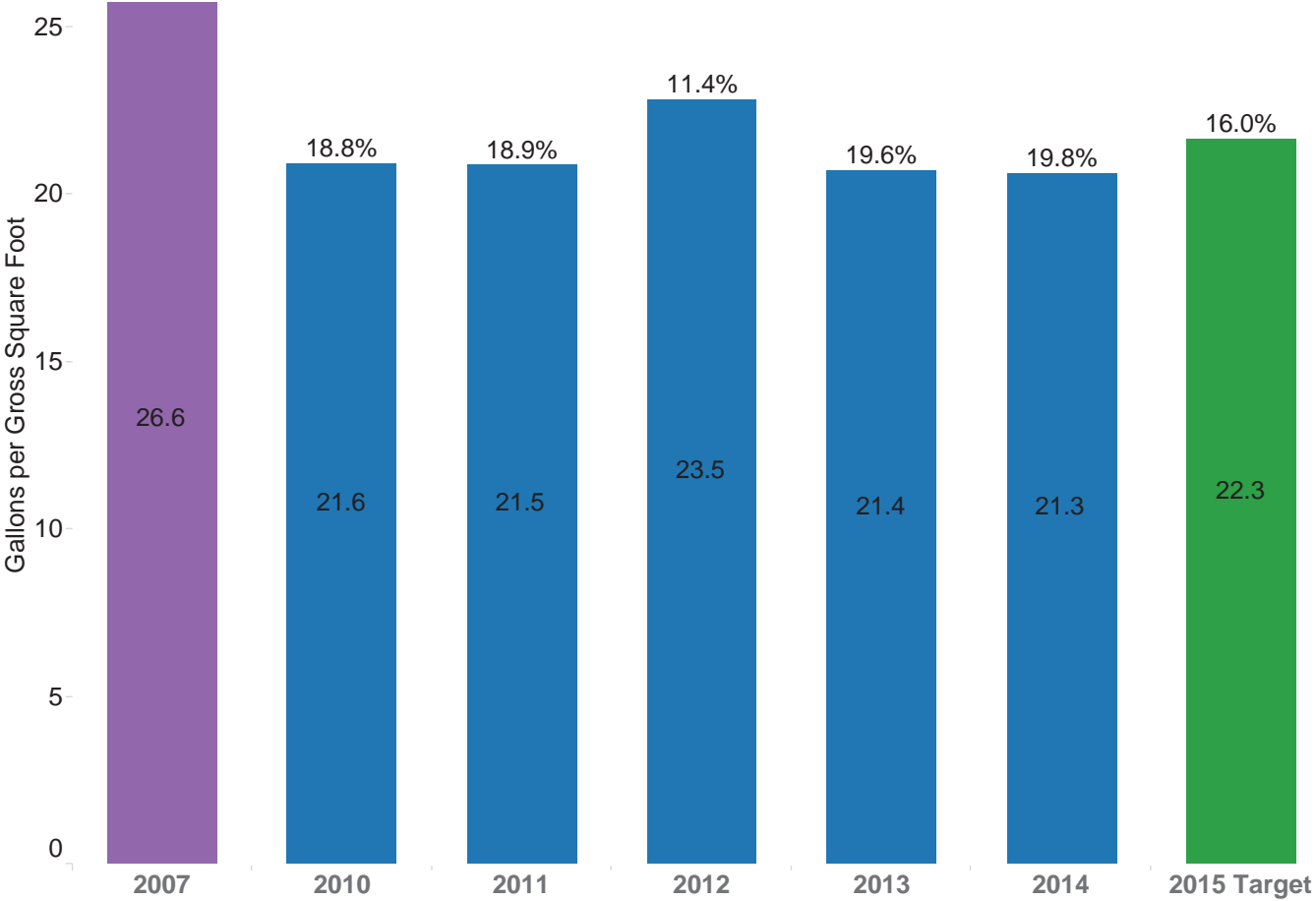
## NARA Progress toward Fleet Alternative Fuel Consumption Goals (FY 2014 Goal: +135.8%)



**National Archives and Records Administration**

**Goal 4: Water Use Efficiency & Management**

NARA Progress toward Potable Water Intensity Reduction Goals  
(FY 2014 Goal: 14%)

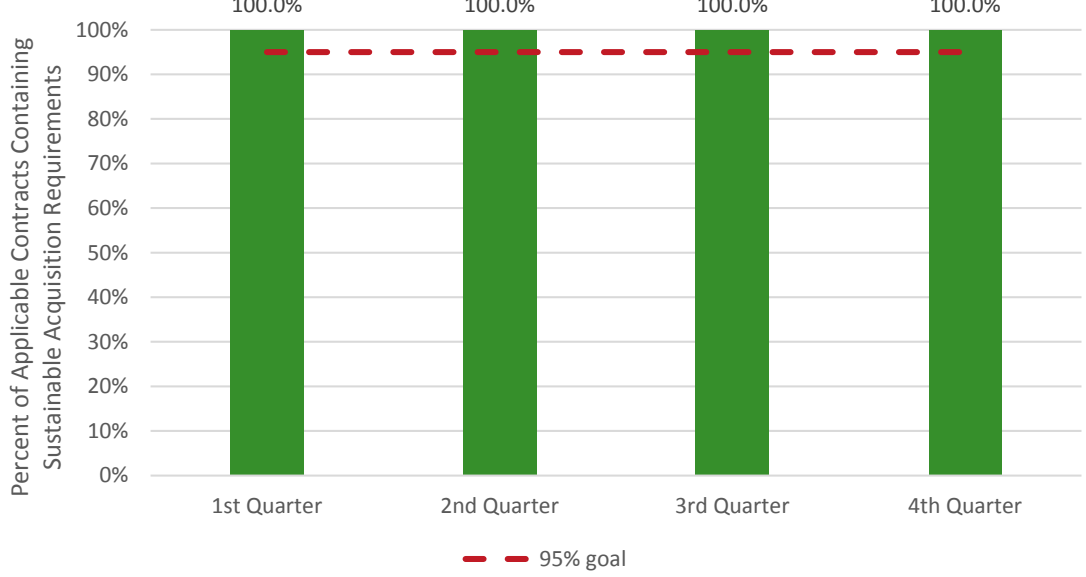




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**Goal 6: Sustainable Acquisition**

### NARA Progress toward Sustainable Acquisition Goal






**National Archives and Records Administration**




**Goal 7: Electronic Stewardship & Data Centers**

EPEAT	POWER MANAGEMENT	END-OF-LIFE	COMMENTS
			




EPEAT:

	95% or more Monitors and PCs/Laptops purchased in FY2013 was EPEAT Compliant Agency-wide
	85-94% or more Monitors and PCs/Laptops purchased in FY2013 was EPEAT Compliant Agency-wide
	84% or less Monitors and PCs/Laptops purchased in FY2013 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

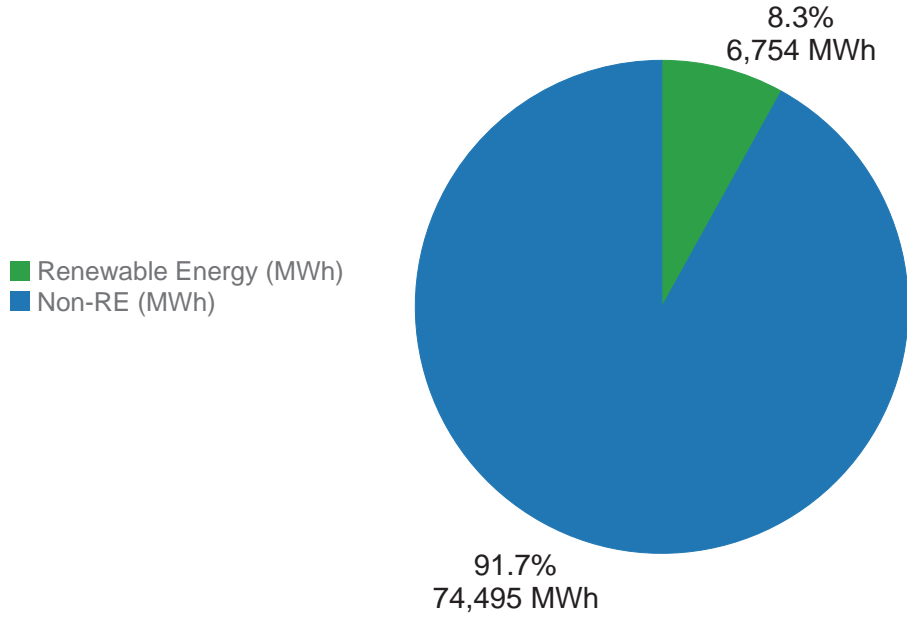
End-Of-Life:

	100% of electronics tracked at end-of life, demonstrating 100% disposal through GSA Xcess, CFL, Unicor, USPS Recycling Program or Certified Recycler (R2, E-Stewards). <i>Submitted annual report to GSA for Federal Electronics Assets furnished to non-Federal recipients.</i>
	100% of electronics tracked at end-of life, demonstrating 100% disposal through GSA Xcess, CFL, Unicor, USPS Recycling Program and/or non-Certified Recycler. Submitted annual report to GSA for Federal Electronics Assets furnished to non-Federal recipients.
	100% of electronics not tracked at end-of-life or less than 100% disposal through GSA Xcess, CFL, Unicor, USPS Recycling Program or non-Certified Recycler. <i>No annual report submitted to GSA for Federal Electronics Assets furnished to non-Federal recipients.</i>

**National Archives and Records Administration**

**Goal 8: Renewable Energy**

NARA Use of Renewable Energy as a Percentage of Electricity Use  
(FY 2014 Goal: 7.5%)



**National Archives and Records Administration**

**Goal 10: Energy Performance Contracts**





**National Archives and Records Administration**

**Strategies - Goal 1: Greenhouse Gas (GHG) Reduction**

**Table 1-1: Strategies - Scope 1 & 2 GHG Reductions**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure success including milestones in next 12 months</b>
Required Strategies under E.O. 13693	Yes	NARA is committed to meet all EO13693 requirement.	Continuously improving GHG reduction.
Use the FEMP GHG emission report to identify/target high emission categories and implement specific actions to resolve high emission areas identified.	Yes	NARA has been using FEMP GHG emission report. Agency exceeded EO 13514 Scope 1 and scope 2 GHG reduction target.	NARA is continuously improving GHG emissions.
Identify alternative sources of data or alternative methods of analysis not set forth in E.O. 13693, but with the potential to support its goals.			
Identify and support management practices or training programs that encourage employee sustainability and greenhouse gas consideration.	Yes	NARA facility and energy managers conduct energy and sustainability trainings annually.	Annually participate in energy and sustainability training.
Conceptualize the goals of E.O. 13693 within a projected cost-benefit framework to identify low-hanging fruit.			
Isolate successful measures applied toward the goals of E.O. 13514 that could be expanded to meet the goals of E.O. 13693.	Yes	Agency exceeded EO 13514 GHG reduction target.	Continuously improve GHG reduction will help NARA to meet the goals of EO 13693.

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure success including milestones in next 12 months</b>
Determine unsuccessful programs or measures to be discontinued to better allocate agency resources, human and otherwise.			
Determine which goals set forth in E.O. 13693 represent unambitious targets given past agency performance, identify by how much they could be exceeded, and establish new within-agency target			
Employ operations and management best practices for energy consuming and emission generating equipment.	Yes	O & M best practices are included in all NARA's CFM contracts.	Regularly work with the CFM contractors on each project to improve building O &M practices.

**Table 1-2: Strategies - Scope 3 GHG Reductions**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 Word Limit)</b>	<b>(D) Specific targets/metrics to measure success including milestones in next 12 months</b>
Required Strategy Under E.O. 13693	Yes	NARA is committed to meet EO 13693 requirement.	Continually improve scope 3 GHG reduction.
Reduce employee business ground travel.	Yes	Agency reduced employee business ground travel due to budget cuts and as part of scope 3 GHG reduction goal.	NARA new policy requires employee business travel is approved by senior management on a case by case basis. Ground travel has been reduced by 50%.
Reduce employee business air travel.	Yes	Agency reduced employee business air travel due to	NARA new policy requires employee business travel is

(A) Strategy	(B) Top Five? Yes/No/NA	(C) Strategy Narrative (100 Word Limit)	(D) Specific targets/metrics to measure success including milestones in next 12 months
		budget cuts and as part of scope 3 GHG reduction goal.	approved by senior management on a case by case basis. Air travel has been reduced by 50%.
Develop and deploy employee commuter reduction plan.			
Use employee commuting survey to identify opportunities and strategies for reducing commuter emissions.	Yes	NARA identified opportunities for improving employee commuting via meetings with MTA to improve bus service; developed cluster diagrams to identify potential employee shuttle service to and from work sites; improved existing shuttle system between facilities.	Expect continued reduction of employee contributions to scope 3 GHG emissions through encouraging employees to use mass transit, carpooling, and other alternative commuting methods (teleworking, AWS).
Increase number of employees eligible for telework and/or the total number of days teleworked.	Yes	Allow eligible employees to work CWS days, encourage use of mass transit, and increase number of teleworkers.	Supervisors encourage and approve (based on feasibility) employee telework agreements and AWS. NARA's Telework and AWS have increased 3% annually.
Develop and implement bicycle commuter program.			
Provide bicycle commuting infrastructure.			
Plan to begin FY 2016: Report scope 3 greenhouse gas emissions for leases over 10,000 E.O. 3(h)(v) rentable square feet.			

