

National Aeronautics and Space Administration



# 2012 Strategic Sustainability PERFORMANCE PLAN





# NASA 2012 Strategic Sustainability Performance Plan

## Table of Contents

Policy Statement .....	1
Executive Summary .....	2
Abbreviated Agency Size and Scope Table .....	6
Goal Analysis .....	7
Appendix 1 - Climate Change Adaptation Plan	
Appendix 2 –Fleet Management Plan	
Appendix 3 - Biobased Purchasing Strategy	

### Agency point-of-contact:

Olga M. Dominguez  
Assistant Administrator for Strategic Infrastructure  
NASA Headquarters / 1201Eye Street  
300 E Street, SW  
Washington, DC 20546-001

E-mail: [olga.m.dominguez@nasa.gov](mailto:olga.m.dominguez@nasa.gov)

Telephone: 202-358-2800

## POLICY STATEMENT

Worldwide, people have turned to the National Aeronautics and Space Administration (NASA) for inspiration throughout our history. It is NASA's mission "To drive advances in science, technology, and exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of the Earth." NASA is an agency that leads by example and will continue to spur profound changes in our knowledge, culture, and expectations.

NASA's sustainability policy is to execute NASA's mission without compromising our planet's resources so that future generations can meet their needs. Sustainability involves taking action now to enable a future where the environment and living conditions are protected and enhanced. In implementing sustainability practices, NASA manages risks to mission, risks to the environment, and risks to our communities, all optimized within existing resources.

In executing its mission, NASA's sustainability objectives are to:

- increase energy efficiency;
- increase the use of renewable energy;
- measure, report, and reduce NASA's direct and indirect greenhouse gas emissions;
- conserve and protect water resources through efficiency, reuse, and stormwater management;
- eliminate waste, prevent pollution, and increase recycling;
- leverage Agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services;
- design, construct, maintain, and operate high-performance sustainable buildings;
- utilize power management options and reduce the number of Agency data centers;
- support economic growth and livability of the communities where NASA conducts business;
- evaluate Agency climate change risks and vulnerabilities and develop mitigation and adaptation measures to manage both the short- and long-term effects of climate change on the Agency's mission and operations;
- raise employee awareness and encourage each individual in the NASA community to apply the concepts of sustainability to every aspect of their daily work to achieve these goals;
- maintain compliance with all applicable Federal, state, local or territorial law and regulations related to energy security, a healthy environment, and environmentally-sound operations; and
- comply with internal NASA requirements and agreements with other entities.

To implement this policy and meet the requirements and targets outlined in this plan, NASA will be practical in the integration of sustainability and sustainable practices. We will look for ways to leverage existing management systems, processes and decision-making, to influence both long-term planning and short-term actions, to enhance and strengthen our ability to perform our mission.



Olga M. Dominguez

NASA Senior Sustainability Officer

## EXECUTIVE SUMMARY

Every federal agency is required, by Executive Order 13514 to develop an annual Strategic Sustainability Performance Plan, or SSPP. An SSPP documents each agency's strategy for sustainability and progress toward achieving specific goals. This is the third SSPP NASA has issued and it identifies our sustainability goals and objectives, progress, and implementation strategies, and includes new plans required by the Council on Environmental Quality in 2012, such as our Fleet Management Plan and Climate Risk Management Plan and Report.

This Executive Summary provides an overview of our achievements through May 2012, highlights particular successes and challenges, and describes our vision for actions we will focus on in 2013.

### Achievements and Successes

*NASA is meeting or exceeding the majority of our Strategic Sustainability Performance Plan goals and objectives.*

- NASA exceeds its renewable energy target and this past year added more solar panels to its portfolio. Using an Agency-wide energy strategy, we altered our renewable energy investment strategy and emphasized identification of large projects that can make a significant difference for the Agency rather than initiating smaller projects at each NASA Center.
- NASA implemented system upgrades to an existing Refuse-Fired Steam Generating Facility that provide a more reliable energy supply for mission activities. Operation costs and benefits are shared via a cooperative agreement with a neighboring city and now 85% of the steam generated for the NASA Center is a direct result of biomass rather than natural gas, decreasing natural gas consumption by 50 million cubic feet.
- NASA Goddard Space Flight Center (GSFC) was the first federal facility to utilize landfill gas beginning in 2003 and currently landfill gas supplies approximately 25% of GSFC's Greenbelt Campus energy needs. In pioneering the use of landfill gas for the federal family, NASA GSFC delivered 2,334,950 MMBTU<sup>1</sup> of biogenic energy (e.g., produced from decomposition of organic waste by living organisms) between fiscal years 2003 and 2011. This effort has averted 177,029 MtCO<sub>2</sub>e<sup>2</sup> of anthropogenic emissions that would have resulted from producing an equivalent amount of energy with natural gas. Based upon EPA data, this greenhouse gas emission reduction equates to eliminating the total energy consumption of more than 1,700 average U.S. homes for nine years.<sup>3</sup>
- Centers continue to utilize Center-specific energy strategies – including competition -- to increase energy efficiency. Some examples include: a) utilizing energy management control systems to better align building

---

<sup>1</sup> MMBTU is an acronym for million British Thermal Units, a standardized scientific term used to describe the heat value (energy content) of fuels, and also to describe the [power](#) of heating and cooling systems, such as furnaces, stoves, and air conditioners. It is a common basis for comparisons of energy use.

