National Aeronautics and Space Administration

2015 Strategic Sustainability PERFORMANCE PLAN

Submission date: June 30, 2015

Point of contact: NASA Chief Sustainability Officer, 202.358.2800

www.nasa.gov

Cover photos, clockwise, starting from the left:

Mission Support Facilities Demonstrate that the Future is Now: Net Zero Energy Propellants North

Located at the Kennedy Space Center in Cape Canaveral, Fla., Propellants North is NASA's first carbon-neutral facility. The Net-Zero building produces enough energy onsite from renewable sources to offset what it requires to operate. As NASA renews its existing buildings and plans for new ones, reducing energy consumption is one of the highest priorities. New building designs with net zero energy technologies show promise for a more sustainable future. *Photo credit: NASA/Frank Michaux.*

New Science Data Will Reveal Soil Moisture Patterns

The Soil Moisture Active Passive (SMAP) observatory launched Jan. 31, 2015. This artist's rendering depicts the 20-foot wide reflector antenna supporting the collection of SMAP's radar and radiometer instrument measurements in space. The width of the region scanned on Earth's surface during each orbit is about 620 miles (1,000 kilometers). SMAP will soon begin its three-year science mission to map global soil moisture and detect whether soils are frozen or thawed. SMAP will help scientists understand the links in Earth's water, energy and carbon cycles, help reduce uncertainties in predicting weather and climate, and enhance our ability to monitor and predict natural hazards such as floods and droughts, improving our resilience in light of climate change impacts. *Image Credit: NASA/JPL-Caltech*

New Space Technology Makes an Impression on the International Space Station Crew

International Space Station Expedition 42 Commander Barry "Butch" Wilmore shows off a ratchet wrench made in Dec. 2014 with a 3-D printer on the station. A design file for the wrench was transmitted from ground to the ISS. The 4.48-inch-long by 1.29-inch-wide wrench was designed by an engineer at Made In Space Inc., contracted by NASA to design, build and operate the printer. The 3-D printer built the wrench by additive manufacturing, depositing 104 layers of plastic. Long-term and long distance missions, such as those to Mars, would benefit greatly from having onboard manufacturing capabilities. For exploration missions where resupply from Earth is impractical or impossible, this new capability may improve efficiencies in how NASA conducts its work and completes science experiments in space. *Photo Credit: NASA*

Human Exploration Will Be Out of This World with Orion Spacecraft

The United Launch Alliance Delta IV Heavy rocket with NASA's Orion spacecraft mounted atop, awaits lift off from Cape Canaveral Air Force Station's Space Launch Complex on Dec. 5, 2014. The Orion spacecraft orbited Earth twice, reaching an altitude of approximately 3,600 miles above Earth before landing in the Pacific Ocean. No one was aboard Orion for this flight test, but the spacecraft is designed to allow us to journey to destinations never before visited by humans, including an asteroid and Mars. *Photo credit: NASA/Bill Ingalls*

Overlay image:

Aeronautics Research Will Lower the Boom with a Green Supersonic Machine

This artist's rendering features a future aircraft design concept for supersonic flight over land from a design team led by Lockheed Martin Corporation. Simulation tools showed dramatic lowering of sonic booms through the use of an "inverted-V" engine-under wing configuration. This concept is one of two designs presented in April 2010 for NASA's studies into advanced supersonic cruise aircraft that could enter service in the 2030-2035 timeframe. By assessing aspects of aerodynamics, boom, structural, airport noise, emissions, and fuels, the researchers hope to produce the next generation of green, supersonic flight capabilities. *Image credit: NASA/Lockheed Martin Corporation*

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
2015 Strategic Sustainability Performance Plan

AGENCY POLICY STATEMENT

The world's citizens look to the National Aeronautics and Space Administration (NASA) for inspiration and leadership. 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 leads by example and will continue to spur profound changes in mankind's knowledge, culture, and expectations. In its 2014 Strategic Plan, NASA commits to "environmental stewardship through Earth observation and science, and the development and use of green technologies and capabilities in NASA missions and facilities." The Strategic Plan adds further that "When we study the Earth from space, we not only reveal the marvelous complexity that enables our planet to support life, but we also gain valuable insight into climate change and weather patterns that translate into better warning and response times for dangerous weather events and natural disasters."