**National Archives and Records Administration**

**Strategies - Goal 2: Sustainable Buildings**

**Table 2-1: Strategies - Sustainable Buildings**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy Under E.O. 13693	Yes	NARA is committed to meet all EO 13693 requirements.	NARA is currently working on the LEED certification for Archives II building in College Park Maryland.
Use remote building energy performance assessment auditing technology 3(a)(A)			
Participate in demand management programs 3(a)(B)	Yes	NARA is currently participating in the demand management programs with the local utility companies	As requested, participate in the demand respond and energy curtailment programs.
Ensure that monthly performance data is entered into the Environmental Protection Agency (EPA) ENERGY STAR Portfolio Manager 3(a)(C)	Yes	NARA is committed to enter all applicable data to EPA Energy Star Portfolio Manager monthly.	Continually input monthly performance data into Portfolio Manager for all covered buildings.
Where feasible: Incorporate Green Button data access system into reporting, data analytics, and automation processes 3(a)(D)			
Implement space utilization and optimization practices and policies 3(a)(E)	[Please Choose]		
Identify opportunities to transition test-bed technologies to achieve the goals of this section 3(a)(F)			
Where feasible: Conform to city energy performance benchmarking and reporting requirements 3(a)(G)			

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Begin planning for FY 2020 requirement: Ensure all new construction of Federal buildings greater than 5,000 gross square feet that enters the planning process be designed to achieve energy net-zero and, where feasible, water or waste net-zero by FY 2030 3(h)(i)			
In all new agency lease solicitations over 10,000 rentable square feet, include criteria for energy efficiency as a performance specification or source selection evaluation factor 3(h)(iv)			
In all new agency lease solicitations over 10,000 rentable square feet, include requirements for building lessor disclosure of carbon emission or energy consumption data for leased portion of building 3(h)(iv)			
In planning new facilities or leases, include cost-effective strategies to optimize sustainable space utilization and consideration of existing community transportation planning and infrastructure, including access to public transit 3(h)(vi)			
Ensure that all new construction, major renovation, repair, and			

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
alteration of agency buildings includes appropriate design and deployment of fleet charging infrastructure 3(h)(vii)			
Include climate resilient design and management into the operation, repair, and renovation of existing agency buildings and the design of new buildings 3(h)(viii)	[Please Choose]		
Recommended Strategy			
Install and monitor energy meters and sub-meters as soon as practicable.			
Collect and utilize building and facility energy use data to improve building energy management and performance.			
Incorporate green building specifications into all new construction and major renovation projects.			
Redesign or lease interior space to reduce energy use by implementing daylighting, space optimization, sensors/control system installation, etc.			
Develop and deploy energy and sustainability training	Yes	NARA CSO is responsible for developing and deploying energy and	Facility and energy managers annually participate in energy and sustainability training.

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
for all facility and energy managers.		sustainability training for facility managers	
Include in every construction contract all applicable sustainable acquisition requirements for recycled, biobased, energy efficient, and environmentally preferable products.	Yes	NARA revised its specification to require all new construction and major renovation to include all applicable sustainable acquisition requirements.	Agency is exceeding its sustainable acquisition practices (at 100% currently). NARA policy is in place requiring contractors to submit recycling, reuse, and reduction requirements.

**Table 2-2: Strategies - Data Center Efficiency**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure success including milestones in next 12 months</b>
Required Strategy under E.O. 13693	Yes	NARA is committed to meet EO 13693 requirements for data center.	NARA has only one data center located in room 4320 of Archives II building at College Park Maryland. Agency is Continually improving data center energy efficiency.
Ensure the agency chief information officer promotes data center energy optimization, efficiency, and performance 3(a)(ii)(A)	Yes	NARA is committed to meet EO 13693 requirements for data center.	NARA chief sustainability officer will work with agency chief information officer to promote data center energy optimization, efficiency and performance.
Install and monitor advanced energy meters in all data centers by fiscal year 2018 3(a)(ii)(B)	Yes	NARA installed advanced meter at its (only one) data center in May 2014.	Continually use metering data to improve data center energy efficiency.
Recommended Strategy			

<b>(A)Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure success including milestones in next 12 months</b>
Optimize agency Data Centers across total cost of ownership metrics.			
Improve data center temperature and air-flow management.	Yes	NARA continually improving temperature and air-flow in its data center.	Continually reducing the number of servers and keep the raised floor clear and clean to reduce any flow restrictions.
Identify and consolidate obsolete and underutilized agency computer servers into energy efficient data centers.	Yes	NARA had identified agency core and non-core data/servers and developed a Data Center Consolidation Plan in August 2010	NARA plans to reduce its servers from 423 in 2010 to 299 by 2016.



**National Archives and Records Administration**  
**Strategies - Goal 3: Clean and Renewable Energy**

**Table 3: Strategies - Clean & Renewable Energy**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy under E.O. 13693	Yes	NARA is committed to meet all EO 13693 requirements	Increasing renewable energy consumption at all facilities.
DoD only: Include in DoD accounting, fulfillment of the requirements of DoD goals under section 2852 of the National Defense Authorization Act of 2007 3(e)(vi)			
Recommended Strategy			
Install agency-funded renewable on-site and retain corresponding renewable energy certificates (RECs) or obtaining replacement RECs 3(d)(i)	Yes	NARA installed over 500 KW solar/PV systems at Archives II, College Park Maryland through agency funds and ESPC project.	Increasing agency-funded renewable on-site and increasing RECs certificates to meet EO 13693 requirements.
Contract for the purchase of energy that includes installation of renewable energy on or off-site and retain RECs or replacement RECs for the term of the contract 3(d)(ii)	Yes	NARA and other agencies purchases renewable energy through GSA utility packagers.	Increasing renewable energy purchased to meet the latest renewable energy requirements.
Purchase electricity and corresponding RECs or obtaining equal value replacement RECs 3(d)(iii)	[Please Choose]		
Purchase RECs 3(d)(iv)			
Install thermal renewable energy on-site at Federal facilities and retain corresponding renewable	NA	This is not economical for NARA	

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
attributes or obtain equal value replacement RECs 3(e)(i)			
Install combined heat and power processes on-site at Federal facilities 3(e)(ii)	Yes	NARA recently installed two 75 KW co-generation units at Archives I (Washington DC) and three 75 KW co-generation units at Archives II (College Park, Maryland).	Increasing combined heat and power systems at all NARA sites as funds become available.
Identify opportunities to install fuel cell energy systems on-site at Federal facilities 3(e)(iii)			
Identify opportunities to utilize energy from small modular nuclear reactor technologies 3(e)(iv)			
Identify opportunities to utilize energy from small modular nuclear reactor technologies 3(e)(iv) Identify opportunities to utilize energy from a new project that includes the active capture and storage of carbon dioxide emissions associated with energy generation 3(e)(v)			
Implement other alternative energy approaches that advance the policy set forth in section 1 and achieve the goals of section 2 of E.O. 13693 3(e)(vii)			
Consider opportunities to install or contract for energy installed on current or			

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
formerly contaminated lands, landfills, and mine sites.			

**National Archives and Records Administration**

**Strategies - Goal 4: Water Use Efficiency & Management**

**Table 4: Strategies - Water Use Efficiency & Management**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy under E.O. 13693	Yes	NARA is committed to meet all EO 13693 requirements.	Continually improving water efficiency at sites via ESPC and other projects.
Install appropriate green infrastructure features to help with storm- and wastewater management (such as rain gardens, rain barrels, green roofs, or impervious pavement) 3(f)(iv)	Yes	The National Archives at College Park, Maryland has a small green roof and a 6000 gallon storage tank to catch rain water for irrigation system.	Installing appropriate green infrastructure features through out NARA's facilities when funds become available, and via ESPC projects.
Install and monitor water meters; collect and utilize building and facility water data for conservation and management 3(f)(ii)	Yes	All NARA facilities have water meters.	Continually using water meters to improve water efficiency.
Recommended Strategy			
Install high efficiency technologies (e.g., WaterSense).	Yes	Retrofit of bathroom fixtures and landscaping water systems at most facilities via ESPC contracts.	Installing high efficiency technologies and fixtures via agency-funded and/or ESPC contracts.
Prepare and implement a water asset management plan to maintain desired level of service at lowest life cycle cost (for best practices from the EPA, go to <a href="http://go.usa.gov/KvbF">http://go.usa.gov/KvbF</a> ).	Yes	Using LEED strategies for best water practices.	Continue to reduce water use to meet or exceed EO 13693 targets.
Minimize outdoor water use and use alternative water sources as much as possible.			

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Design and deploy water closed-loop, capture, recharge, and/or reclamation systems.			
Install advanced meters to measure and monitor (1) potable and (2) industrial, landscaping and agricultural water use.			
Develop and implement programs to educate employees about methods to minimize water use.			
Assess the interconnections and dependencies of energy and water on agency operations, particularly climate change's effects on water which may impact energy use.			
Consistent with State law, maximize use of grey-water and water reuse systems that reduce potable and ILA water consumption.			
Consistent with State law, identify opportunities for aquifer storage and recovery to ensure consistent water supply availability.			
Ensure that planned energy efficiency improvements consider associated opportunities for water conservation.			
Where appropriate, identify and implement regional and			

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
local drought management and preparedness strategies that reduce agency water consumption including recommendations developed by Regional Federal Executive Boards.			

**National Archives and Records Administration**

**Strategies - Goal 5: Fleet Management**

**Table 5: Strategies - Fleet Management**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy under E.O. 13693	Yes	NARA is committed to meet all EO 13693 requirements.	Continually reducing agency fleet vehicle size and GHG emissions.
Collect and utilize agency fleet operational data through deployment of vehicle telematics – as soon as is practicable, but not later than two years after date of order 3(g)(iii)	Yes	All NARA vehicles are equipped with telematics.	Reduce fuel use and GHG emissions 4% by 2017.
Ensure that agency annual asset-level fleet data is properly and accurately accounted for in a formal Fleet Management System as well as submitted to the Federal Automotive Statistical Tool reporting database, the Federal Motor Vehicle Registration System, and the Fleet Sustainability Dashboard (FLEETDASH) system 3(g)(iv)	Yes	NARA uses Fleet Management System, and data is submitted to FAST.	NARA will attempt to maintain green on OMB Scorecard for this category.
Plan for agency fleet composition such that 20% of passenger vehicle acquisitions are zero emission or plug-in hybrid vehicles by 2020, and 50% by 2025. Vehicles acquired in other vehicle classes count double toward this target 3(g)(v)	[Please Choose]		

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Plan for appropriate charging or refueling infrastructure for zero emission or plug-in hybrid vehicles and opportunities for ancillary services to support vehicle-to-grid technology 3(g)(vi)	[Please Choose]		
Recommended Strategy			
Optimize/Right-size the composition of the fleet (e.g., reduce vehicle size, eliminate underutilized vehicles, acquire and locate vehicles to match local fuel infrastructure).			
Increase utilization of alternative fuel in dual-fuel vehicles.			
Use a Fleet Management Information System to track fuel consumption throughout the year for agency-owned, GSA-leased, and commercially-leased vehicles.	Yes	NARA uses GSA GPS tracking systems to track fuel use and driving habits	Fleet Manager sends out monthly reports to encourage better driving habits and reduce idle times, thus maximizing mpgs.
Increase GSA leased vehicles and decrease agency-owned fleet vehicles, when cost effective.	Yes	NARA has 59 GSA leased vehicles. One vehicle is NARA-owned and is an EV.	NARA is replacing vehicles that better match the vehicle with Agency needs, including hybrids and EVs.
Implement vehicle idle mitigation technologies.			
Minimize the use of "law enforcement" vehicle exemption and implementing the GSA			



<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Bulletin FMR B-33, Motor Vehicle Management, Alternative Fuel Vehicle Guidance for Law Enforcement and Emergency Vehicle Fleets of November 15, 2011.			
Where State vehicle or fleet technology or fueling infrastructure policies are in place, conform with the minimum requirements of those policies.			
Reduce miles traveled (e.g., share vehicles, improve routing with telematics, eliminate trips, improve scheduling, use shuttles, etc.).			

**National Archives and Records Administration**

**Strategies - Goal 7: Pollution Prevention & Waste Reduction**

**Table 7: Strategies - Pollution Prevention & Waste Reduction**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy under E.O. 13693	[Please Choose]		
Report in accordance with the requirements of sections 301 through 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C 11001-11023) 3(j)(i)	[Please Choose]		
Reduce or minimize the quantity of toxic and hazardous chemicals acquired, used, or disposed of, particularly where such reduction will assist the agency in pursuing agency greenhouse gas reduction targets established in section 2 of E.O. 13693 3(j)(iv)	[Please Choose]		
Recommended Strategy			
Eliminate, reduce, or recover refrigerants and other fugitive emissions.	Yes	<p>NARA is continually reducing the need for refrigerants by going to smaller package systems, when feasible. NARA recovers and cleans refrigerants whenever service or replacement projects are conducted. NARA monitors refrigerants as part of the ongoing maintenance program.</p>	NARA maintains 5% or less annual refrigerant loss.

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Reduce waste generation through elimination, source reduction, and recycling.	Yes	NARA follows requirements of EO 13693, which replaces requirements of 13423 and 13514.	NARA's goal is to reduce waste generated by at least 50% by 2020.
Implement integrated pest management and improved landscape management practices to reduce and eliminate the use of toxic and hazardous chemicals/materials.	Yes	Pest Management and landscape management are in place for all NARA maintenance contracts.	NARA requires contractors to submit monthly reports that include all chemicals used. NARA continually monitors and when feasible, replaces toxic chemicals, when a viable alternative exists. The Agency uses IPM plans at each site.
Establish a tracking and reporting system for construction and demolition debris elimination.	Yes	Tracking is accomplished using MAXIMO reporting system.	MAXIMO QC requires 95% compliance for all tasks.
Develop/revise Agency Chemicals Inventory Plans and identify and deploy chemical elimination, substitution, and/or management opportunities.	Yes	Included in the CFM contract, is a tracking system for chemicals.	CFM Contractors are required to submit monthly reports for NARA COR to review, monitor, and make suggestions for improvement.
Inventory of current HFC use and purchases.			
Require high-level waiver or contract approval for any agency use of HFCs.			
Ensure HFC management training and recycling equipment are available.			

**National Archives and Records Administration**  
**Strategies - Goal 8: Energy Performance Contracts**

**Table 8: Strategies - Energy Performance Contracts**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months</b>
Required Strategy under E.O. 13693			
Utilize performance contracting to meet identified energy efficiency and management goals while deploying life-cycle cost effective energy and clean energy technology and water conservation measures 3(k)(i)			
Fulfill existing agency performance contracting commitments towards the \$4 billion by the end of calendar year 2016 goal established as part of the GPRA Modernization Act of 2010, Climate Change Cross Agency Priority process 3(k)(ii)			
Recommended Strategy			
Evaluate 25% of agency's most energy intensive buildings for use with energy performance contracts.	Yes	NARA has evaluated 100% of Agency-owned facilities for potential energy savings measures via ESPC projects.	NARA continually evaluates each location for additional energy savings measures.
Prioritize top ten projects which will provide greatest energy savings potential.	Yes	NARA prioritizes ESPC projects based on the greatest savings potential as follows: Archives II, Archives I, Presidential Libraries, and the Archives in Atlanta.	100% completion of the Archives II, Phase-2 ESPC project and the Presidential Library Group-1. We will complete ESPC Presidential Library Group-2 by October 2015.