<sup>2</sup> MtCO<sub>2</sub>e means "Metric tons of carbon dioxide equivalent, a base unit of measure that standardizes the global warming potential for all greenhouse gases, versus carbon dioxide, and enables comparison and aggregation of these emissions.

<sup>3</sup> Source for home-equivalency - <http://www.epa.gov/cleanenergy/energy-resources/refs.html> [Website referenced on 6/15/12]

lighting and heating, ventilation and air conditioning operating schedules to the real needs of the buildings and b) setting up an “Energy Dashboard” website illustrating building consumption patterns, so building occupants can compare their building’s energy performance versus other buildings.

- NASA proudly received Leadership in Energy and Environmental Design (LEED<sup>®</sup>) Platinum status for three innovative buildings this past fiscal year, at Ames Research Center (California), Kennedy Space Center (Florida), and Langley Research Center (Virginia). These buildings exemplify our creative thinking and ingenuity to reuse components of deconstructed buildings and incorporate NASA space technology into new structures.
- Recognizing the importance of integrated planning in response to sustainable facilities, we have developed our first Agency-wide Master Plan for the stewardship and development of our various installations. The Master Plan serves as a framework in which multiple programs, projects, and organizations can contribute to NASA’s efforts to enable our mission, manage costs, and be responsible stewards of natural and built assets.
- NASA’s alternative fueling infrastructure – present at 12 of 20 NASA locations -- enabled NASA to increase its alternative fuel use by 115,000 gallons (measured as “gasoline gallon equivalents” or GGE) to 264,076 gallons (GGE) in 2011, thus, meeting the Executive Order 13514 projected goal. NASA Centers are piloting the use of solar panel-assisted Low Speed Electric Vehicles and/or their charging stations to determine the effect on extending battery life and reductions on electrical draw.
- Repair and/or replacement of old water distribution pipes led to a 28% reduction in potable water consumption that helps significantly with other water conservation measures such as increasing the use of low-maintenance, drought-tolerant native plant species, and partnering with local municipalities to use reclaimed water for landscaping.
- Waste diversion, both non-hazardous solid waste and construction and demolition debris, continues to increase at NASA. This past year saw several new Center activities: a) a pilot program for composting cafeteria food waste; b) instituting a single stream recycling program where all recyclables are mixed during collection rather than collected separately; and c) expanding paper recycling to include sensitive but unclassified documents, which are a class of documents with special disposal requirements.
- Issuance of NASA’s new Agency Consolidated End User Services contract, with its modernization strategy, is expected to deliver significant productivity gains and cost savings, as well as meet standards such as printer duplexing, power settings, and EPEAT<sup>®</sup> green procurement. EPEAT<sup>®</sup> is a comprehensive environmental rating that helps identify greener computers and electronic equipment.
- NASA engages in innovative practices and initiatives that support not only NASA’s sustainability efforts but aid other agencies and organizations, both domestic and international. NASA reviews internal and external sources for ways to advance ideas, policies, methodologies, and technology in order to identify, overcome, and properly manage its long- and short-term mission and institutional risks, and identify opportunities to successfully explore space.
- Three initiatives, which are currently underway, are highlighted.
  - International Partnerships - By working collaboratively with other nations, we are exploring ways to protect natural resources, conserve energy, reduce the use of hazardous materials in space and earth-based applications, and reduce greenhouse gas emissions. International partnerships give NASA the opportunity to share its scientific and engineering expertise, stay aware of continually changing international environmental regulations, and understand global markets for materials that NASA uses to accomplish its mission.

- Increasing Knowledge via Forums and Training Courses – Through NASA’s Academy of Program/Project and Engineering Leadership (APPEL,) NASA offers two courses: “Introduction to Green Engineering” and “Introduction to Sustainable Facilities,” which engage NASA professionals in sustainability principles associated with application to NASA missions and projects, as well as with the institutional infrastructure that supports those missions and projects.
- The Use of Communities of Practice and Principal Centers for Spreading Ideas Up, Down, and Across the Agency - Technology Evaluation for Environmental Risk Mitigation (TEERM) - the TEERM Principal Center identifies and validates environmental technologies that enhance mission readiness and reduce environmentally-driven risk to NASA’s mission. TEERM projects focus on laboratory or field testing of commercially available replacements for hazardous materials currently used by NASA and commonly involve two or more of our stakeholders. Three major areas of focus include lead-free solder, coatings for launch structures, and renewable and alternative energy. Individual projects are frequently multi-year.

***Center Sustainability Officers are catalysts for promoting sustainable principles at the Centers.***

Recent video teleconferences between the Center Sustainability Officers, the NASA Senior Sustainability Officer, and other sustainability planners at NASA Headquarters provide clear evidence of integrating SSPP goals into everyday operations at NASA Centers. These quarterly video teleconferences spur friendly competition among the Center Sustainability Officers for bragging rights to Center accomplishments. A few examples are illustrative:

- Ames dedicated the Collaborative Support Facility (building N232, “Sustainability Base”) as a LEED Platinum building.
- Dryden Flight Research Center (California) reported on the ground-breaking ceremony for its first LEED Platinum building.
- Virginia’s governor bestowed a 2012 Environmental Excellence Award Gold Medal to Wallops Flight Facility for its highly successful Energy Savings Performance Project.
- Kennedy Space Center completed its detailed Sustainability Plan in 2011, noting that sustainability goals are part of the Center’s Strategic Planning Guidance.
- Langley Research Center received a Governor’s 2012 Environmental Excellence Award Gold Medal for Implementation of the "revitalization through sustainability" concept for the campus and planting 80 trees as part of various revitalization, natural resource, and outreach projects.