This is the fifth Strategic Sustainability Performance Plan (SSPP) submitted by NASA. What began as lofty goals is now closer to being engrained in the day-to-day culture at NASA. In December 2013, the Administrator formally adopted sustainability principles, including climate adaptation. NASA Policy Directive 8500, NASA Environmental Management, states that "NASA will execute the mission without compromising our planet's resources so that future generations can meet their needs." The policy directs every NASA employee and organizational element to comply with all federal, state, local, and territorial laws, and incorporate environmental risk reduction and sustainability practices into all phases of our work – planning, development, implementation, and operational phases. The policy further directs the implementation of practices to: increase energy efficiency, reduce energy consumption and greenhouse gas emissions, increase the use of renewable energy, reduce water consumption, purchase environmentally-preferable products and services, reduce solid waste generation and the use of hazardous materials, increase recycling and diversion of waste materials, build high-performance and sustainable buildings, operate an efficient fleet program, increase electronics stewarding and green engineering, and undertake climate change adaptation and encroachment protection actions.

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, supporting the economic growth and livability of the communities in which we conduct business and within the Nation we serve. 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. We will continue to 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. Finally, we pledge to maintain compliance with all applicable Federal, state, local or territorial law and regulations related to energy security, a healthy environment, and environmentally-sound operations.

Calvin F. Williams
NASA Chief Sustainability Officer

National Aeronautics and Space Administration

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

VISION

NASA's sustainability policy is to execute the mission without compromising the planet's resources so that future generations can meet their needs. In the risk management culture of NASA, that means we endeavor to implement proactive measures to reduce NASA's exposure to environmental, institutional, programmatic, and operational risks. In doing so, we continuously improve the resilience of NASA's space and ground asset operations and performance. NASA will continue to integrate sustainability principles into existing policies and procedures to foster awareness, approaches and actions for a more sustainable world.

While the requirements of Executive Orders 13693, *Planning for Federal Sustainability in the Next Decade*, shape the metrics of our sustainability goals, they do not constrain the scope of sustainability initiatives. Reflecting a desire to design to outcomes, rather than metrics, integration activities already under way at NASA include:

- Master Plans and Capital Plans inform construction and demolition investments;
- Designs recognize operational and mission risks, such as: direct mission risks (schedule, cost, technical); safety, security and health; legal requirements; and climate risks (short term, long term, and extreme events);
- Centers assess climate change vulnerabilities with partners in the local community and state and federal neighbors; and
- Land management policy incorporates flooding risks into evaluations of investments to create or renew facilities.

In addition to these ongoing actions, NASA is focusing on other activities that will contribute to positive trends in the Strategic Sustainability Performance Plan (SSPP) goals.

NASA is focusing on its Critical Infrastructure Security.

NASA continues to strive to increase resiliency of our missions through sustainability practices. Threats to sufficient supplies of necessary energy and water and disruptions to their distribution systems can disrupt mission critical facilities and operations at NASA Centers and international locations. NASA will perform facility energy and water security assessments to identify threats and vulnerabilities to its industrial management systems, energy/water infrastructure and supply (including supply diversity) to ensure that a reliable and resilient capabilities and assets are available to carry out critical missions.

NASA is working to identify and respond to threats due to material obsolescence.

At NASA, material obsolescence is the inability to obtain or use (sometimes critical) coatings, solvents, foams and other materials due to one or more factors such as national or international policy driven material unavailability or market driven economic forces. NASA will continue to work with national and international partners to help mitigate these risks.

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 was issued, NASA set a policy that projects planned for fiscal year (FY) 2006 and beyond meet the minimum Leadership in Energy and Environmental Design (LEED) rating of Silver and strive to meet LEED ratings of Gold. As of mid-FY 2015 we have exceeded those goals with over 59.22 percent of the gross square feet of NASA's LEED-certified buildings rated Gold or Platinum. An important aspect of our infrastructure program is to demolish underutilized and/or unsuitable space. In the period from October 1,

2013 to Oct 1, 2014, approximately 674,656 square feet of building inventory was demolished, making way for more efficient building stock; simultaneously NASA's construction and demolition diversion rate was 79%.

Internal partnership continues to yield better understanding of climate risks.