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in next 12 months</b>
Cut cycle time of performance contracting process by at least 25%.			
Assign agency lead to participate in strategic sourcing initiatives.	Yes	NARA Agency Energy Manager is assigned as the Project Manager for all ESPC projects.	NARA continually is looking for additional energy savings measures throughout all NARA-owned facilities.
Devote 2% of new commitments to small buildings (<20k sq. ft.)			
Identify and commit to include 3-5 onsite renewable energy projects in energy performance contracts.			
Ensure relevant legal and procurement staff are trained by FEMP ESPC/UESC course curriculum	Yes	NARA Energy Management Team attends FEMP-ESPC webinar trainings.	100% of facility managers will continue to attend FEMP-ESPC trainings.
Provide measurement and verification data for all awarded projects.			
Enter all reported energy savings data for operational projects into MAX COLLECT (max.gov).	Yes	NARA reports ESPC project data into MAX COLLECT system.	NARA will continue to comply with 100% of requirements.

**National Archives and Records Administration**

**Strategies - Goal 9: Electronics Stewardship**

**Table 9: Strategies - Electronics Stewardship**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy under E.O. 13693	Yes	NARA is committed to meet all EO13693 requirements.	Maintain 100% compliance.
Establish, measure, and report procurement preference for environmentally sustainable electronic products 3(1)(i)	Yes	NARA currently measures, and reports procurement preference on all contracts specifying environmentally preferable electronic products.	Maintain 100% compliance.
Establish, measure, and report policies to enable power management, duplex printing, and other energy-efficient or environmentally sustainable features on all eligible agency electronic products 3(1)(ii)	Yes	NARA policies support power management, duplex printing, and other sustainable features on all new products.	Maintain 100% compliance.
Establish, measure, and report sound practices with respect to the agency's disposition of excess or surplus electronic products 3(1)(iii)	Yes	NARA disposed 100% of its electronic waste products through GSA surplus and recycling programs.	Maintain 100% compliance.
Recommended Strategy			
Update and deploy policies to use environmentally sound practices for disposition of all agency excess or surplus electronic products and monitor compliance.	Yes	NARA disposed 100% of its electronic waste products through GSA surplus and recycling programs.	Maintain 100% compliance.

**National Archives and Records Administration**

**Strategies - Goal 10: Climate Change Resilience**

**Table 10: Strategies - Climate Change Resilience**

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
Required Strategy under E.O. 13693	[Please Choose]		
Update agency external programs and policies (including grants, loans, technical assistance, etc.) to incentivize planning for, and addressing the impacts of, climate change. (In column C, identify names of agency programs or policies)	Yes	NARA is currently updating policies NARA 503 and NARA 170 to reflect EO 13693 requirements.	Continue to update old policies with climate adaptation language as they come up for renewal. Any new policies must have climate adaptation language inserted into the policy as required by EO 13693.
Recommended Strategy			
Update agency emergency response procedures and protocols to account for projected climate change, including extreme weather events.	Yes	NARA is currently updating policies NARA 503 and NARA 170 to reflect EO 13693 requirements.	NARA is continually upgrading its emergency management plan to meet EO 13693 and other requirements.
Ensure workforce protocols and policies reflect projected human health and safety impacts of climate change.			
Update agency external programs and policies (including grants, loans, technical assistance, etc.) to incentivize planning for, and addressing the impacts of, climate change.			
Ensure agency principals demonstrate commitment to	Yes	NARA is currently updating policies NARA 503 and	NARA is updating its Presidential Library Design Guidance to meet climate

<b>(A) Strategy</b>	<b>(B) Top Five? Yes/No/NA</b>	<b>(C) Strategy Narrative (100 word limit)</b>	<b>(D) Specific targets/metrics to measure strategy success including milestones to be achieved in the next 12 months</b>
adaptation efforts through internal communications and policies.		NARA 170 to reflect EO 13693 requirements.	change adaptation requirements.
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.			
Ensure that agency climate adaptation and resilience policies and programs reflect best available current climate change science, updated as necessary.	Yes	NARA is currently updating policies NARA 503 and NARA 170 to reflect EO 13693 and EO 13653 requirements.	NARA will continue to update Climate Adaptation and Agency Sustainability plans as needed.
Design and construct new or modify/manage existing agency facilities and/or infrastructure to account for the potential impacts of projected climate change.			
Incorporate climate preparedness and resilience into planning and implementation guidelines for agency-implemented projects.	Yes	NARA is currently updating policies NARA 503 and NARA 170 to reflect EO 13693 requirements.	NARA will continue to update plans and guidelines as warranted on all agency construction projects.
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.			



**National Archives and Records Administration**

**Business Support Services**

**Facility and Property Management Division**

**Climate Change Adaptation and Resiliency Plan**  
**(An Attachment to the NARA Sustainability Plan)**

**Revised May 26, 2015**

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IX. Exhibits

I. Key Terms and Acronyms

**Adaptation-** a change or adjustment to improve something, or to make it suitable to a different situation.

**Building Condition Report-** a five year cycle engineering survey of the building and its physical environment.

**Climate-** the average of weather over at least a 30-year period.

**Climate Change-** A non-random change in climate that is measured over several decades or longer. The change may be due to natural or human-induced causes.

**Drought-** an extended period when a region receives a deficiency in its water supply, whether atmospheric, surface or ground water. A drought can last for months or years, or may be declared after as few as 15 days.

**Flooding-** a rising and overflowing of a body of water especially onto normally dry land. Generally used synonymously with inundation.

**Floodplain-** any land area susceptible to being inundated by flood waters from any source.

**Greenhouse Gases (GHGs)-** a greenhouse gas (abbreviated GHG) is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This is the fundamental cause of the greenhouse effect. Primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, ozone, and CFCs.

**Inundation-** the act of flooding; the covering a land area or overspread with water.

**Mitigation-** the action of reducing the severity, seriousness, or painfulness of something.

**National Archives and Records Administration (NARA)-** An independent agency of the United States government charged with preserving and documenting government and historical records and with increasing public access to those documents, which comprise the National Archives. NARA is officially responsible for maintaining and publishing the legally authentic and authoritative copies of acts of Congress, presidential proclamations and executive orders, and federal regulations. The NARA also transmits votes of the Electoral College to Congress. The chief administrator of NARA is the Archivist of the United States.

**National Oceanic and Atmospheric Administration (NOAA)**- a federal agency of the Commerce Department whose mission is to understand and predict changes in climate, oceans and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources.

**Qualitative Risk Assessment (or Analysis)**- the relative measure of risk or asset value based on ranking or separation into descriptive categories such as low, medium, high; not important, important, very important; or sometimes on a scale from 1 to 10.

**Quantitative Risk Assessment**- the use of measurable, objective data to determine asset value, probability of loss, and associated risk(s).

**Rainfall Intensity**- the volume or depth of rainfall per unit time.

**Relative Sea Level Rise (RSLR)**- relative sea level is the sea level related to the level of the continental crust. Relative sea level changes can thus be caused by absolute changes of the sea level and/or by absolute movements of the continental crust.

**Resiliency**- the ability to properly adapt to stress, catastrophe or adversity.

**Sea Level Rise (SLR)**- the average amount of rise (globally) in the elevation of the oceans relative to land. Current sea level rise is about 3 mm/year worldwide.

**Sea Level**- the level of the ocean's surface, especially the level halfway between mean high and low tide, used as a standard in reckoning land elevation or sea depths.

**Sustainability**- the ability to continue a defined behavior indefinitely. This term is not completely understood as it is often used to talk about economics and growth (e.g. the world's standard definition of environmental sustainability is sustainable development, which means sustainable economic growth). Sustainable growth is actually an oxymoron (i.e. to be sustainable means to maintain, but not grow long term).

**Weather**- the state of the atmosphere at a place and time pertaining to heat, dryness, sunshine, wind, rain, etc

## **II. Background**

### **A. NARA's Mission**

The National Archives and Records Administration drives openness, cultivates public participation, and strengthens our nation's democracy through public access to high-value government records. Our mission is to provide public access to Federal Government records in our custody and control. Public access to government records strengthens democracy by allowing Americans to claim their rights of citizenship, hold their government accountable, and understand their history so they can participate more effectively in their government.

### **B. Climate Change for NARA in a Nutshell**

The National Archives and Records Administration (NARA) is a small, geographically diverse agency with two Washington DC-based Archives Buildings, and other field Archives, Federal Records Centers and Presidential Libraries and Museums. NARA-operated facilities are located throughout the continental United States. NARA's primary mission is to both protect the records of the Federal Government, and to make that information available to American citizens. NARA must balance the Agency mission with future challenges and requirements dictated by changing climate and Executive actions. NARA, while promoting adaptation to climate change, must continue to address the following: 1) Preserve and process records to ensure access by the public as soon as legally possible; 2) Address challenges of electronic records in Government to ensure success in fulfilling NARA's mission in the digital era; and 3) Provide prompt, easy, and secure access to our holdings anywhere, anytime. These above tasks may be altered or influenced by the changing climate. Regardless of future climate, NARA must maintain records integrity, human health, and operations of the Agency. NARA must make plans to help mitigate the rate of climate change and to adapt to the effects and potential threats of climate change. The greatest initially-identified climate change threats to NARA properties, holdings and staff are sea level rise, flooding, and drought. These risks are considered general in nature, and are not location specific. To date, adequate data for location specific risk assessment is not readily available.

This Climate Change Adaptation and Resiliency Plan is NARA's third iteration of this living document. This edition was modified in accordance with Executive Order (EO) [13653](#), *Preparing the United States for the Impacts of Climate Change*. In addition, new data and experience from prior adaptation plans (publicly released in 2012 and 2013), and prior experience of NARA and other Federal agencies responding to events like Hurricane Sandy in 2013, and localized flooding in Washington D.C. in 2006, and lessons learned from types of events has helped advance NARA's planning for future climate change.

## **III. Introduction**

In geologic time, the Earth's climate is rapidly changing; significant changes in just the last one hundred years include: increased global atmospheric temperatures, mixed and seasonal precipitation patterns, rising sea level, and a sharp increase in severity and frequency of severe weather events. These changes put people in sensitive areas, especially coastal, desert, and river

systems, and other low lying areas at much greater risk to property loss, disease and safety. Clearly, current weather patterns and long range climate systems are changing. However, many mistakenly consider weather and climate to be one in the same. Although weather and climate may seem to be the same thing, they are different in terms of time, and how we must plan for them. To understand climate change we must first recognize the distinction between weather and climate. The Earth's climate system includes the land surface, atmosphere, oceans, and ice, and many aspects of global climate are changing. Climate represents long-term averages (i.e. trends) and weather variations measured over decades to centuries, and is often more subtle on a humanistic time frame. On the other hand, weather represents short-term changes (of days up to about 10 years). This distinction is important as we make our plans for the future. We must now plan for expected or predicted change, not relying solely on past data. Instead of accepting the premise that the past will repeat itself, we must also accept that fact that when it comes to climate, change is inevitable. Long range planning that relies on past data in many sensitive areas simply will not give an accurate portrayal of how to plan for future climate changes and their effects on the built environment. Although flood maps are outdated in some areas, they still remain the most consistent source for flood data across the United States. NARA utilizing the most recent 100 year floodplain data to establish a new site, or assess an existing location, will utilize a three foot above freeboard buffer as the standard for building elevations. NARA considers all locations to be critical because of the holdings contained in the buildings, as opposed to the buildings themselves. Reliance on a less strict standard could result in less certain outcomes. Protecting to this level should help build in some buffer at many location that may help to account for older maps that may no longer accurately predict future 100 or even 500 year floodplains. We need much more accurate predictors of the future (computer models) to better plan and adapt to climate change, for building permanent structures. These models, although they vary considerably, still all predict that climate change will occur.

***“Evidence from the top of the atmosphere to the depths of the oceans, collected by scientists and engineers from around the world, tells an unambiguous story: C”***  
***Source: US Global Change Research Program, 2014;***  
***<http://www.globalchange.gov/climate-change>***

Evidence for climate change is abundant- from the outer reaches of the atmosphere to the ocean bottom. Worldwide, scientists and engineers have compiled massive amounts of data by monitoring the Earth's weather and climate using satellites, weather balloons, multi-parameter devices at surface stations, and specialized observing systems (e.g. tidal buoys, glacial ice monitors, ice cores, etc.). This data has allowed computer models to predict climate change with good certainty at the regional level, which is helpful. In spite of all of the data, which is considered reliable at a regional scale, it is still difficult to plan on a local scale.

The data from this research shows that human activities do influence climate change. The changes, although observational, are quantifiable. Each line of research taken by itself is not necessarily a strong indicator of climate change. However, when all lines of evidence are examined together, they create an undeniable argument that climate change is occurring within our lifetimes; and that human activities do play a significant role in those changes. Human

influences driving recent climate change are based on the following scientific lines of meteorological, oceanographic, and geologic evidence:

- 1) Improved fundamental understanding of how certain gases trap heat, how our climate system responds to the increases in the gases, and how human and natural factors influence climate.
- 2) Reconstructing past climates using data from tree rings, ice cores, and coral, showing global surface temperatures over the last several decades are unusual, with the last decade (2000-2009) being warmer than any time in the last 1300 years.
- 3) Outputs from climate models that simulate climate of the past century, and separate human and natural factors that influence climate. With human factors removed, models show that recent solar and volcanic activity should have actually resulted in a cooling of the earth during this period. All other natural variations are far too small to explain global warming. When human influences are included in the models, they closely reproduce global warming that has been observed for the last 50 years.
- 4) “Fingerprint” studies attribute observed climate change to particular causes. One example is that the stratosphere (the layer above the troposphere) is cooling while the Earth’s surface and lower atmosphere is warming, suggesting warming is from increased heat-trapping, the so-called greenhouse gases (GHGs). If warming was due simply to increased solar output, the entire Earth’s atmosphere (including the stratosphere) should have warmed.