**Vision for Fiscal Year 2013**

NASA anticipates continuing positive trends in the SSPP goals in FY 2013, albeit with some challenges. Changes in the NASA mission can make it difficult to forecast energy reduction performance beyond 2012. As NASA is a mission oriented organization it must balance the needs of the mission with the institutional support for the mission and this plan does that. Fortunately, strategic thinking and policies developed by NASA in the past continue to yield many benefits.

***Early NASA policy on green buildings is manifesting itself now.***

Several years before the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding to commit to Federal Leadership in implementing common strategies for planning, acquiring, siting, designing, building, operating, and maintaining high performance and sustainable buildings, NASA set a policy that projects planned for FY 2006 and beyond meet the minimum LEED rating of Silver and strive to meet LEED ratings of Gold. As of mid-FY 2012 we have exceeded those goals with over 55% of the gross square feet of NASA’s LEED-certified buildings rated Gold or Platinum. Additionally, NASA also saw its first existing building certified via the LEED-Existing Building standard.

***Early identification of climate risks yields valuable internal partnership and better understanding of climate risks.***

In 2005, launch capabilities, space operations and ground systems were identified as at risk from regional climate variability and were included as a risk within NASA's risk management framework. Since that time, a partnership between NASA's Office of Strategic Infrastructure and NASA's Earth Science Division has yielded many benefits including creation of NASA's collaborative Climate Adaptation Science Investigators (CASI) team and holding climate risk workshops at several NASA Centers.

Climate science experts from across the Agency, such as the CASI team, provide NASA's environmental and facilities stewards cutting-edge downscaled climate data and projections. This data allows asset stewards at NASA Centers, working closely with local and regional partners, to develop asset-focused risk matrices, adaptation strategies, and methods for integrating these solutions within existing management processes. Four site-specific workshops were hosted between May 2010 and March 2012, and we anticipate hosting two more in calendar year 2012. These workshops have addressed traditional assets, such as built infrastructure and natural ecosystems, but also less tangible resources including human capital and emergency response and information systems. NASA will also continue to stress the ability to utilize existing funds and planning mechanisms with only necessary modifications to identify and incorporate climate risk reduction with minimal cost.

***NASA is well positioned for implementation of its Fleet Management Plan.***

NASA's Fleet Management Plan confirms NASA's commitment to optimizing its fleet vehicle size, leveraging federal purchasing dollars to building manufacturing capacity for more alternative fueled vehicles, and reducing petroleum consumption through efficiency and alternative fuels. NASA is meeting or exceeding mandated targets.

***NASA's Energy Savings Performance Contract Plan is underway.***

NASA has met the initial planning phase of its Energy Savings Performance Contract Plan, committing \$19.6 million for energy performance contracting, and we anticipate executing the projects discussed in this SSPP.

***NASA's Plan toward achieving targets it did not meet in 2011.***

NASA is trailing in some of the goal components such as for Electronic Stewardship and Data Centers, in particular: a) percent of data centers metered; b) percent of data centers with average central processing unit utilization of 65%; and c) power utilization effectiveness. The specific challenges associated with these elements are detailed in this SSPP. NASA anticipates that the continued installation of energy meters at the data center level – often rooms within multipurpose buildings – will contribute to improving power utilization effectiveness, but that it will likely not achieve the targets established by the Council on Environmental Quality within the time frame imposed. Continued consolidation and virtualization is also anticipated to help with regard to central processing unit utilization and power utilization effectiveness, but again, probably not in the time frame outlined by the Council on Environmental Quality.

***NASA is pleased with its progress toward meeting all SSPP goals and objectives***

Overall, we are very pleased with our progress toward meeting the SSPP goals and anticipate continuing this positive trend in the coming year striving to maximize our sustainable practices and push beyond current federal mandates. One way we are doing so is with facilities such as NASA's net-zero energy building at our Kennedy Space Center in Florida. This building has zero net energy consumption and no carbon emissions over the course of a year. This is accomplished by constructing a highly energy efficient structure, then providing the energy required with non-carbon emitting, renewable solar energy.