In 2005, launch capabilities, space operations and ground systems were deemed at risk from regional climate variability and were identified as a risk within NASA's risk management framework. Since that time, a partnership between NASA's Office of Strategic Infrastructure (OSI) and NASA's Earth Science Division has yielded many benefits. Center climate scientists on NASA's Climate Adaptation Science Investigators (CASI) team continue to work collaboratively with Center institutional representatives to address adaptation issues. This partnership of on-site scientists and non-scientists also is instrumental in supporting climate risk workshops at NASA Centers and with other state, local, and federal agencies in the District of Columbia.

Climate science experts from across the Agency provide NASA's facilities, workforce, emergency planning, and environmental stewards cutting-edge downscaled climate data and projections. This data allows asset stewards at NASA Centers, working closely with local and regional partners, to understand their current and future climate risks, develop adaptation strategies, and integrate climate considerations and solutions within existing management processes. Six site-specific workshops have been conducted since May 2010. These workshops addressed conventional assets, such as built infrastructure and natural ecosystems, but also less tangible resources including workforce, emergency response, and information systems.

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

NASA awarded $52.5M investment value in Energy Savings Performance Contracts and Utility Energy Services Contracts through April 2015 toward our President's Performance Contracting Challenge pledge to award $73.9M by the end of 2016. NASA's remaining project toward the pledge addressed the challenge of reviewing and revising a complex proposal for combined heat and power at a Field Center; the only development milestone remaining is to negotiate and award. Field Centers continue to pursue other potential ESPCs/UESCs.

LEADERSHIP

NASA's leadership embraces sustainability as a means to enable and enhance resilience of NASA's mission efforts. Sustainability has been incorporated beyond NASA's environmental management leadership as an Agency policy and requirement. Sustainability is integrated into delivering mission success through the Agency's master planning, procurement, communication and computing technologies, its infrastructure design, construction, and deconstruction of capabilities no longer required, in prioritization and budgeting of space mission assets, and in drafting Agency policies. By leveraging partnerships with international, intergovernmental, academic, industrial and entrepreneurial communities, NASA can improve mission assurance and resilience. These partners contribute innovation and technology to NASA's mission and extend sustainability principles globally.

In April 2015, Administrator Bolden named his Assistant Administrator (AA) for the Office of Strategic Infrastructure (OSI) as NASA's Chief Sustainability Officer. The OSI provides executive and functional leadership, policy, technical expertise, and oversight for Agency infrastructure including facilities engineering and real property, environmental management, logistics management, aircraft management, strategic capabilities assets program, and integrated asset management. The Office's mission is to ensure that the right infrastructure assets and capabilities are available in the timeframe needed to support the Agency's mission. The AA's role, responsibility, and authority as senior leader of the OSI are well aligned with duties as NASA's Chief Sustainability Officer. The Center Sustainability Officers (CSOs), in many cases,

parallel the responsibilities of the Chief Sustainability Officer at the Center level, thus extending accountability from the Agency to Center level.

The Chief Sustainability Officer and CSOs consider infrastructure asset decisions to be a prime focus area to ensure NASA's sustainability. Recent revisions to master planning policies and a new land management directive compel institutional stewards at the Agency and Center levels to carefully evaluate risk factors relating to capital investments. New facility design guidelines take climate into account and Center-level climate change vulnerability assessment activities enable better capital investments.

NASA's Aeronautics Research Mission Directorate (ARMD) supports sustainability beyond NASA

The ARMD is developing an integrated set of terminal arrival tools that will allow arrival aircraft to safely fly closer together on more fuel-efficient routes, thereby increasing capacity, reducing delays, and minimizing fuel burn, noise, and greenhouse gas emissions. In addition, aeronautics researchers have demonstrated through analysis and testing that ultra-high bypass propulsion systems can be integrated with hybrid wing body concepts to meet goals for reduced fuel use and noise. Developments such as the hybrid wing body hold the promise of significantly reducing the environmental impact for commercial aircraft not available in traditional tube-and-wing aircraft designs.