Scientific evidence strongly suggests the planet has warmed over the last 120 years (*US Global Change Research Program, 2014*). We must focus our efforts on reducing our impacts on future climate change (mitigation), and find ways to deal with present and future climate changes (adaptation). Global climate models predict the climate will continue to change – how rapidly and radically depends on the amount of heat-trapping greenhouse gases (GHGs) the Earth naturally produces plus what we have already emitted, from human activities, and how much we will continue to be emitted in the future. What may still be up to debate is how climate change will affect us in the future. The bottom line is no one really knows how severe the future climate change will be, or exactly which areas will be negatively affected first. However, it seems prudent to use available scientific data to help plan for the future. Changes in climate attributed to the presence of elevated GHGs present many new challenges and opportunities. NARA is preparing to take on many the challenges and opportunities created by future climate change using both mitigation and adaptation strategies.



#### IV. What NARA Can Do

NARA's responsibility as a Federal agency mandates we meet requirements of [EO13653](#), *Preparing the United States for the Impacts of Climate Change*; it directs federal agencies to support development of climate resilient infrastructure and provide information, data, and tools to increase climate change preparation and resilience. NARA accepts our responsibility as a Federal agency, and concludes that we must continue to search for better ways to be both sustainable, and meet present and future climate change challenges. Simultaneously, in the interest of saving taxpayer dollars, NARA is continually searching for ways to use advantageous climate change opportunities as they become available.

NARA uses both mitigation and adaptation in our climate change planning. Mitigation represents steps we must take to reduce the greenhouse gases we produce as an agency. NARA has made great strides to reduce the GHGs produced by sharply reducing energy use, business travel and employee commutes. These mitigation efforts should reduce potential global warming in the future, and thus reduce the impacts on future climate change. However, the GHGs already in the atmosphere will not go away quickly, so the past GHG emissions and present and future emissions will continue to affect climate for a very long time. GHG emissions are reduced by improving energy efficiency, and by switching to low-carbon/non-carbon energy sources. At NARA, we do this primarily by directly reducing energy used at our facilities, installing alternative energy systems, encouraging mass transit use where available, teleworking, reducing business travel via teleconferencing and webinar usage, and using compressed or alternate work schedules, where feasible.

**“Climate change is affecting the American people in far-reaching ways. Impacts related to climate change are evident across regions and in many sectors important to society—such as human health, agriculture and food security, water supply, transportation, energy, ecosystems, and others—and are expected to become increasingly disruptive throughout this century and beyond..”**

**Source: US Global Change Research Program, 2014;  
<http://www.globalchange.gov/climate-change>**

Adaptation, on the other hand, refers to actions we take to prepare for and adjust to changing climate conditions. Taking these actions reduces the harm from negative climate changes. Research shows that proper planning for climate change saves many times the dollars versus no action, as does being poised to take advantage of any new opportunities created by the changing climate. To be ready for the future, we must better understand climate change effects, and begin to accept that climate change has already occurred, will continue to change, and will shape our collective futures. NARA is partnering with other agencies to share information and experiences on climate change. This partnering has resulted in better understanding of what must be done, what areas are most susceptible to climate change, and ways to pool resources to come up with community-wide plans for the future. The severity

and speed of climate change depends on what we do both now and in the future. Each of us must do our part to help with mitigating climate change. There are several areas of risk that NARA has identified pertaining directly to our operations. These are risks to agency operations as relative sea level rise, flooding, and drought. Each of these risks will be discussed in the pages to follow.

Climate adaptation planning is the other facet of climate change we must address, and is important at all levels of government and the private sector. However, few measures have been implemented to-date. Meeting adaptation challenges will take considerable planning and time to establish prudent strategies for meeting the changes. We must not only protect our own assets, but cooperate with other organizations to better understand the problems and opportunities, maximize everyone's efforts to keep from unnecessarily duplicating efforts, and reduce losses. It is especially important to use any tax dollars wisely, by avoiding losses due to inaction, or inadequate actions. On the flip side, we do not want to waste money by building new facilities in areas vulnerable to climate change, over build to unrealistic specifications at new locations, or overspend to protect an older location versus relocating a facility.

For NARA, this means that adaptation planning refers to steps we must take now and in the future to protect the health and safety of people, our buildings and other infrastructure, holdings, the natural system, and our communities from climate change. Adaptation and mitigation are closely linked. Without significant mitigation actions now, adaptation efforts in the future will be more far more difficult and costly. To help predict the future challenges of climate change for the agency and each facility location, risk assessment is the next logical step.

Although risk assessment focuses mostly on the likelihood of negative consequences it does not exclude potential beneficial consequences. Because climate will affect everyone to some extent, there will be lots of challenges to government agencies, private companies, and the general population. Climate change is one issue the Federal government cannot afford to ignore, and the government must lead in this area. At the same time, government cannot tackle all of the issues of climate change alone. Government agencies and the private sector must cooperate and pool resources to be able to successfully overcome climate change challenges. NARA cannot simply operate independently to do its part to help with climate change. For NARA, to be successful with its strategies, NARA must include climate change adaptation and resiliency planning into all programs, policies, and operations. Once policies are modified, and a firm grasp of vulnerabilities and climate change effects on our operations, we can better assist other organizations.

One step NARA must do is conduct agency-level and facility-level vulnerability and qualitative risk analyses. Once the qualitative risk analyses are completed, we will have a rough baseline to work from. The next step is quantitative risk assessment, so we have a statistical basis for our decisions. When something changes, more data becomes available, or a new opportunity arises, we will look for ways to better adjust to the changes and relate this information to how we do business. Generally, these quantitative assessments give more certainty and clarity; however, they will require much more data to keep the level of uncertainty low enough to make informed decisions. These types of decisions are the result of a more formal risk assessment process. Formal risk assessments usually require studies that estimate the likelihood of specific sets of

events occurring and/or their probable consequences. These results are justified, statistically, and suggest the best prediction for long term risk. To-date adequate local level data has been hard to find to determine the amount of risk and the degree of uncertainty surrounding estimates. The information is being compiled by climate leadership groups and is now available for public use. With the release of the new information, higher quality risk assessments may be practical for many locations.

Risk assessments require common sense and quality data to quantitatively determine risk with reasonable certainty. Previously, due to the lack of definitive localized information pertaining directly to localized risk, risk assessments were difficult to conduct at the facility level. Therefore, risk assessments at many NARA locations have been subjective and confined to regional area granularity. NARA is planning on the data being available in a format that can be easily used, so that we can take realistic steps to quantitatively assess risk at each location. NARA plans to make this information and planning part of our Building Condition Reports (BCRs), so we can do near term and long term planning for each of our NARA-owned and/or occupied locations. The lack of granular information has put NARA in an uncomfortable position, as we are the protectors of our nation's heritage, with numerous irreplaceable documents and artifacts. Failure to protect these artifacts and documents would mean a mission failure for the Agency.

***"...sea levels are now rising about 3 millimeters per year, or 1.2 inches per decade, a pace likely to keep accelerating with global warming."***

***Source: VOX Climate Change, January 15, 2015,***

***<http://www.vox.com/2015/1/15/7552539/sea-level-20th-century>***

## **V. Risk Assessment Challenges**

Given the paucity of current, high-quality localized data, and a lack of fiscal resources to conduct assessment, NARA has been unable to conduct a comprehensive and detailed quantitative assessment of the Agency's facilities vulnerabilities and risks due to climate change until recently. Instead, NARA's Climate Change Adaptation and Resiliency Planning previously used a common sense approach using data from widely-accepted scientific literature on regional impacts of climate change to identify the potential vulnerabilities. From this less granular data, we have been able to get some idea of risk, and to assess current and future risk, and make general suggestions for adaptive changes. The Agency is already conducting priority actions to locations initially identified as at risk. These actions are controlled and supported by the Agency Climate Change Adaptation and Resiliency Steering Group, which is chaired by our Climate Change Officer. All of these actions are part of a larger Federal effort to promote a healthy and prosperous nation resilient to the changing climate. The NARA community of locations extends into many states in all regions of the continental United States. NARA has a very big task. Protecting our nation's heritage, and making that heritage available to the American people is no small task, but is the hallmark mission of the agency. To maintain this agency mission, NARA must pay particular attention to relative sea level rise, flood risk from precipitation events and storm surge, and on the other side of the coin, drought in certain regions.

## A. Sea Level Rise

Climate change projections include sea level rise and a greater likelihood of severe weather events (e.g., hurricanes, storm surge, flooding etc.). The effects of sea-level rise on coasts will vary considerably from region-to-region and over a range of spatial and temporal scales. Land subsidence in certain locations causes relative sea-level rise to exceed global mean sea-level rise. The effects will be greatest and most immediate on low-relief, low-elevation parts of the U.S. coast along the Gulf of Mexico, Mid-Atlantic States, northern Alaska, Hawaii, and island territories and especially on coasts containing deltas, coastal plains, tidal wetlands, bays, riparian, and estuaries.

Even though most of NARA facilities are located inland, sea level rise and extreme events may impact those facilities located in coastal regions through inundation, especially during storm events. In addition, salt water intrusion affecting freshwater availability and quality is possible. In the longer term, coastal erosion could also increase vulnerability at some locations.

Rising sea levels clearly threaten coastal communities and vital local infrastructure along the U.S. coast. One of the lessons emerging from Hurricane Sandy's impact on the New York City region is the vulnerability to storm surges, which sea level rise (SLR) is likely to exacerbate. Establishing sea level trends is critical to understand the risk SLR poses to coastal communities and infrastructure over time. Sea level is measured by tidal gauges and satellites. That data can then be reported as a global average or as local rates. Changes to mean *sea level* result from transfer of fresh water from land to oceans (e.g. land-based ice sheets and mountain glaciers) and thermal expansion of ocean water due to higher global temperatures.

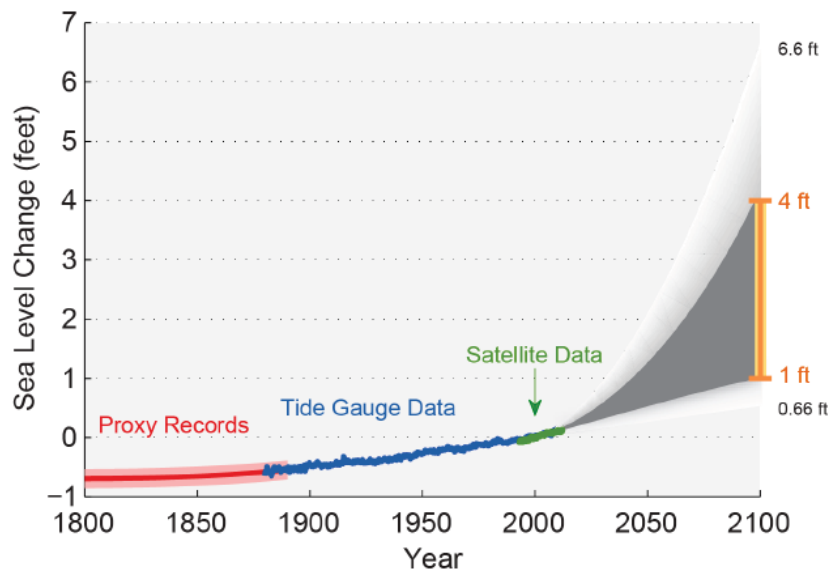
During the 19<sup>th</sup> and 20<sup>th</sup> centuries, global sea level rose about 7 inches/100 years; over the last 20 years the rate has accelerated to nearly 12 inches per century. This is an alarming increase, and if this present SLR trend continues, coastal communities will be even more significantly impacted in the near future.

There is uncertainty about the rate of global SLR through the end of the current century. Most uncertainty is attributed to a lack of scientific understanding of how large ice sheets (primarily from Greenland and West Antarctica) will respond to global warming. The range of the National Climate Assessment (NCA) projections encompass an array of recent estimates of potential global SLR through 2100, and were selected to help bound the risk from SLR. The U.S.NCA provides a range of plausible global SLR scenarios, ranging from 8 inches up to 6.6 feet by 2100. The NCA focuses on the middle scenarios of 1 to 4 foot (see orange line in Chart below). However, global SLR of 6.6 feet should be considered where there is little tolerance for risk (e.g. for new permanent government buildings, such as NARA holdings). In contrast, a global SLR estimate of

***“RSL accounts for change in global sea level, plus the effects of local factors, including vertical land motion (subsidence or uplift), ocean circulation patterns, salinity, sedimentation, and erosion.”***

**Source:**  
**Intergovernmental Panel on Climate Change**  
**[http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5\\_Chapter13\\_FINAL.pdf](http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter13_FINAL.pdf)**

8 inches (0.66 foot) should be considered only where there is a much, much greater tolerance for risk. NARA has no buildings that would fall into that category.



**Figure 1**

**Historical & Projected  
Global Sea Level Rise**

*(Source: US Global  
Change Research  
Program, 2014;  
<http://www.globalchange.gov/climate-change>)*

NARA needs more granular, localized data to quantitatively estimate risk to specific locations. NARA must have baseline data to determine what the risks are, and the severity of those risks. This is especially true in coastal areas. One key element to determine risk is **relative sea level (RSL)**. In contrast to global sea level, RSL refers to the height of the sea surface relative to a specific point on land. This is where the rubber meets the road for baseline risk assessment along coastal areas. RSL accounts for change in global sea level, plus the effects of local factors, including vertical land motion (subsidence or uplift), ocean circulation patterns, salinity, sedimentation, and erosion. With RSL determined, predictions of effects due to storm surge, tidal influence, antecedent and current precipitation can be better factored in to make a more reasonable quantitative assessment of risk for a specific location. NARA will use RSL at all appropriate locations to determine quantitative risk at that location.

Most regions in the lower 48 states have experienced changes in RSL equal to or greater than the global average, meaning that RSLs are increasing in those locations at a faster rate than the rest of the world. Rates greater than the global average are primarily seen on the mid-Atlantic and Gulf coasts. Portions of the mid-Atlantic have seen a RSL increase of >8 inches just since 1960. This information can be used to determine current, and to some extent future risk, for proposed locations and for existing buildings. Along with conducting risk assessments, long range planning must include adaptive measures for climate. Many of NARA's adaptive measures currently use existing sustainability measures and Leadership in Energy and Environmental Design (LEED) principles.

**B. Flooding**

Changes in precipitation are expected to result in increased soil erosion potential due to increased precipitation intensity and amount, and greater flood potential from increased precipitation

frequency, duration, amount and intensity. These effects are expected to be greatest in the East and Midwest. In addition, there is a greater potential for water quality impairments in some areas due to increased sedimentation and nutrient loading. This could directly or indirectly affect water availability for extended periods in some locations.