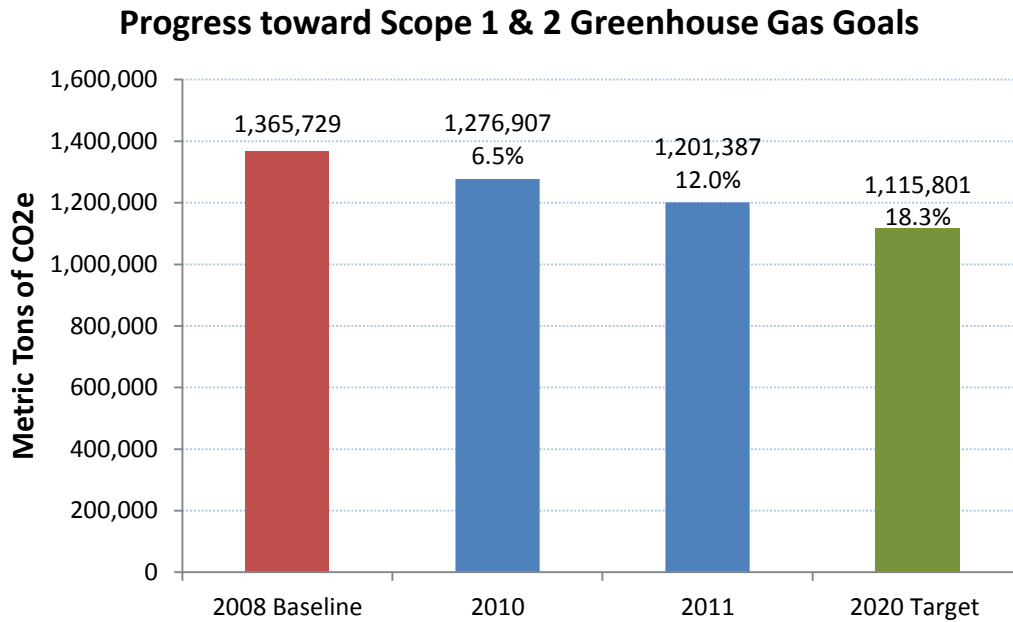


**TABLE 1: SIZE AND SCOPE OF AGENCY OPERATIONS**

<b>Agency Size and Scope</b>	<b>FY 2011</b>
Total Number of Employees as Reported in the President's Budget	18,377
Total Acres of Land Managed	329,429
Total Number of Facilities Owned	2,590
Total Number of Facilities Leased (GSA and Non-GSA lease)	15
Total Facility Gross Square Feet (GSF)	46,393,522
Operates in Number of Locations Throughout U.S.	46
Operates in Number of Locations Outside of U.S.	13
Total Number of Fleet Vehicles Owned	917
Total Number of Fleet Vehicles Leased	2,515

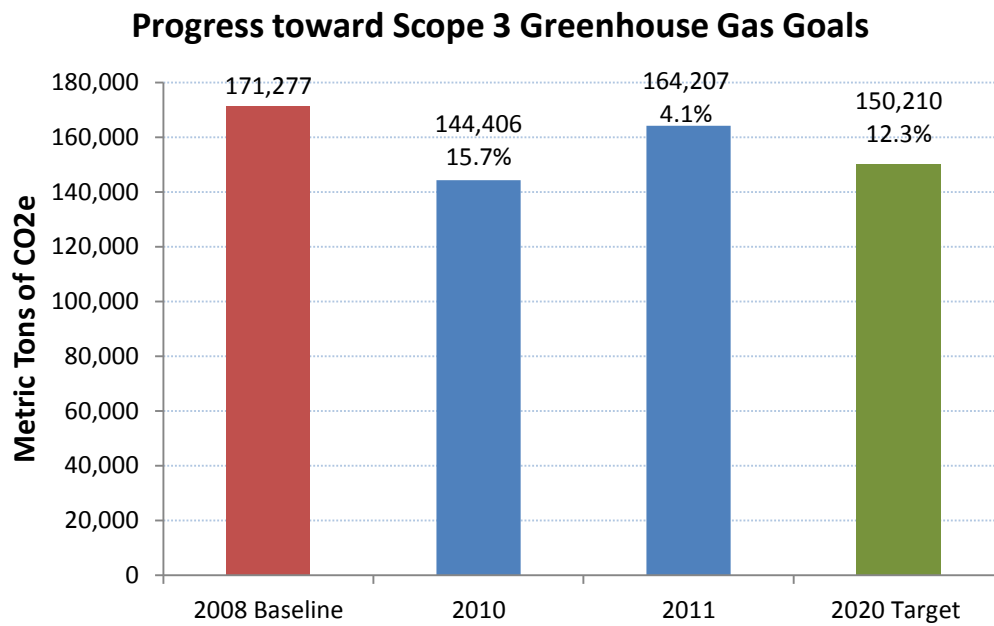
## GOAL 1: GREENHOUSE GAS REDUCTION AND MAINTENANCE OF AGENCY COMPREHENSIVE GREENHOUSE GAS INVENTORY

### Agency-Specific Performance Metrics for Scope 1 & 2 GHG Emissions Reduction:



Note: E.O. 13514 requires each agency to establish a scope 1 & 2 GHG reduction target for FY2020. The target for this agency is 18.3% compared to FY2008. The red bar represents the agency's FY2008 baseline. The green bar represents the FY2020 target reduction. The blue bars show actual status in relationship to the target. The percentage on each bar shows the reduction or increase from the FY2008 baseline.