HQ Sustainability Working Group (SWG) coordinates sustainability implementation, with valuable Center contributions

The goal of the Headquarters (HQ) SWG is to ensure an integrated strategy towards sustainability across the Agency, leveraging existing programs and teams. The SWG team is led by NASA's Chief Sustainability Officer and is composed of HQ leaders from each appropriate community of practice area. These HQ leaders coordinate Center activities to achieve goals, objectives, and targets contained within the annual SSPP. The HQ SWG meets every two weeks during the update of the SSPP and has representatives from many NASA offices – OSI, Office of Procurement, and Office of the Chief Information Officer. More broadly, perspectives of other organizations (for instance the Chief Financial Officer or General Counsel) are consulted to ensure alignment, enabling sustainable progress. Thus the SWG includes participants with concerns broader than institutional infrastructure.

Successful implementation of NASA's sustainability vision and goals relies on individual leadership as well as the activities and leadership of multiple cross-Center teams. While the SWG ensures an integrated strategy towards sustainability within NASA, most of the work towards sustainability is executed by the Center level workforce. Because NASA is geographically dispersed, creating cross-Center teams has been an important method to spread and strengthen best practices across the NASA community. Many diverse disciplines and functional areas are needed to achieve all of the goals, requirements, and targets associated with sustainability. To execute, NASA has well established communities of practice – energy, water, transportation, recycling and sustainable acquisition, design and construction, maintenance and operations, master planning, climate change adaptation, electronic stewardship, and others. The pursuit of more sustainable practices requires the integration and coordination of these discipline-focused teams.

NASA will continue to draw upon the creativity, experience and initiative of its workforce and partners to achieve NASA's mission, integrate sustainability into the NASA work ethic and enable the Agency to meet the goals and challenges of the Strategic Sustainability Performance Plan. NASA will also collaborate with both domestic and international partners to find new ways to implement sustainability.

Executive Order 13514 Federal Leadership in Environmental, Energy, and Economic Performance

GOALS	STATUS
Goal 1: Greenhouse Gases *GOAL: Reduce direct GHG emissions (onsite or offsite) by 18.3% and indirect emissions (e.g., commuting, travel) by 12.3% by FY2020, compared to 2008*	
Goal 2: Sustainable Buildings *GOAL: Facility Energy Intensity: Reduce energy consumption/GSF of building area by 3% annually from FY2003 baseline for FY2006 – FY2015 (30% Total)* *GOAL: Sustainable Buildings: At least 15% of Agency's existing buildings meet Guiding Principles by FY 2015*	
Goal 3: Fleet Management *GOAL: Reduce petroleum use by 2% annually, compared to 2005; increase use of alternative fuels by 10% annually through FY2015*	
Goal 4: Water Use *GOAL: Reduce potable intensity (gallons/sq ft) by 2% each year, compared to 2007; reduce use for industrial, landscaping, and agricultural by 2% each year, compared to 2010*	
Goal 5: Waste Reduction *GOAL: Divert 50% of solid waste (excluding construction and demolition debris); divert 50% of construction and demolition debris*	
Goal 6: Sustainable Acquisition *GOAL: >95% of applicable new contract actions meet federal mandates for acquiring products that are energy efficient, water efficient, biobased, environmentally preferable, non-ozone depleting, recycled content, or are non-toxic or less toxic alternatives*	
Goal 7: Electronic Stewardship *GOAL: Procure energy-efficient equipment rated per Electronic Product Environmental Assessment Tool (EPEAT); use best practices for computer operation and disposal*	
Goal 8: Renewable Energy *GOAL: For FY13 and beyond, 7.5% of agency's total electricity consumption is from renewable energy sources*	
Goal 9: Climate Change Resilience *GOAL: Evaluate climate change risks to identify and manage the effects of climate change on the agency's operations and mission in both the short and long term*	
Goal 10: Energy Performance Contracts *GOAL: Award $73.9M investment value in Energy Savings Performance Contracts and Utility Energy Services Contracts by the end of 2016*	

Goal 1: Greenhouse Gases

GOAL: Reduce direct GHG emissions (onsite or offsite) by 18.3% and indirect emissions (e.g., commuting, travel) by 12.3% by FY2020, compared to 2008

Status as of September 30, 2014	• Reduced Scope 1 and 2 by 29% (Scope 1 includes direct GHG emissions from sources owned by NASA; Scope 2 includes indirect GHG from purchased electricity, heat, or steam) • Reduced Scope 3 by 26.1% (Includes other indirect GHG emissions, e.g., travel in non-NASA vehicles) • Reduced Scope 3 by 32.4% when including Scope 3 percentage points from hosting a third-party operated project at a NASA Center