The amount of rain falling in extreme precipitation events has increased in the U.S. by approximately 20 percent in the past century, and this trend is projected to continue. A national upward trend in the number of extreme precipitation events is statistically significant with the greatest frequencies occurring in recent years. More intense precipitation or storm events could result in flooding. NARA sites have already experienced floods under existing climate conditions along with record breaking rainfalls, resulting in millions of dollars in damages. Flooding occurs for many reasons. Those reasons can be antecedent moisture, rainfall intensity and duration, changes in land use, and other preexisting conditions.

Making decisions about where to build a new facility or how to protect an existing facility, and what can be done to protect the facility from future flooding, is complicated. In some cases, it may be too expensive or impossible to try to stay in the same location. Reliance on old data is also questionable. United States Geological Survey (USGS) data, although very complete, is now outdated and does not predict future flood risk. USGS data is based past storm events, thus making this information questionable for use in risk assessments for future climate change adaptation. Additionally, the U.S. Army Corps of Engineers, together with the Federal Emergency Management Agency (FEMA) routinely review existing flood data to update the associated flood maps. However, this data and future maps are based on old data and flood events which may not be a good indicator of future events. For example, the Mississippi River valley has seen multiple major floods occurring with greater frequency in the past century, notably in 1927, 1973, 1993 and 2011.

#### **Examples of floods, storm-related damage, close calls, etc., impacting NARA facilities**

NARA has had first-hand experience with flooding at some of our facilities in recent years. In 2006, the Federal Triangle in downtown Washington D.C. flooded, causing extensive damage to many Federal buildings.

The National Archives at 700 Pennsylvania Avenue, NW was among the buildings in the area inundated by flood waters. Although the building was surrounded by water, the flood gate protection kept water from intruding into the building from outside the perimeter. However, the Archives did have some intrusion into the building via the sewer system, which damaged electrical panels and flooded the basement floor area. Although the Archives was able to protect the holdings and building, but it took a few months to move panels, install water blocking devices to prevent future intrusion from sewer piping, and restore normal service to the building.

Tropical Storm Sandy also impacted a NARA site in South Manhattan. The lower level of the building was flooded during this event. Fortunately, holdings had been moved to another location prior to the flood event, thus avoiding a major loss at this location.

These events in just the last decade have made NARA aware of the changing situation with climate and potential for flooding at many of locations. Therefore, NARA is moving forward with assessing risk at each location, to make plans to adapt to extreme events and general changing climate conditions in each area.

### **C. Drought**

Short term and long-term water shortages, or drought is expected to increase in frequency with changing climate in some areas. Extreme climate events such as increased temperature and associated drought have important impacts to NARA operations. Water supply is challenged in areas already water-stressed, including the Southern Plains and the Southwest where drought is likely to become more frequent and longer lasting. There are also water management challenges in the irrigated West, due to changes in snowpack and snowmelt, with consequent impacts on water availability. NARA has several facilities that will likely be impacted by drought. Drought conditions may also lead to more general increased requirements for infrastructure to deliver water to those areas that no longer have viable water sources and to power generation to some of those facilities.

Climate impacts will likely manifest as changes in land use and resources demand even more water availability. These changes will likely reinforce and intensify individual impacts on land and water resources (e.g., water shortages and associated price increases for food, utilities, etc.). These changes will have general feedback through water and land use which will likely impact energy demand. Declines in the quantity and quality of water associated with climate change may directly affect site operations. Additionally, warmer temperatures and changes in the hydrologic cycle, including precipitation type, frequency, and intensity are expected with climate change. Climate change impacts to water availability may impact energy availability at energy facilities, thus impacting consumer energy costs.

The increased incidence of droughts and water constraints may result in water-related electricity shortages and disruption of NARA facility operations in some locations. For the majority of NARA's potable and non-potable water use in drought affected areas will become paramount to sustainable operations. The availability of significant volumes of water will remain essential to critical facility operations. Prolonged droughts coupled with warmer weather may also contribute to increased wildfires, which may impact operations at some of our facilities, especially in the Southwest.

On the beneficial side, increased average temperatures will result in decreased heating needs during winter months; but they will also likely result in increased summer cooling needs for NARA buildings. In addition, NARA sites may face operationally disruptive electricity shortages during peak summer demand periods due to increased electricity demand. Other regions could face more extreme climate events (extreme heat and cold) and more variable temperatures throughout the year. Results could include increased energy and heating/cooling costs and the need for additional capacity. Increased incidence of heat and climate related workforce health issues related to heat stress, potential increases in pestilent species or epidemics, and outdoor human operational constraints may also affect day to day operations.

## VI. NARA's Commitment to Climate Change and LEED

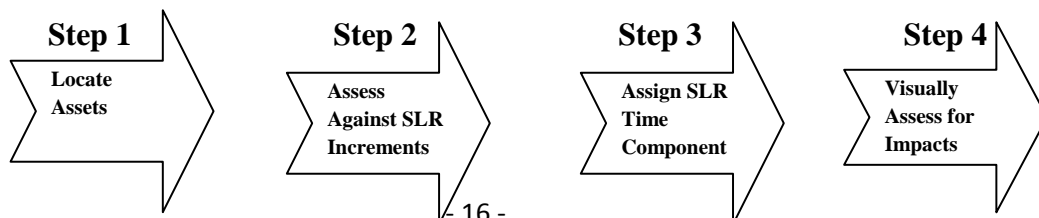
NARA is improving its efforts to adapt to climate change. Long range planning based on good risk assessments is critical to making informed decisions to address the changing climate. The [Architectural and Design Standards for Presidential Libraries](#) was revised in July 2014. This new plan helps guide planning, construction, and acquisition of new facilities, and for major construction or improvements at existing facilities. This Guide also incorporates LEED concepts and requires LEED certification for new buildings and major construction projects.

NARA fully subscribes to the concepts of LEED as both sustainable and meeting needs for adapting to changing climate. Two NARA-owned facilities are now certified LEED Platinum, and two more facilities are currently working toward LEED certification. As a result of adopting LEED strategies, NARA now requires new facilities to be built to LEED Platinum, and construction at existing facilities to be built LEED Silver. Furthermore, the agency now incorporates LEED standards and pricing into periodic building condition reports (BCRs). The BCRs help NARA plan for upcoming costs and projects needed to maintain sustainable buildings, improve building system integrity, energy, and water use, and adapt to climate change. The BCR mechanism also helps NARA plan for potential on site renewable energy, and more efficient energy systems when practicable.

NARA, with the help of DOE, awarded two significant Energy Saving Performance Contracts (ESPC) projects in 2013. These two projects are in addition to successful earlier ESPC projects awarded in 2008 and 2009. These projects helped set NARA's energy and water use trajectories to historical lows, and helps NARA create a path to sustainability, while addressing climate change adaptation and resiliency challenges.

NARA senior management is engaged in climate change adaptation and resiliency planning and other sustainability aspects. For instance, all procurements must meet rigorous standards for bio-based, environmentally preferable, Energy Star, Electronic Performance Environmental Assessment Tool (EPEAT), and other sustainable standards. Life cycle cost and life cycle environmental impacts are considered for procurement, use, and end of life of products and services. Contractors performing services or acquiring products used for, or on NARA's behalf must also meet these acquisition standards. Other services, including automobile and building leasing also require these products and buildings must simultaneously fulfill sustainability requirements and address climate change adaptation and resiliency strategies.

### A. Risk Assessment Process





### **Step 1: Locate Assets**

Use public and subscription sources to provide location, GIS and map data for assets.

### **Step 2: Assess Against SLR Increments**

SLR estimates from NOAA Coastal Services Center were used to assess increments of SLR, and how far inland the coastline may extend and depth of inundation that may be experienced at the location. NOAA models present-day tidal surface at each point on the U.S. coast, Mean Higher High Water (MHHW) tides, with interpolated data from tide gauges. Using GIS tools, NOAA increases present-day MHHW tidal surface with SLR. The increases are shown from 1 to 6 feet, in one foot increments. NOAA extends increased tidal surface inland over a detailed topography model, until it is constrained by land. Elevation data for inland regions is from the USGS.

NOAA's analysis includes hydrologic connectivity between the tidal surface and inland regions at or below the elevation of the modeled tidal surface. As a result, the model allows for an elevated tidal surface to flow inland to areas of lower elevation, but prevents areas of lower elevation to fill with water unless there is a suitable flow path.

The processed data sets are released publically by NOAA, and were obtained in Geographic Information System (GIS) data format for use in this study. NOAA's SLR data enables the present-day highest high tide, or MHHW, to be mapped (shown in blue) in relation to the substation. In the figure on the right, a 5 foot SLR increase above present-day MHHW is shown in purple (areas of deeper inundation symbolized in darker purple). In this example, the substation is not inundated by 5 feet of SLR, but is located within several blocks of the new coastline that would result from 5 feet of SLR.

For each Metropolitan Statistical Area, assets were analyzed at each one foot increment of SLR, between 1 foot and 6 feet, to determine whether they would be inundated. Note that this approach does not account for erosion occurring as sea level rises, or avoidance of inundation through construction of sea walls and other means.

### **Step 3: Assign SLR Time Component**

The next step involved projecting the year in which the increments of SLR would occur by relating each one foot increment to a specific time period based on the National Command Authority's global SLR scenarios, adjusted for local factors based on historical trends. This step involved two activities. First, the NCA's global SLR scenarios were refined to account for relative sea level effects for the individual MSAs in the study. Second, the relative SLR rates for the MSAs were related to specific timeframes, to identify risks as they pertain to infrastructure planning. Under the first activity, historical tidal data from NOAA's tide gauge network were used to establish a regional trend that reflects localized factors such as subsidence, ocean currents, salinity, and temperatures. Historical trends were assessed for each of the relevant coastal counties in the pilot MSAs, using data from the nearest tide gauge. These trends were then incorporated into the NCA's four scenarios for future global SLR, to generate the required relative SLR rates for each county in each MSA.

Under the second activity, NOAA's GIS data of SLR (depicting SLR of 1 foot to 6 feet in one foot increments) were associated with the timeframes of the locally adjusted NCA scenarios. This exercise provided a projected year for each one foot increment of SLR under each scenario for each location. An example is shown for Miami in Exhibit 3-4 below. It depicts projected SLR through 2100 under each of the four NCA scenarios: High (blue), Intermediate-High (red), Intermediate-Low (green), and Low (purple). The arrows indicate when 3 feet of SLR is projected to occur under the two higher NCA scenarios. Under the High Scenario (after accounting for local trends in relative SLR), Miami would experience SLR of 3 feet in approximately 2066; under the Intermediate-High Scenario it would experience SLR of 3 feet in approximately 2087, 21 years later. The approach outlined in this report can be repeated as the climate change science evolves and the global SLR scenarios are updated.

Exhibit 3-5 below shows a table of years corresponding to each 1 foot SLR increment, for each NCA scenario, for the counties in the Miami MSA. A comparable table was generated for each MSA and is presented in Section 4. The tables have been color-coded to draw attention to the important time frames: red cells highlight SLR increments (at least 1 foot) reached before or around 2050; yellow cells highlight measurable SLR increments (at least 1 foot) reached between 2050 and 2100.

#### **Step 4: Visually Assess for Impacts**

The analysis described above uses data sets, GIS, and modeled outputs. By combining these large quantities of data, the analysis can evaluate the effects of SLR over time for large areas, relative to energy assets. The final step was to perform a visual assessment of the assets to ensure that the results make sense and to identify other factors that warrant consideration. The visual assessment did identify a result that the "automated" approach did not capture; some assets were identified as being not inundated, but surrounded by water under some SLR increments. The analysis of facilities therefore makes a distinction between inundated facilities (some portion under water) and operationally affected facilities (not under water but surrounded by water).

#### **NARA Risk Assessment Model and how it will be used by NARA.**

#### **B. How Climate Change Impacts Agency Mission and Strategic Goals**

Over the last 50 years global climate has changed significantly. More change, with likely significant consequences, is expected in the next 60-80 years. Impacts of the changes are also clearly being felt across the United States today. Storms are causing considerably more physical and property damage, and disrupting our lives with more frequency; droughts are more common in certain areas; and sea level is rising. Some low lying areas around Norfolk, Virginia now flood 120 days per year. This flooding is expected to increase to over 300 days per year in the next 20 years.

NARA's facilities are scattered across most of the nation, so NARA must plan for local and regional climate change. Over the last five decades, average temperature across the United States rose about 2°F, and precipitation increased an average of 5 percent. However, in spite of

overall precipitation increases, in many areas, precipitation has and will continue to decrease significantly. Extreme weather cycles, heat waves, intense precipitation events and regional droughts, are becoming more frequent. One precipitation trend in the United States is for increasing frequency and intensity of heavy downpours. These events can cause sewer systems to fail, and localized flooding. Change in heavy downpours was responsible for much of the observed increase in overall precipitation during the last 50 years. Each climate model shows change is inevitable, but there are wide differences in how severe the changes will affect future weather events and climate. This creates uncertainty for determining our vulnerabilities and risk. To be ready for an uncertain future, NARA must incorporate realistic climate change expectations into its programs, policies, rules, and operations to ensure they remain effective regardless of future climatic conditions.

One particular area of complexity is sea level rise, and how that rise puts our built environment and people at risk. Water expands as it warms causing sea levels to rise. Glacial and ice sheet melting also contributes to sea level rise. The sea level has also risen ~ 8 inches or more along some coastal areas of the United States, and is projected to rise another 1 to 4 feet by 2100. Although these changes are gradual and of concern (salt intrusion into drinking water systems, and creating conditions for the spread of disease, etc.) sea level rise by itself is not generally considered a catastrophic problem. However, sea level rise combined with storms (rainfall, wind speed, direction, and rotational effects) and other factors (tides, subsidence, antecedent soil moisture, changes in watersheds, and other man made built environment influences, etc.), massive property damage and loss of life may occur. Oceans absorb over 90% of atmospheric heat including those resulting from, or associated with, emissions from human activity. Precipitation since 1991 (relative to 1901-1960) increased the most in the Northeast (8%), Midwest (9%), and southern Great Plains (8%), while much of the Southeast and Southwest had a mix of areas of increases and decreases. Certain susceptible areas such as Washington D.C. and New York City have experienced extensive damage recently from the combination of sea level rise, storm surge, and tide phase. Although much of the blame is placed on the storms, the likelihood remains for repeat scenarios due to the predisposition from sea level rise in these susceptible areas.