## Agency-Specific Performance Metrics for Scope 3 GHG Emissions Reduction:

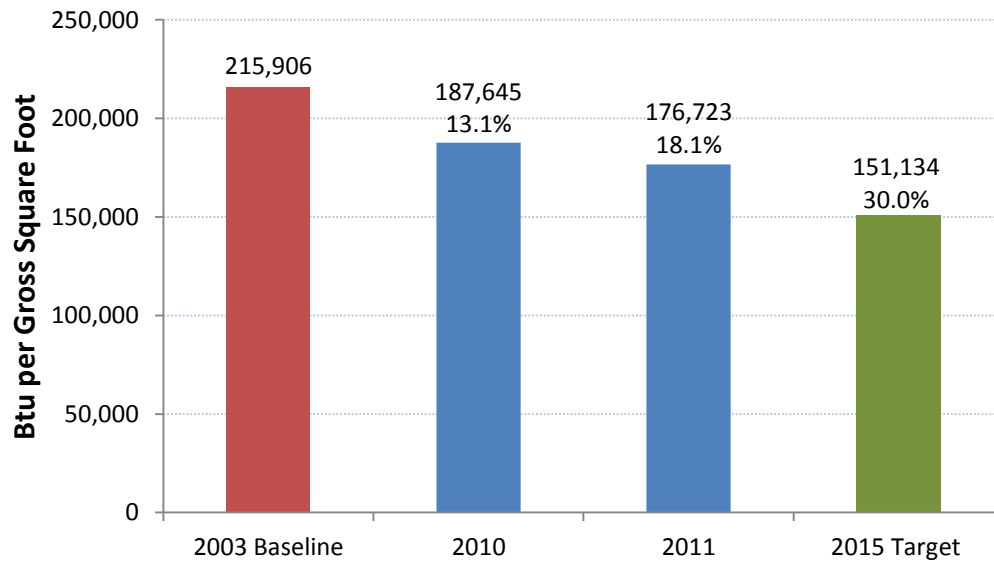


Note: E.O. 13514 requires each agency to establish a scope 3 GHG reduction target for FY2020. The FY2020 target for this agency is 12.3% compared to the FY2008 baseline. The red bar represents the agency's FY2008 baseline. The green bar represents the FY2020 target reduction. The blue bars show actual status in relationship to the target. The percentage on each bar shows the reduction or increase from the FY2008 baseline.

## GOAL 2: BUILDINGS

### Agency-Specific Performance Metrics for Facility Energy Intensity Reduction:

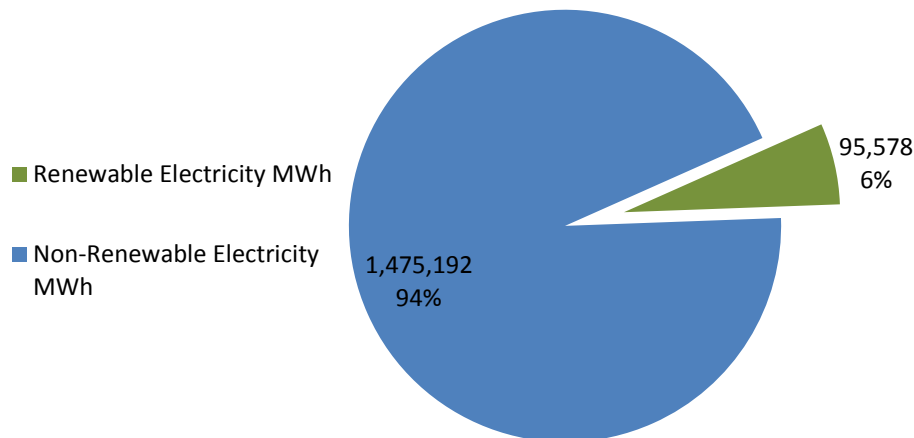
Progress toward Facility Energy Intensity Reduction Goals



Note: EISA requires agencies to reduce energy intensity by 18% for FY2011, compared to an FY2003 baseline; a 30% reduction is required by FY2015. The red bar represents the agency's FY2003 baseline. The green bar represents the FY2015 target reduction. The blue bars show actual status in relationship to the target. The percentage on each bar shows the reduction or increase from the FY2003 baseline.

## Agency-Specific Performance Metrics for Renewable Energy:

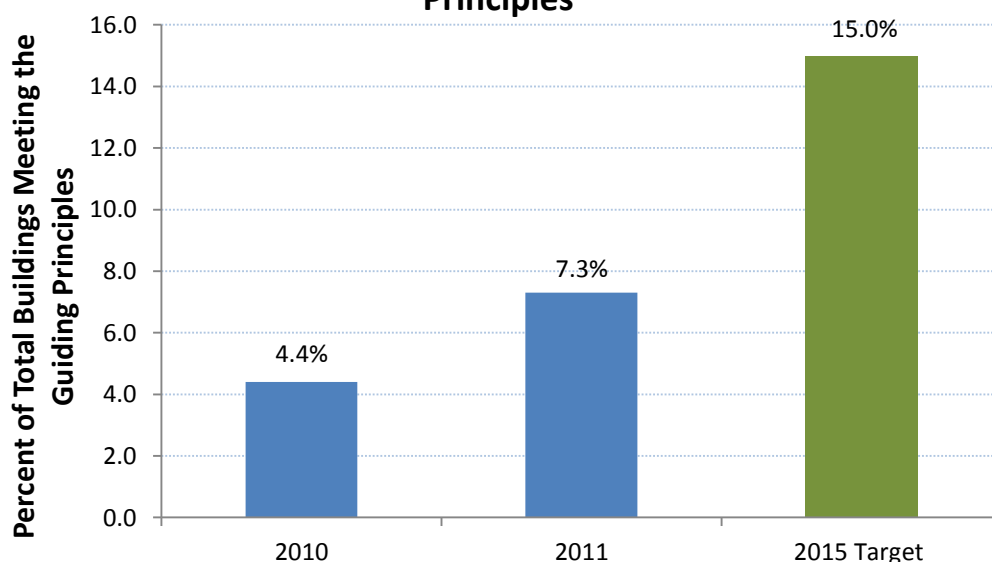
### Use of Renewable Energy as a Percentage of Electricity Use



Note: EAct requires agencies to increase the use of renewable energy as a percentage of electricity use to 5% by FY2010-2012 and 7.5% by FY2013 and beyond.