Summary NASA GHG emission reduction targets reflect a comprehensive strategy that includes: reductions in energy use and intensity; reduced use of fossil fuels and increased use of alternative fuels in fleet vehicles; increased application of green building principles and sustainable design; and innovative energy technologies and funding strategies that promote conservation and renewable energy use. NASA integrates this variety of contributing approaches across Field Centers through the Chief Sustainability Officer interacting with Center Sustainability Officers. This is supported by various Headquarters functional managers interacting with NASA communities of practice for efforts such as developing policy and guidance, establishing priorities, formulating budget recommendations, sharing best practices and lessons learned, and reporting externally. NASA Centers provide emissions data for tracking Agency progress via an on-line tracking system, which NASA is updating to include additional analytical capabilities for Center-level GHG emissions. To help achieve Scope 1 & 2 reductions, NASA evaluated the top three emission categories identified in its Federal Energy Management Program (FEMP) GHG emission report. Electricity and onsite (stationary) combustion were the top two and benefit most from energy efficiency and alternative energy initiatives. Purchased Steam and Hot Water replaced fugitive fluorinated gases as the third largest emission source, and NASA began metering thermal loads at the building level with greater precision to target inefficiencies and reduction opportunities. While NASA's fugitive fluorinated gas emissions for FY 2014 decreased greatly, this source is mission driven and this large reduction is expected to be temporary. NASA hosts a third-party operated renewable energy project at a Center for which NASA was granted Scope 3 percentage points to add to its actual Scope 3 emission reductions; NASA retains neither the renewable energy produced nor the associated renewable energy credits (RECs).

Planned Actions NASA is on target to meet a NASA-developed FY 2015 GHG intensity goal for Scopes 1 and 2, which aligns with its facility energy intensity goal (see Goal 2). NASA will continue to reduce GHG emissions from on-site fossil-fuel consumption by installing more efficient boilers, generators, and furnaces, and by using renewable fuels. Electricity consumption will continue to be reduced through equipment upgrades and more efficient building designs. NASA will continue to implement designs for new construction and major renovations that are 30% more energy efficient than applicable code. NASA is also expanding efforts to research alternatives to specialty chemicals used in research with high global warming potentials, and will continue to discuss strategies with partner Agencies. For Scope 3, NASA is continuing efforts to reduce employee business travel by encouraging teleconference and remote interaction rather than travel and will continue to search for new opportunities for increased telework. This effort, in place for both business air and ground travel, will provide greater combined emission reductions from the baseline year than any other Scope 3 emission source.

Success Examples

- NASA leveraged overall Agency sustainability strategies to promote Scope 1 and 2 GHG emission reductions, which is reflected through several achievements. NASA earned a LEED Gold award that used efficient design, building automation, and both passive and renewable resources to achieve an estimated 60% reduction in energy versus the Center's average building – this translates directly into reduced GHG emissions; and conducted broader efforts across the Agency including energy audits and adding more precise building monitoring capabilities to uncover areas of opportunity for future reductions.

- In FY 2014 NASA championed the integration of mitigation and adaptation efforts through the development of a special training session to help educate users of climate change information. NASA continues to exemplify expertise in this area through efforts such as the Climate Adaption Science Investigator (CASI) group – in FY 2014 the team released two reports on the use of the RETScreen software to substantially reduce building energy and monitor the effectiveness of energy improvement projects, helping NASA and the commercial building sector improve building energy efficiency thus reducing their carbon footprint.
- NASA increased the amount of information collected through the biennial commuter survey for FY 2014. Using enhanced information afforded by these improvements, NASA recorded increased rates of telework and remote interaction through the use of free response and other new analytical capabilities, allowing the survey to serve as an additional success measurement tool. This information helps NASA to understand the needs of each Center, promoting success stories such as exceeding vanpool/carpool ridership goals at one Center in FY 2014, and aids NASA in overcoming barriers to telework and other commuting programs that have arisen at some Centers.
- The Scope 3 GHG Emission Reduction Pilot Project at one Center exceeded initial expectations for GHG reductions associated with commuting to and from work. Supporting the use of electrical vehicles (EVs), the program resulted in reducing Scope 3 emissions by approximately 36 MTCO2e in FY 2014. NASA was also able to carry this out without incurring significant costs – less than $550 for the annual period – by using an annual pass purchasing system. NASA is looking to initiate a similar program at another Center following 80 requests to date from employees interested in charging personal vehicles. To support this NASA is developing a private-market based implementation approach through Center coordination with industry, federal agencies, and local governments. This next step may serve as a model for broader agency-wide implementation in concert with the addition of special parking designated for fuel efficient and hybrid electric vehicles in the interim.