Climate change trends and secondary influence are predicted to continue because greenhouse gases (GHGs) already deposited in the atmosphere remain for tens to hundreds of years. Even if we were able to completely eliminate man's contributions to GHGs, many of the predicted climate effects would still occur over the next few decades. Because globally, humans continue to contribute to GHGs, the effects may become more pronounced due to past, current and future emissions. Even without any future human influence, climate change will likely occur against a background of natural variations in climate. Climate models predict that in the United States, temperatures will warm substantially during the 21st century. These changes pose risks for human and environmental systems. Certain at risk populations, systems and environmental components include: public health, air quality, drinking water sources, freshwater resources, the coastal environment, wildlife and ecosystems, infrastructure, economic activity, and cultural resources.

Best available science directs our attention to areas where NARA's mission, facilities, and operations may be adversely affected by climate change. NARA does not have the resources to conduct a detailed quantitative risk assessment of the vulnerability of its mission to climate change at each location. However, our Climate Change Adaptation and Resiliency Plan uses expert judgment, combined with best information available from peer-reviewed scientific literature on the impacts of climate change, to identify potential vulnerabilities. The next section summarizes the Agency's currently known mission, facility, and operational vulnerabilities. With improvements to our scientific understanding, other vulnerabilities may join the list. This summary is organized by NARA's strategic goals (listed below).

### **C. NARA's Known Vulnerabilities and Climate Related Risks**

To be adequately prepared for climate change, NARA must plan not only for gradual changes (increases in temperature and sea level; moisture variability, etc.), but also catastrophic events. Assessing NARA's climate change vulnerabilities and ultimate risk is a dynamic process. The extent that vulnerabilities have been identified and understood varies across locations, due to limited data. The data is limited not only because it is not current for many localities, but it also fails to plan for the future, as the data relies on past events. Climate change science is expected to improve over time, providing ever greater weight and clarity of evidence to evaluate consequences of existing and expected impacts. To furthermore complicate local planning efforts, on the global scale, climate model simulations show consistent projections of future conditions under a range of emissions scenarios, but there is insufficient granularity to plan locally with reasonable certainty. Models project large and historically unprecedented future warming in every region of the U.S. For precipitation, models show decreases in precipitation in the subtropics and increases in precipitation at higher latitudes. The contiguous U.S. straddles the transition zone between drier conditions in the sub-tropics (south) and wetter conditions at higher latitudes (north). Because the location of this zone varies among models, projected changes in precipitation in central areas of the U.S. range from small increases to small decreases. Clear direction of precipitation change only occurs north of the contiguous U.S. where increases are projected and in the far Southwest, where significant decreases are projected.

NARA will continue to improve its understanding of known vulnerabilities and assess risk as information becomes available. NARA can then adjust activities to anticipated changing climate conditions. NARA's mission activities and the potential climate change impacts to those activities are linked to our strategic goals:

#### **1. MAKE ACCESS HAPPEN**

**Potential Impacts:** Increased need for cooling and humidity control to preserve documents and other archival holdings; increased risk from storm surges and long term sea level rise; and vulnerability to intense mainland wind storms and flooding; while maintaining a healthy environment for employees and visitors.

#### **2. CONNECT WITH CUSTOMERS**

**Potential Impacts:** Increased need for cooling and humidity control to preserve documents and other archival holdings, especially as related to electronic records storage

and cloud-based systems; increased risk from storm surges and long term sea level rise; and vulnerability to intense mainland wind storms and flooding.

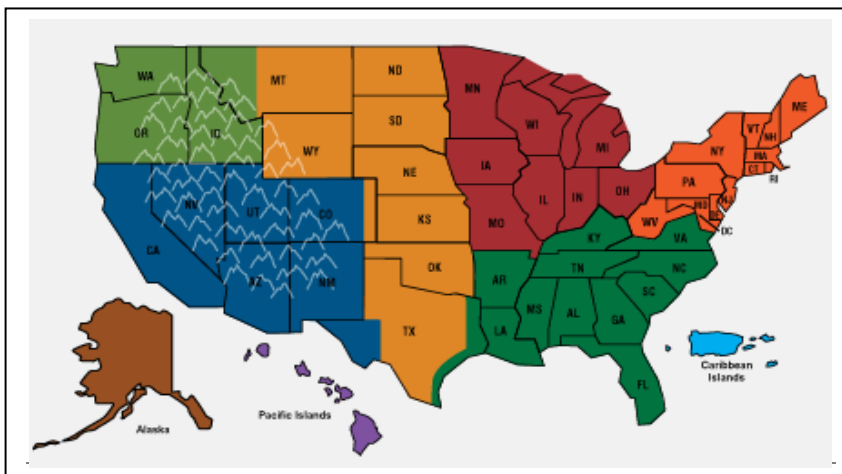
3. **MAXIMIZE NARA’S VALUE TO THE NATION**

**Potential Impacts:** Increased need for cooling and humidity control to preserve documents and other archival holdings; increased risk from storm surges and long term sea level rise; and vulnerability to intense mainland wind storms and flooding which could affect physical and remote access to NARA facilities and systems; while maintaining a healthy environment for employees and visitors.

4. **BUILD OUR FUTURE THROUGH OUR PEOPLE**

**Potential Impacts:** Increased need for training all NARA staff on the agency’s Climate Change Adaptation and Resiliency Plan and related initiatives.

NARA’s assessment of potential impacts is qualitative at this point in time, and has been done primarily at the national or geophysical regional level. The assessment identifies vulnerabilities to entire programs within NARA to help focus the Agency’s climate adaptation efforts. However, because there are widely differing geographic regional areas, severity and importance of known vulnerabilities will vary across and within regions. NARA management is concerned about the lack of local data, but will attempt to capture regional differences and identify vulnerabilities of greatest importance. Included, will be identifying the most vulnerable areas within these programs. Because regional data is the basic level of information available to date, NARA is focusing attention at the geophysical climatic regions established by the U.S. Global Change Research Program. However, as the granularity of the information improves, localized data will be used to make risk assessments, reduce our vulnerabilities, and make more informed decisions on climate adaptation for each facility. Due to the lack of granularity of information on the local level at most locations, NARA is currently basing risk on data from the following geophysical regions (see figure below):



**Figure 2**  
**Map of Regions**

- **Northeast-** Heat waves, heavy downpours, and sea level rise pose growing challenges to life in the Northeast. Infrastructure, agriculture, fisheries, and ecosystems will be

increasingly compromised. Infrastructure will be increasingly compromised by climate-related hazards, including: sea level rise, coastal flooding, and intense precipitation events.

- **Southeast-** Sea level rise poses widespread, continuing threats to the region's economy and environment. Extreme heat will affect health, energy, agriculture, and more. Decreased water availability will have economic and environmental impacts.
- **Midwest-** Extreme heat, heavy downpours, severe storms, and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and exacerbate risks to the Great Lakes and large river estuaries.
- **Great Plains-** Rising temperatures lead to increased demand for water and energy. In parts of the region, this will constrain development, stress natural resources, and increase competition for water. Agricultural practices will need to cope with changing conditions affected by large and severe storms and flooding.
- **Southwest-** Increased heat, drought, and insect outbreaks linked to climate change, have increased wildfires. Declining water supplies, reduced agricultural yields, health impacts in cities due to heat, and flooding and erosion in coastal areas are additional concerns.
- **Northwest-** Changes in the timing of stream flow reduce water supplies for competing demands. Sea level rise, erosion, inundation, risks to infrastructure, and increasing ocean acidity pose major threats. Increasing wildfire, insect outbreaks, and tree diseases are causing widespread tree die-off.
- **Coasts-** Coastal lifelines, such as water and energy infrastructure, and nationally important assets, such as ports, tourism, and fishing sites, are increasingly vulnerable to sea level rise, storm surge, erosion, flooding, and related hazards.

NARA is aware that more localized data is needed to better determine risk and prepare for climate change at each facility. For some facilities, there is no margin for error as failure to protect priceless/irreplaceable documents and artifacts would be mission failure. In the absence of localized data, planning must concentrate on worst case scenarios. This leaves NARA in a situation where we may be forced to over-protect/overbuild, thus potentially waste taxpayer dollars, to protect NARA assets.

NARA must prepare for gradual changes in climate and sudden or catastrophic climate change events. In the event of a catastrophic weather event, NARA's people, buildings, systems and other critical assets may be affected but our plans must ensure a rapid and thorough response to recover in a timely and efficient manner. Recent examples of catastrophic weather events occurred in Washington DC in June 2006 and in St. Louis in 2013. In the Washington DC event, excessive rain and flooding affected operations at the main Archives building. The flooding that occurred served as a reminder of the need for high standards for safety, durability, sustainability,

and climate change adaptation. In St. Louis, not long after opening the new facility at Archives Drive, an EF3 tornado (Enhanced Fujita Scale level 3), touched down on the access road immediately in front of the facility. This tornado destroyed over a mile of high voltage power lines and severed all power to the facility for 3 days. Despite the loss of all power, the facility was undamaged, the records were secure, and the environmental conditions of the storage bays saw only minor increases in temperature and relative humidity levels during the outage. In this instance the design, construction and contingency planning worked in a real world event.

Climate models indicate increased frequency and severity of extreme weather events that may affect Agency facilities, personnel safety, physical security, continuing operations, and emergency communications. Extreme weather events are expected to become more commonplace as the climate changes, increasing occurrence of flooding, heat waves, lightning and high winds. An increase in these events would increase the risk to NARA's personnel in the field and facilities. NARA is also assessing these vulnerabilities and identified areas of potential impact:

- Severe weather and flooding could potentially damage NARA facilities and holdings.
- Floods, lightning or other weather-related events could cause outages in NARA's Information Technology operations and/or phones, causing a loss of communications, and access to information. Any event that disrupts power, phone or internet capability could hamper us from fulfilling our mission goals.
- Extreme weather events, including severe winds and lightning could cause damage to NARA's building inventory and interior assets.
- Seasonal temperature changes and changing weather patterns can affect air quality and general comfort. Extreme heat, poor air quality or other weather conditions exacerbated by climate change may increase health risks of employees and contractors engaged in outdoor activities.
- Severe winds, lightning and other extreme weather events could cause power outages that disrupt NARA's air quality in storage and office space, security systems, outdoor lighting and emergency communication systems. Many systems in NARA facilities around the country are not linked to an uninterruptible power supply or backup generators. Outdoor lighting and security cameras are also vulnerable to direct impacts from high winds and other severe weather.
- An increase in the number of extreme weather events could affect planning and management of emergency operations.
- Changing water supplies may compromise the quality of water used at facilities. Water shortages and quality issues could have significant impacts on the Agency's ability to manage its facilities and provide access to records in our custody, particularly in drought-prone regions.

NARA is committed to collaborate with other agencies, and private and public organizations on climate change adaptation and resiliency planning. Some examples are listed below.

**Past and present agency and Non Governmental Organization (NGO) collaboration.**

- a. Government Services Administration (GSA)- for Records Centers
- b. Library of Congress (LoC)
- c. National Park Service (NPS)- Presidential Libraries on Park Service property
- d. Universities – where Presidential Libraries are co-located
- e. Environmental Protection Agency (EPA)- Climate Change Adaptation and Resiliency Planning- Community of Practice groups
- f. National Oceanic and Atmospheric Administration (NOAA)- for regional data, and sea level rise information
- g. National Aeronautics and Space Administration (NASA)- some local, but mostly regional data
- h. Association of Climate Change Officers (ACCO)- collaboration, networking and training on climate change
- i. United States Green Building Council (USGBC)- LEED preparation and certification

**Agencies potentially facing similar impacts and climate change management challenges.**

- a. GSA
- b. NPS
- c. Government printing Office (GPO)
- d. LoC,
- e. Smithsonian, etc.

Due to the irreplaceable nature of NARA’s holdings, much of NARA's planning efforts are focused within our own agency; however, NARA’s staff participates in interagency collaborative efforts. In spite of NARA’s small size, staff is engaged in interagency efforts to anticipate and address effects of climate change, and thus help all organizations move forward to meet the demands and challenges of climate change.

How will NARA address climate change and preserve the goals of its mission? First, we must identify regional climate change effects and identify critical locations susceptible to climate change using a diverse (e.g. Engineering, Finance, Design) planning team, and accessing the most up-to-date and reliable geographically-relevant climate change data.

Second, develop risk management approaches and methodologies to best deal with climate change model predictions, including partnering with other agencies (e.g. NASA, NOAA, DOE, DOI, GSA, NPS, LoC, GPO, and universities with co-located Presidential Libraries) where appropriate, on near term and long term actions and investments. NARA must create flexible design standards accounting for changing climatic conditions at unique locations, and an aggressive education and outreach program. Specifically, NARA must plan for sea level rise and storm surge protection, shifting precipitation patterns, flood events, wind and other extreme weather events, and other natural disasters at each location. NARA will incorporate climate change requirements into all of its policies, and emergency planning.



Finally, the agency must also consider secondary effects caused by climate change, and be prepared to deal with those effects (including loss of phone and internet). NARA must continue to protect its holdings according to precise temperature and humidity levels as described in [NARA Directive 1571](#) for archived records, and [36 CFR 1234](#) for federal records located in Federal Records Centers. Some examples of site specific adaptive activities include, seeking enhanced/expanded data collection; improving flood and shoreline protection; building sustainable structures; improving old structures to make them more energy and water efficient, and resistant/sustainable to climate change; and making plans to relocate at-risk infrastructure when other adaptation strategies are not feasible.

NARA is adopting a common set of principles (see below) to guide all of its efforts to integrate climate adaptation into its programs, policies and rules. The principles affirm NARA's approach of integrating climate adaptation into existing programs and activities to ensure their effectiveness as the climate changes. They uphold NARA's core values, and using the best available science, to protect people and locations most vulnerable to climate change, and using sensible approaches to develop and implement adaptation strategies. NARA is only one partner in a broader effort that must include multiple levels of government and private partners. The principles call for ongoing evaluation of effectiveness of climate change adaptation and resiliency approaches, recognizing the Agency will continue to learn how to adapt effectively over time.