## Agency-Specific Performance Metrics for Total Buildings Meeting the Guiding Principles:

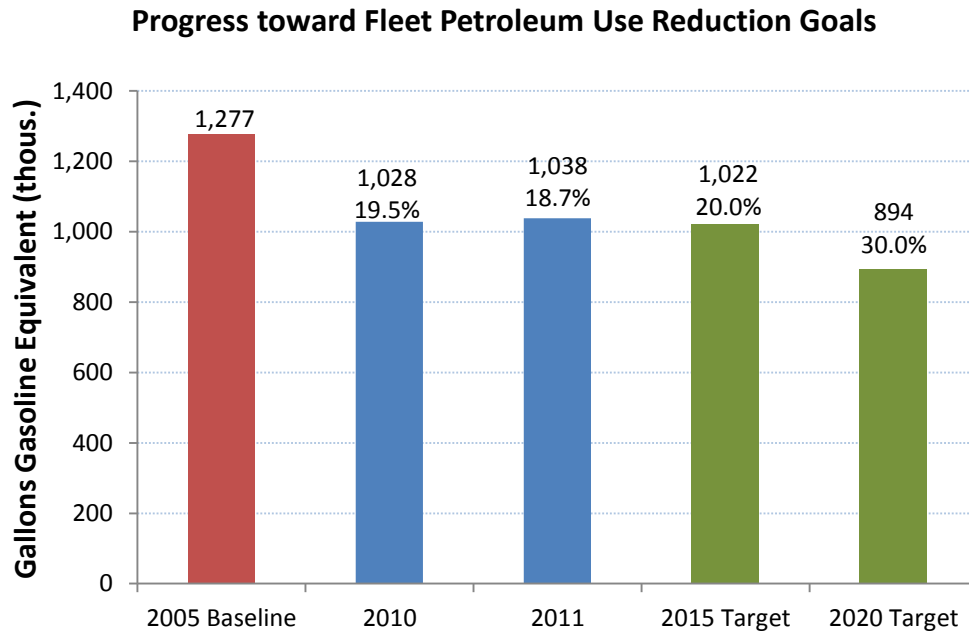
### Progress toward Total Buildings Meeting the Guiding Principles



Note: E.O. 13514 requires that by FY2011 agencies have 7% of new, existing, and leased buildings >5,000 square feet meet the Guiding Principles; the requirement increases to 15% by FY2015. The green bar represents the FY2015 target. The blue bars show actual progress toward the target.

## GOAL 3: FLEET MANAGEMENT

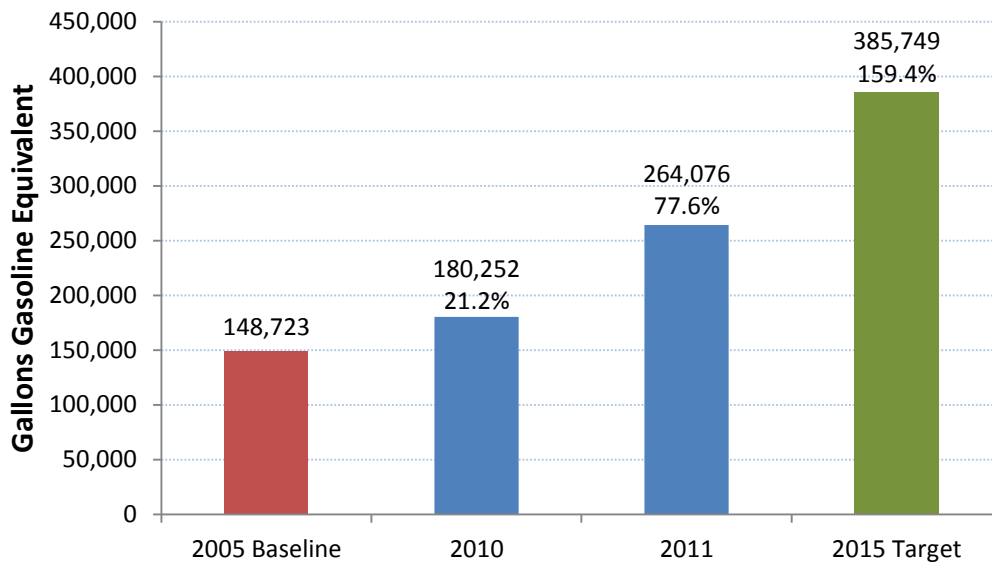
### Agency-Specific Performance Metrics for Fleet Petroleum Reduction:



Note: E.O. 13514 and EISA require that by FY2011 agencies reduce fleet petroleum use by 12%, compared to an FY2005 baseline. A 20% reduction is required by FY2015 and a 30% reduction is required by FY2020. The red bar represents the agency's FY2005 baseline. The green bars represent the FY2015 and FY2020 target reductions. The blue bars show actual status in relationship to the target. The percentage on each bar shows the reduction or increase from the FY2005 baseline.

## Agency-Specific Performance Metrics for Fleet Alternative Fuel Use:

### Progress toward Fleet Alternative Fuel Consumption Goals

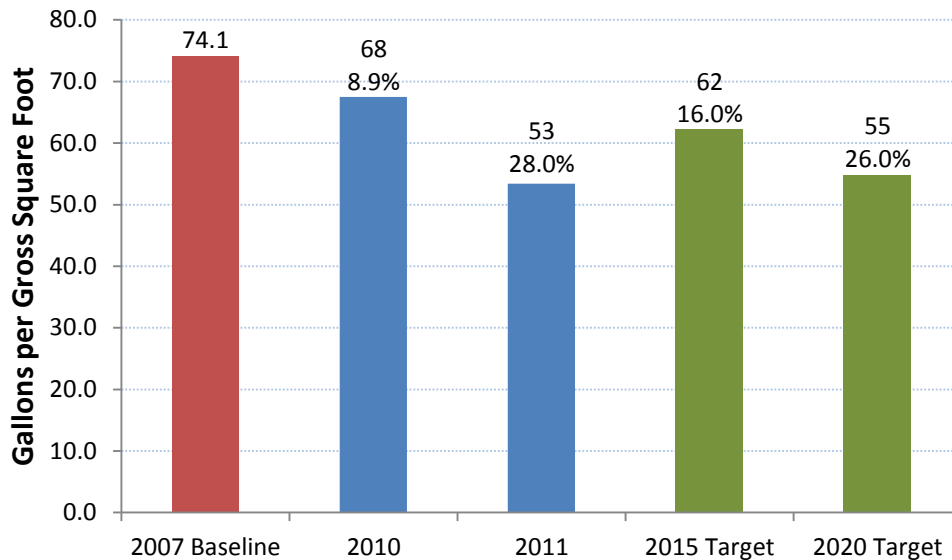


Note: E.O. 13423 requires that agencies increase total non-petroleum-based fuel consumption by 10% annually compared to an FY2005 baseline. Consequently, by FY2011 agencies must increase alternative fuel use by 77%, compared to an FY2005 baseline. By FY2015, agencies must increase alternative fuel use by 159.4%. The red bar represents the agency's FY2005 baseline. The green bar represents the FY2015 target. The blue bars show actual status in relationship to the target. The percentage on each bar shows the reduction or increase from the FY2005 baseline.

## GOAL 4: WATER USE EFFICIENCY AND MANAGEMENT

### Agency-Specific Performance Metrics for Potable Water Intensity Reduction:

Progress toward Potable Water Intensity Reduction Goals

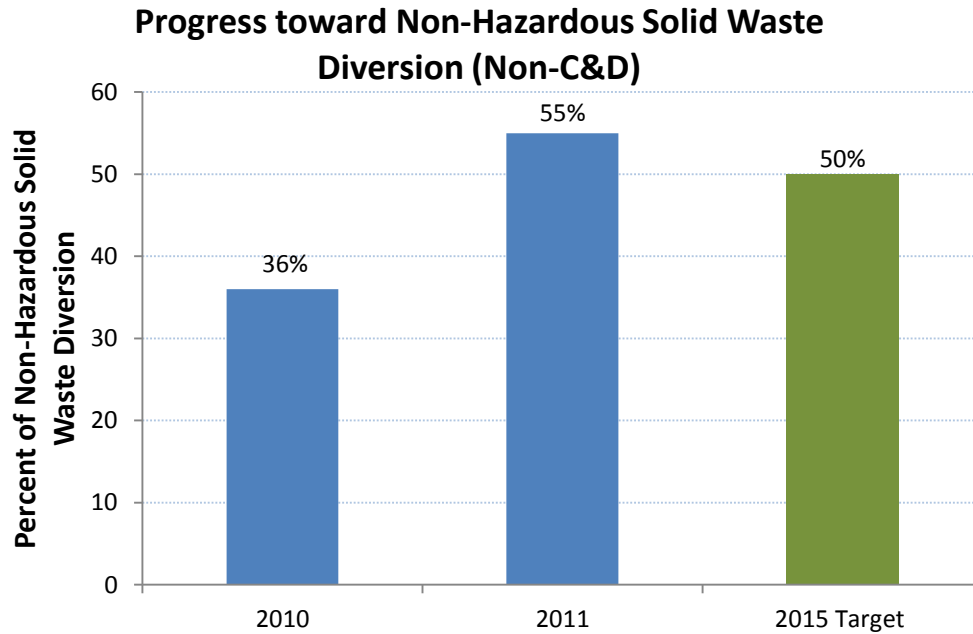


Note: E.O. 13514 requires agencies to reduce potable water intensity by 2% annually through FY2020, compared to an FY2007 baseline. Consequently, by FY2011 agencies are required to reduce potable water intensity by 8%, compared to an FY2007 baseline. A 16% reduction is required by FY 2015 and a 26% reduction is required by FY2020. The red bar represents the agency's FY2007 baseline. The green bars represent the FY2015 and FY2020 target reductions. The blue bars show actual status in relationship to the target. The percentage on each bar shows the reduction or increase from the FY2007 baseline.






## GOAL 5: POLLUTION PREVENTION AND WASTE REDUCTION

### Agency-Specific Performance Metrics for Non-Hazardous Solid Waste Diversion (Non-C&D):






Note: E.O. 13514 requires that by FY2015 agencies annually divert at least 50% of non-hazardous solid waste from disposal. The green bar represents the FY2015 target. The blue bars show actual progress toward the target.