#### **D. Climate Change Adaptation and Resiliency Guiding Principles**

- Adopt integrated approaches into core policies, planning, practices and programs.
- Prioritize most vulnerable areas to climate impacts.
- Use best-available science, grounded in the best-available scientific understanding of climate change risk, impacts and vulnerabilities.
- Build strong partnerships across multiple sectors building on existing efforts and knowledge of a wide range of stakeholders.
- Apply risk-management methods and tools that identify, assess and prioritize options to reduce vulnerability to potential environmental, social and economic implications of climate change.
- Maximize mutual benefits using strategies that complement or directly support other related climate or environmental initiatives. These initiatives should improve and support disaster preparedness, sustainable resource management, and development of cost-effective technologies to reduce greenhouse gas emissions.
- Continuously evaluate performance using measureable goals and performance metrics to assess whether adaptive actions are achieving desired outcomes.

### **E. Challenges and Training Needs**

NARA is committed to personnel safety, integrity of our buildings and holdings, and the efficiency of operations. The increasing frequency and severity of extreme weather events poses risks to meeting these objectives. Climate change could disrupt Agency' programs, compromise safety of its staff, or affect integrity of its physical infrastructure. Adaptation planning to protect NARA's workforce, operations and underlying infrastructure is crucial to success of the Climate Adaption Plan.

NARA will develop and implement measures to protect its workforce and increase the resilience of its facilities and operations to climate change. For example, where possible, NARA will enhance resilience of existing facilities in coastal areas to protect them from severe weather, flood damage, and sea level rise. The Agency will also work with other government agencies, particularly the GSA, to account for climate change in design and construction of new facilities, or when new buildings are leased.

The fact that the climate will continue to change in many ways, presents challenges for decision makers. Many standard practices may no longer be effective unless they account for climate change. For example, standard methods used for estimating the probability and expected frequency of floods for flood plain mapping, designing infrastructure systems, and estimating runoff into rivers and streams are based on assumptions of climate stability. NARA and its partners must alter practices and decisions to account for a continuously changing climate. The development of decision-support tools play a central role in NARA's overall efforts to adapt to climate change. Following the recommendations of the National Research Council, NARA is committed to developing decision-support tools to improve outcomes sensitive to changes in climate. NARA will provide training to certain individuals through the Association of Climate Change Officers (ACCO), to help lead the Agency through some of the more intricate climate change challenges. These tools will empower staff to consider climate, and changes in social and economic conditions influenced by climate change. They will enable staff to integrate climate adaptation planning into their work and decision-making processes.

Climate change poses serious threats to the economic well-being, public health, natural resources, and environment of the United States. Adverse impacts of climate change include: exacerbating air quality degradation, reduced quality and supply of potable water, sea level rise affecting coastal businesses and residences, damage to marine and terrestrial ecosystems, and increased incidence of human health-related problems. Although climate change cycles occur naturally, NARA recognizes that concerted actions are necessary to fully address the rate of climate change due to human activity, and that actions taken by NARA to reduce emissions of GHGs will have local and global effects on future climate. NARA also realizes that leading by example may help encourage others to act in a similar manner to reduce future anthropogenic effects on climate.

An organization with adaptive capacity has the ability to craft and implement ways to achieve its goals as circumstances change. NARA needs its personnel and partners to have significant adaptive capacity in the midst of climate change. NARA will help build adaptive capacity through ongoing participation and collaboration in education and training. One goal is to

increase awareness about the importance of climate change adaptation and resiliency, and to encourage all staff and partners to consider changing climate in the normal course of business. A second goal of NARA's training will be to expose staff to specific approaches and tools for integrating climate adaptation into decision-making processes.

### **F. Leadership**

By exercising leadership and implementing energy conservation measures, NARA will continue efforts to reduce emissions of greenhouse gases. Investing in the development of innovative and pioneering technologies will assist NARA in achieving and surpassing Federal Agency limits on emissions of greenhouse gases established by [EO13514](#).

### **G. NARA History on Climate Change and Resiliency Adaptation**

Previously, NARA actions have focused primarily on mitigation; i.e. the reduction of greenhouse gases emitted to the atmosphere by NARA's facilities, normal operations (also including acquisition and disposal activities), business travel, and employee commuting. Long term, reducing greenhouse gas emissions is important; however, even with significant emissions reductions climate change impacts are inevitable, and so climate change adaptation and resiliency must be considered and addressed in future planning efforts.

### **H. Future Planning**

The future of NARA Climate Change Planning will rely on identifying and developing appropriate strategies for mitigation, climate change adaptation, sustainability, and resiliency at each location. NARA to date, has performed well on mitigation via improved energy efficiency, operational, telework promotion, employee commuting on mass transit, reduced business travel, solid waste, and water programs; all leading to reduced GHG emissions. NARA will continue to improve these areas by devoting money via ESPCs and Agency dollars to further improve efficiency and promote renewable energy sources. This next phase to address climate change is to initiating responses to specific regional vulnerabilities through adaptation. Adaptation strategies are largely based on preparedness for and/or protection from risks that either occur over time, or are extreme (catastrophic) events. Adaptation planning stems from a solid understanding of a region's specific risks, and taking effective and timely action to alleviate the full range of climate change consequences. Risks are addressed by reducing vulnerability or exposure, thus promoting resiliency. Reducing risk is accomplished by understanding regional changes utilizing available data, and increasing infrastructure resilience, transferring risk through appropriate future planning (e.g. building in low risk areas), partially negating risk through technological change or retreat, or via behavioral changes and revised protocols. NARA recognizes that planning now for climate change may prevent spending many times more money at a later date, responding to an avoidable catastrophe. We also recognize that issues must be prioritized. Not all issues can, or should be, addressed at once, so it is important that risks are prioritized to maximize NARA's resources to ensure timely and effective response to climate change. Although NARA's mission goals stress protection of holdings and continued availability of those holdings to the public, another important consideration is maintaining human health and safety, while maintaining NARA's basic services. Risks presenting the most serious consequences (threats to human health/safety, and maintaining viability of holdings and buildings during serious and short term threats) are generally projected to occur first, and so are

given highest priority; however, timely response to serious long term risks is also important, especially if response requires substantial time or resources to implement.

NARA continues to increase its understanding of the implications climate change has on its business practices, and is building a working knowledge to ensure future decisions consider climate change impacts and do not create further vulnerabilities or liabilities. This plan incorporates [NARA's Directive 1571](#) and [36 CFR 1234](#) to protect holdings against short and long term risk. Since this Plan represents formal initiation of NARA's attempts to develop its climate adaptation response, some initiatives may be initially exploratory in nature and aim to identify appropriate changes or actions to respond to the impacts of concern not addressed in 1571. To alleviate risk to human health, emergency management and safety plans are being reviewed and revised. Reviewing current NARA protocols/practices and programs associated with risk are an early step to identify immediate adjustments to alleviate or reduce that risk. Where adjustments to current protocols/practices will not sufficiently address risk, more substantial actions will be developed and implemented in NARA programs. NARA will coordinate with other government agencies, consult with local businesses, academic institutions, environmental organizations, and other stakeholders to fully implement and refine NARA's Climate Change Adaptation and Resiliency Plan. This plan also addresses and strengthens NARA's attempts to meet OMB Scorecard, [EO 13653](#), and LEED requirements (at appropriate sites). Detailed information on NARA's areas of focus for climate change adaptation and resiliency are described below.

### **I. NARA Climate Change Adaptation and Resiliency Plan Areas of Focus: Reduce Green House Gas Production**

Building systems account for approximately 70 percent of NARA's GHG emissions and are a key area for improving energy use efficiency. Since 2008, NARA has had spectacular success with improving agency energy efficiency. Improving building systems efficiency provides opportunities for energy savings and greenhouse gas reductions, thus contributing to global mitigation efforts. These improvements have been, and will continue to be a major focus at the following NARA-owned buildings: Archives I, Archives II, National Archives at Atlanta and 13 Presidential Libraries and Museums. Remaining NARA locations (Federal Record Centers and other Regional and Affiliated Archives) are leased via GSA or private leases, and so are not under direct control of NARA. Although those facilities are not NARA controlled, the agency will strongly encourage leasing entities to improve energy efficiency and promote GHG reductions at these locations to further contribute to GHG mitigation.

NARA recognizes that even small changes in energy use practices can add up to big GHG emissions reductions. It is as easy as turning off the lights when not needed, adjusting thermostats at night in unoccupied areas, and reducing unnecessary water use in restrooms and break rooms. NARA will continue to concentrate on low cost and no cost solutions first, when planning for projects. A combination of higher cost, and longer payback period projects are also included to provide more robust savings and longer term solutions to energy and GHG reductions. NARA is using ESPC s to help improve the energy efficiency at all of the agency-owned-locations.

NARA continues to use mitigation strategies to promote energy efficiency in existing buildings. Retrofitting buildings is an excellent strategy for improving energy efficiency in older buildings. Deep energy retrofit measures such as: installing energy efficient equipment, building envelop sealing, moisture management, controlled ventilation, insulation, and solar control can result in dramatic energy savings alongside promoting optimal building performance. NARA has committed to a 30 percent Agency-wide reduction in it's energy use.

National Archives Total Agency Utilities Cost and Energy/GHG Savings								
		Executive Order 13423			Executive Order 13514			
FY	Total Utilities Costs (to include Water)	Btu/GSF	Btu/GSF Reduction vs FY2003	FY Goal Target Reduction	Scopes 1&2 GHG Emission (Ton)	Scopes 1&2 Reduction (%)	Scope 3 GHG Emission (Ton)	Scope 3 Reduction (%)
2003	\$7,798,163.48	<b>181,189</b>	Baseline					
2006	\$13,629,555.42	156,988	-13.4%	-3.0%				
2007	\$14,101,762.75	150,896	-16.7%	-6.0%				
2008	\$15,043,427.79	130,993	-27.7%	-9.0%	<b>66,303</b>	Baseline	<b>14,557</b>	Baseline
2009	\$14,496,452.58	127,765	-29.5%	-12.0%	60,868	-8.2%	14,601	0.3%
2010	\$13,825,049.86	125,173	-30.9%	-15.0%	61,182	-7.7%	14,745	1.3%
2011	\$12,837,795.15	128,138	-29.3%	-18.0%	56,962	-14.1%	13,775	-5.4%
2012	\$11,508,035.95	131,758	-27.3%	-21.0%	55,218	-16.7%	13,645	-6.3%
2013	\$11,544,170.53	128,522	-29.1%	-24.0%	54,564	-17.7%	12,937	-11.1%
2014	\$11,365,736.74	126,497	-30.2%	-27.0%	53,096	-19.9%	12,198	-16.2%

**Figure 3 (“EOs 13423 and 13514 replaced in FY 2015 by EO 13693.”)**

NARA has focused on lighting as another way to reduce energy use and GHG emissions. As part of the retrofitting process, NARA is expanding incandescent light replacement. NARA uses high efficiency fluorescent or LED lights wherever appropriate. High use and fixtures that are difficult to re-lamp are identified as greatest opportunities to save energy and labor (installation) costs. In addition, timers and occupancy sensors are installed as part of the retrofitting scheme. Night lighting is reduced to minimize energy use and reduce night sky light pollution. The lighting systems at Archives I & II were retrofitted under two ESPC projects. Another ESPC project is underway at Archives II to further improve lighting, replace asphaltic roof with white membranous roofing, and add additional solar arrays. NARA has awarded another ESPC project for covering 14 additional sites. Those sites include the National Archives at Atlanta and eleven of the thirteen Presidential Libraries and Museums.

NARA has also made strides to reduce water consumption, and is committed to improve water use efficiency in buildings as part of retrofits and in any new construction. Indoor water strategies include: installing ultra low flow restrictors/aerators on faucets, and replacing urinals and water closets with low flush volume devices. Mechanical water strategies include water reuse for cooling towers, and capturing condensate water and rainwater for irrigation. To date, NARA water use has decreased over 19 % agency wide. Projects at specific sites have resulted

in extraordinary water savings. Recovered condensate water and rainwater projects allow for reusing otherwise wasted water for irrigation. For example, rainwater and condensate water account for all water used to irrigate landscape and turf areas at AII.

<b>National Archives Agency Water Savings</b>			
FY	Gallons/GSF	Gal/GSF Reduction vs FY2007	FY Goal Target Reduction
2007	<b>26.6</b>	Baseline	
2008	25.4	-4.5%	-2.0%
2009	22.7	-14.7%	-4.0%
2010	21.6	-18.8%	-6.0%
2011	21.5	-19.2%	-8.0%
2012	23.5	-11.7%	-10.0%
2013	21.4	-19.5%	-12.0%
2014	21.3	-19.9%	-14.0%

**Figure 4 NARA Agency Water Use**

**J. NARA and LEED**

NARA is looking beyond just energy conservation strategies. NARA is aligning its energy conservation, sustainability, and climate change efforts at all NARA-owned buildings with LEED strategies, and now requires new Presidential Libraries to be designed and built to LEED Platinum Level. Because LEED strategies align closely with OMB requirements, NARA is adopting LEED not only for new construction, but also any new construction projects at existing facilities must be built to LEED standards for any extensive renovation of NARA-owned property. NARA has updated the Presidential Library Design Standards and the Building Condition Reporting, performed by a third party, to include LEED language at all of its owned locations. In addition, the newly-leased National Personnel Records Center and National Archives at St. Louis Records facility is a certified LEED building.

As part of LEED and OMB requirements, NARA promotes and installs renewable energy at each site, where feasible, and uses renewable energy by purchasing renewable energy credits from energy providers, thus further reducing GHG emissions. NARA is using many strategies to help address climate change and meet Federal mandates, NARA not only requires greater efficiency from existing energy sources, but is purchasing energy from green power sources. NARA receives power from regional e-grids, including nuclear and renewable-generation plants. Since traditional power sources are a significant source of CO2 emissions, especially those that use coal, NARA is purchasing at least 7-1/2% of its energy from alternative, renewable energy credits of wind power through the GSA area-wide contract.

### **K. Renewable Energy**

NARA procures renewable energy through its regional energy providers, and via onsite energy generation. NARA is utilizing and increasing the amount of self-generated energy. In FY2014, the existing Photovoltaic solar panels at Clinton Library produced 58,922 KWH. The existing Photovoltaic solar panels at G. W. Bush Library produced 25,850 KWH in FY2014. The Photovoltaic Solar panels at Archives II produced 197,338 KWH in FY2014. The 150 KW co-generation system at Archives I was completed November 19, 2010. A 225 KW co-generation system at Archives II was also installed. The combined strategy of producing our own power and purchasing renewable energy helps NARA reduce electricity use from the grid, and simultaneously reduced GHG emissions from petroleum-based electricity generation.