## GOAL 7: ELECTRONIC STEWARDSHIP AND DATA CENTERS

EPEAT	POWER MANAGEMENT	END-OF-LIFE	COMMENTS
			




### EPEAT:

	95% or more Monitors and PCs/Laptops purchased in FY2011 was EPEAT Compliant Agency-wide
	85-94% or more Monitors and PCs/Laptops purchased in FY2011 was EPEAT Compliant Agency-wide
	84% or less Monitors and PCs/Laptops purchased in FY2011 was EPEAT Compliant Agency-wide

### Power Management:

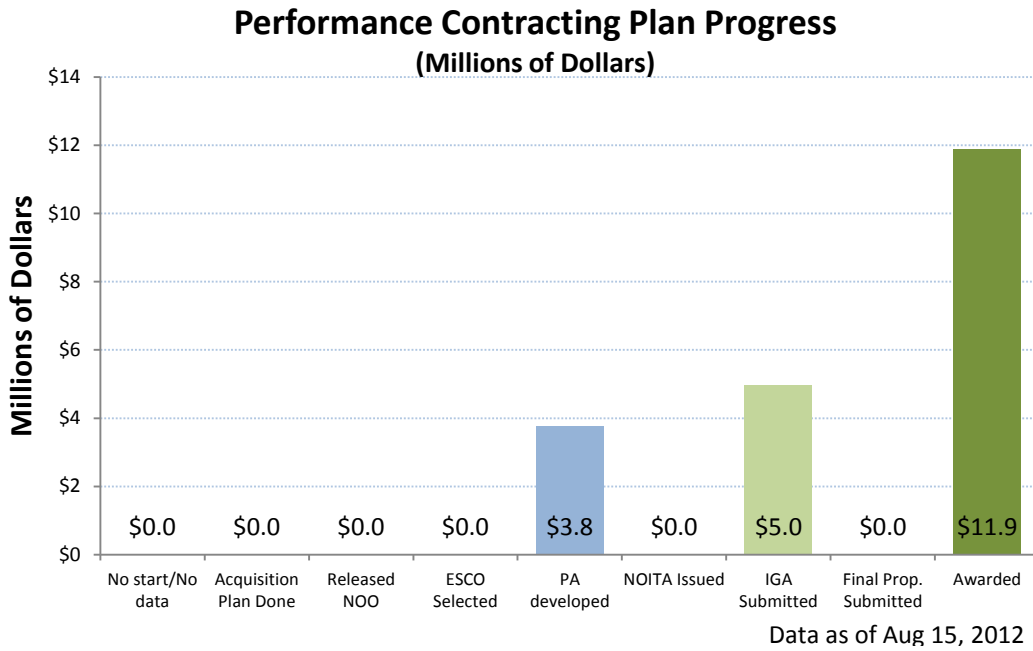
	100% Power Management Enabled Computers, Laptops and Monitors Agency-wide
	90-99% Power Management Enabled Computers, Laptops and Monitors Agency-wide
	89% or less Power Management Enabled Computers, Laptops and Monitors Agency-wide

### End-of-Life:

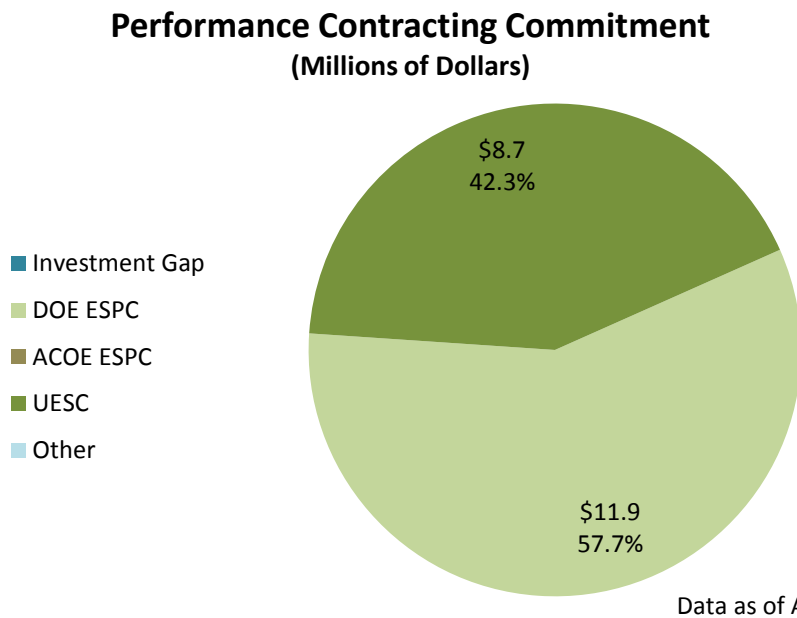
	100% of Electronics at end-of-life disposed through GSA Xcess, CFL, Unicorn or Certified Recycler (R2, E-Stewards)
	100% of Electronics at end-of-life disposed through GSA Xcess, CFL, Unicorn or non-Certified Recycler
	Less than 100% of Electronics at end-of-life disposed through GSA Xcess, CFL, Unicorn or non-Certified Recycler

# PRESIDENT'S PERFORMANCE CONTRACTING COMMITMENT

## Agency-Specific President's Performance Contracting Commitment Metrics:



## Agency-Specific President's Performance Contracting Commitment Metrics:



**APPENDIX 1: CLIMATE CHANGE ADAPTATION PLAN**

**APPENDIX 2: FLEET MANAGEMENT PLAN**

**APPENDIX 3: BIOBASED PURCHASING STATEMENT**