### **L. Process Improvement**

LEED requires facilities to continually improve processes and procedures to promote better environmental outcomes. This is consistent with sustainability requirements for the OMB Scorecard. NARA adheres to the Federal Acquisition Regulation (FAR) clauses for green acquisition and includes language in its purchases (e.g. bio-based, Energy Star, EPEAT, EPP, FEMP, Water Sense, etc.). As a result, NARA anticipates continued improvement in processes associated with acquiring, use, storage, and disposal of chemicals, equipment, furniture, construction materials, office supplies, and any other products or services.

### **M. Landscapes and Hardscapes**

NARA is also making strides to reduce effects on the environment by minimizing heat island effects from its roofs and hardscapes. Many energy and heat island effect improvements can be made at most sites. NARA is promoting the use of rooftop gardens, where applicable, and planting trees to shade existing hardscapes. Roof projects in warmer climates incorporate high albedo materials. New paving project specifications also incorporate high albedo materials when feasible, thus reducing overall community heat island effects. Reducing the amount of heat absorbed and reradiated to the atmosphere helps improve outdoor conditions near a building, but also helps reduce HVAC system loading requirements.

### **N. Fleet, Business Travel and Employee Commuting**

NARA is moving forward with fleet and commuting goals. NARA is utilizing many LEED strategies to help meet fleet, business travel and employee commuting goals. NARA is reducing fleet size and right sizing current vehicles to their appropriate tasks, and using a single vehicle to provide for multiple uses, where feasible. NARA has equipped vehicles with GPS to monitor fuel use, mpg, frequency of use, and driving patterns, including idle times, average speed, etc. Utilizing this information helps NARA determine present and future needs when time for a new vehicle lease is scheduled, and user habits, so recommendations for improvement can be easily conveyed to the users.

Each business day, NARA employees commute to and from work, and travel for business purposes. Approximately 20 percent of NARA's contributions to greenhouse gas emissions are produced by fleet cars, trucks, and buses, and travel on commercial planes and trains. To reduce GHG emissions, NARA must incorporate and promote using public transit, bicycling, walking, ride sharing, and energy-efficient vehicles in its plans. NARA business dictates that employees

have many places to go, and so we need a variety of convenient, energy-efficient ways to get there.

An important first step was to do an employee commuting survey in an effort to measure use of single occupant vehicles vs. carpools, biking, walking and mass transit. NARA just completed an agency-wide survey of employee commuting and is planning strategies to further reduce its carbon footprint by promoting alternatives to single passenger vehicle commuting.

NARA encourages employees to use mass transit when feasible, to help promote mass transit improvements and to boost transit system ridership. A bus full of occupants takes about forty single occupancy vehicles off the road for a given trip. Using mass transit clearly reduces GHG emissions vs. single occupant vehicle use, and as added benefits reduces wear and tear on personal vehicles, and lessens congestion on roadways. Over 20% of NARA employees currently use some sort of mass transit, and NARA is utilizing the DOT mass transit subsidy program to help encourage employees to use local mass transit systems where they are available. NARA encourages employees to use the program as it provides cost savings to employees, reduces GHG emissions and encourages mass transit ridership. Additionally, much of the cost incurred over the subsidy amount may be claimed as a pretax benefit to the employee. NARA will continue to provide incentives for mass transit use by employees in the future, provided they are available.

Since NARA has adopted LEED strategies for its sites, transit oriented development is part of site selection for any new location. Transit-oriented development encourages new construction to focus on neighborhoods built around public transit, and basic services within walking or bicycling distances, thus encouraging residences to be built in the area. This strategy reduces commute time and costs for employees that choose to locate in the area, building a more unified community. For locations that are outside the service area of mass transit, NARA promotes the use of car sharing, carpooling and vanpooling. NARA has established a carpool ride share board for some locations.

NARA continues to improve its fleet efficiency in accordance with EO 13514. NARA is improving fleet efficiency through consolidation and fleet reduction, acquisition of right-sized and appropriate vehicles for tasks performed, and purchase or lease of hybrid, flex fuel, and electric vehicles. In spite of ever increasing transportation demands, NARA plans to reduce its fleet size by 10% by the end of FY2015. Besides reducing the size of the fleet through resizing/right sizing, NARA promotes continued increased Federal fuel efficiency standards. The agency supports the standards by using cars with smaller, more fuel efficient engines and transmissions, and increased use of hybrid and electric vehicles that will continue to improve NARA's fleet fuel efficiency, and America's energy security. In addition, NARA is utilizing cleaner burning, alternate fuels when feasible. All new gasoline powered vehicles acquired by the agency must be flex fuel vehicles, and policy requires vehicles fill up with E85, if available, within five miles of the location. The NARA fleet manager regularly updates vehicle users of locally available E85 filling stations. NARA diesel powered vehicles are also using cleaner burning biodiesel. NARA supports the increased supply and use of sustainable, alternative fuels,



and helps promote electric vehicles, and hybrids. Agency leaders are using electric and hybrid vehicles as their preferred choice for business transportation.

#### **O. Solid Waste and Refrigerants**

Although buildings, employee commuting and business travel account for almost 90% of GHGs emissions produced directly or indirectly, NARA recognizes that most of the remaining GHGs are represented by solid waste and refrigerant use. NARA has reduced solid waste sent to landfills by over 40%, and has committed to reduce waste sent to landfills by greater than 50%. Although reducing, reusing and recycling helps achieve the waste reduction goal, NARA is committed to go farther. It is essential that both individuals and businesses join in the effort, and there are many opportunities to do so. One such project is an onsite compost system. Using this system, the payoff may yield an 80% reduction in waste trucked to landfills by the year 2015 (ultimately yield a 90 percent reduction of NARA's solid waste sent to landfills by 2020), produce a useful product to be used on site (compost for gardening), and reduce GHG emissions. Additionally, NARA has established a community garden plot, where some of the compost is used, and serves as a model of sustainability, a hands-on organic garden, a way to close the loop on waste, and a source of employee pride.

In keeping with LEED requirements, NARA is shifting to devices that can be converted to alternative refrigerants, and when possible phasing out systems that contain CFCs and HCFCs. NARA requires use of non CFC/HCFC refrigerants in all new air conditioners and appliances.

#### **P. Storm Water Runoff**

NARA is currently detaining at least 15% of storm water runoff at some sites, and installing green infrastructure to slow runoff, and to reduce pollutant loading onsite before storm water is discharged to streams. Some storm water is captured and reused on site for irrigation at some locations. This strategy will be implemented at new locations, and when feasible, at existing locations during renovation. NARA recognizes that climate change may have changed storm water runoff requirements due to a change in frequency and intensity of storms, ocean rise and local storm surge capacity changes, and relative elevation change due to construction in other neighboring areas in the same watershed. Periodic review of each location is important to maintain a viable strategy for climate change and future mitigation or adaptation.

#### **Q. Advancing Climate Adaptation and Mitigation Strategies**

Climate Change data shows the earth responds slowly to changes in atmospheric gases. For that reason experts predict full effects of climate change are not yet realized. Over the next few decades, NARA expects to face the combined consequences of heat-trapping gas emissions from the present and decades past. Aggressive actions by the world community will likely reduce greenhouse gas emissions in the future. NARA must do its part to reduce potential future effects of climate change by reducing emissions and incorporate decision-making in policies and strategies.

Incorporating effects of climate change in decision-making requires consideration of scientific insights and cultural and social considerations. The importance of scientific information and societal considerations suggests the need for the public, technical experts, and decision-makers to

engage in mutual shared learning and shared production of relevant knowledge. A major challenge in these engagements is communicating scientific information about the risks and uncertainties of potential changes in climate. The Agency is collaborating with other organizations, and must take action by adapting to change that is already happening, while preparing to meet the challenges and opportunities in the future. The Agency's actions detailed in this plan will help NARA reduce GHG emissions, and prepare the Agency for future climate change challenges. NARA will continue to advance its GHG reduction strategies and better prepare for climate change as more data-especially local data, becomes available. NARA pledges to share its experiences with other agencies, and will continue to collaborate with other government and nongovernment groups to reduce the effects of anthropogenic-related climate change.

## **VII. Additional Adaptation Strategies and Future Challenges**

### **A. Manage Heat**

NARA will update heat response planning, focusing on Agency holdings and human health, observe and complete research into local urban heat island effects, and ways to reduce facility contributions to the local heat island effect.

### **B. Pursue Innovative Cooling**

NARA continues to seek out innovative and low cost/ no cost ideas for cooling buildings, and make green landscape and energy efficiency improvements.

### **C. Protect Indoor and Outdoor Air Quality**

NARA goes to great lengths to reduce ozone-precursors, and other indoor air pollutants to protect holdings and human health.

### **D. Manage Storm Water**

NARA is collaborating with Water Districts on Watershed Plans factoring climate changes and to use vacant land to manage storm water.

### **E. Preserve Plants and Trees**

NARA plans to plant species that thrive in altered climates. NARA attempts to create landscapes that accommodate plants that can tolerate the altered climate, and share our lessons learned with other agencies and the public.

### **F. Engage the Public and Other Organizations**

Besides sharing climate related information with other organizations, and the general public, NARA plans to investigate innovative ways to adapt to climate change. Furthermore, NARA will help its employees understand how to take steps to reduce flooding, improve energy and water use efficiency in their homes, and even manage heat waves, by installing energy efficient lighting and heating and cooling, rain barrels, faucet aerators and low flow fixtures, and back-up power for sump pumps and planting shade trees at key locations, etc.

### **G. Future Plans and Metrics for Evaluating Performance**

NARA's future plans include using a combination of LEED principles and project progress, information from Building Condition Reports, and the OMB Scorecard to guide NARA implementation efforts to assess how the plan is progressing, and an avenue to recommend revisions. Furthermore, NARA's Sustainability Plan and Climate Change Adaptation and Resiliency Plan are updated each year to demonstrate our commitment to continual improvement. One such demonstration is a newly-awarded award for an agency-wide contract to video-teleconference across all of our facilities, thus saving additional business travel and associated GHG emissions. The efforts were overseen by the Senior Sustainability Officer (SSO) and implemented by staff in the SSO's Office.

Without measurements, progress evaluation is difficult to determine. Evaluation offers a systematic way to learn from past experience. NARA values the importance of evaluating activities and acting on lessons learned to improve performance. Through systematic evaluation, the Agency identifies where activities have the greatest impact to protect our priorities; provide the roadmap needed to replicate successes; and identify areas needing improvement.

NARA will evaluate its climate change adaptation and resiliency actions on an ongoing basis. Initially, our success will be measured by progress toward our desired long-term outcome of mainstreaming climate change adaptation and resiliency into the Agency's programs, policies and operations. Based on lessons learned about the most effective climate change strategies, NARA will make adjustments as necessary, to the way adaptation is integrated into its activities, and create new goals and desired outcomes to climate change adaptation and resiliency planning.

NARA is not organized like much larger agencies, i.e. into National Program Offices. Instead, the agency is organized by functional business lines including, Agency Services, Research Services, Legislative Archives, Presidential Libraries and Museum Services, the Federal Register and Office of Innovation. A network of geographically distributed facilities executes the respective missions of these business lines (federal records centers, archives and Presidential Libraries). For the purposes of Climate Change Adaptation and Resiliency Reporting, NARA is organizing its facilities by how they fall into the physio-geographic regions identified by the U.S. Global Change Research Program, titled "Global Climate Change Impacts in the United States". Those seven U.S. regions identified in the report are: Northeast, Southeast, Midwest, Great Plains, Southwest, Northwest, and Coasts. As more detailed, local climate data and other local information is made available to NARA, the specificity to measure climate change and subsequent adaptation at the facility level can become a reality. Until that point, NARA will restrict planning to the regional geographic level. However, NARA will likely always have only one comprehensive Climate Adaptation Plan for the Agency. Regardless, the future Climate Change Plan will contain the following areas:

- **Vulnerability assessments:** an initial assessment of the implications of climate change for the organization's priorities and objectives. This assessment will build on understanding and addressing the ways climate change may affect respective missions at each facility.

- **Priority actions for climate adaptation:** describing the organization-specific priorities related to climate change adaptation and resiliency. At the core of each implementation plan will be a description of the activities that the Agency will pursue over time to integrate climate change adaptation and resiliency into its programs, policies and operations; and how these activities address both organization-specific priorities and the cross-Agency priorities. The plan will describe how facilities will work together on actions most effectively accomplished by more than one facility.

For each action, the plan will identify the organization's key partners at the international, federal, state, local, public and private sector levels.

Activities will include short and long-term actions. Short-term activities may include actions that are readily achievable, e.g., training needed to begin building adaptive capacity. Short-term activities may also focus on areas where the organization has relative certainty about climate impacts, and therefore feels that action cannot or should not be delayed. The more immediate actions will enable the organization to learn what works. Armed with lessons learned, the organization can move forward with insights and information as it begins to address additional issues. Long-term activities will focus on maintaining healthy, sustainable, resilient buildings, and protecting holdings, personnel, contractors and visitors.

- **Agency-wide strategic measures:** to consider activities that address existing Agency-wide Strategic Measures to the extent they are applicable to the organization.
- **Training and outreach:** All facilities will benefit from Agency-wide training activities that they will work together to develop and implement Climate Change Adaptation and Resiliency. The Plan will describe ways the organization will use the Agency-wide training resources to educate its staff, and how the organization will, over time, integrate climate adaptation into *existing* specific training programs.
- **Evaluation and gross-organization pilot projects:** to include a process for measuring and evaluating effectiveness over time. Facilities are encouraged to partner with each other to conduct pilot projects that test climate adaptation approaches that are broadly applicable, and provide reports on these joint efforts. The ultimate goal is to learn what approaches work and why. The plan will periodically be adjusted to improve the organization's efforts to integrate climate adaptation into its activities.

In Summary, NARA recognizes that the integration of climate adaptation planning into its programs, policies, rules, and operations will occur over time. This change will happen in stages and measures should reflect this evolution. The earliest changes in many programs will simply be changes in knowledge and awareness (e.g., increase in the awareness of NARA staff). Building on this knowledge, staff can begin to change behaviors (e.g., increased use of decision support tools to integrate adaptation planning into programs and policies). Over time, there will be evidence of more projects implemented as a result of increased attention to climate-related issues. Finally, in the long-term, adaptation planning efforts will lead to positive conditional changes (e.g., percentage of flood-prone facilities increasing their resilience to storm events).