NASA successfully implemented a campus-wide bike sharing program at Goddard Space Flight Facility in Greenbelt, Maryland. In FY 2014, the program grew from 30 to 50 bikes through donations, preventing the need for personal vehicles, reducing traffic, air pollution and fuel consumption, and promoting alternative transportation. In addition, NASA's new LEED Gold building provides bicycle storage, changing rooms, and showering facilities for bicycle commuters. NASA plans to continue supporting similar programs and infrastructure at other NASA Centers, and will continue to review data collection capabilities for other voluntary programs such as DC Capital Bikeshare.

Bike use at NASA Centers is catching on! The use of bikes rather than personal vehicles will reduce traffic, fuel consumption, and Scope 3 greenhouse gas emissions. Health benefits are a bonus!

Goal 2: Sustainable Buildings

GOAL: Facility Energy Intensity: Reduce energy consumption/GSF of building area by 3% annually from FY2003 baseline for FY2006 – FY2015 (30% Total)

GOAL: Sustainable Buildings: At least 15% of Agency's existing buildings meet Guiding Principles by FY 2015

Status as of September 30, 2014	• 25.9% reduction in facility energy intensity • 15.3% of gross square footage of inventory meet Five Guiding Principles • 11% of the number of total buildings meet Five Guiding Principles

Summary NASA continues to make progress on its energy intensity and sustainable building goals albeit scoring 'yellow' in both metrics. The latter goal is measured both by the *number* of buildings and *gross square feet* of buildings meeting the Five Guiding Principles. NASA added another 216,184 square feet in FY 2014 meeting the Five Guiding Principles, thus achieving 15.3% of its inventory meeting the principles when measured by gross square feet (GSF). NASA is completing the revision of its original Sustainable Facilities Training course. Because Goal 2, Sustainable Buildings, contains multiple components relating to green buildings, energy intensity in buildings, master planning, and Energy Savings Performance Contracts,

coordination and integration occurs across several NASA Headquarter-Center groups. These teams contribute to NASA's Energy Management and Sustainable Facility management strategies, updating internal requirements and guidance documents and providing the coordination and outreach necessary to achieve the goals of the EO. NASA tracks its energy goals through the Annual DOE Energy/Water report, Semi-Annual OMB Scorecard, DOE Compliance System reporting on energy/water consumption, ECM implementation and tracking, and building benchmarking. In addition, HQ representatives participate in Interagency working groups and task forces. NASA's updated master planning requirements and recently-issued Handbook for Master Planning (containing specific reference to sustainable site development and stewardship practices) position the Agency for master plans that enable a more strategic, sustainable building set.

Challenges The energy intensity goal contains an inherent conflict between competing goals - reducing our footprint (GSF) and reducing energy intensity (Btu/GSF). Although demolishing or mothballing facilities based upon mission requirements reduces overall energy usage, the resulting reduction in overall square footage raises the energy usage per square foot. Additional challenges this year in meeting the energy intensity goal were colder than average weather conditions and a need to utilize natural gas at times rather than land fill gas (considered a renewal energy source, which does not count in this metric). With regard to the Guiding Principles goal, NASA has a long standing strategy to maximize the use of its existing facilities while constructing new facilities to meet its mission in the most cost effective methodology. This *Repair by Replacement* strategy maximizes current budget to economically construct new sustainable energy efficient facilities, reduce the facility inventory and Agency footprint when applicable, and provide a total building renovation to those facilities that, when assessed, provide the most favorable conditions to meet the guiding principles. Less intensive renovations to existing buildings, while contributing to energy conservation goals, do not typically meet the Guiding Principles. Thus, NASA has only two existing facilities with 290,000 sf that meet the Guiding Principles, with a 3rd facility consisting of over 200,000 sf of area, currently in performance review. An additional challenge is that the current metric requires a minimum building size of 5,000 sf to be included in the goal metric calculation. NASA has always constructed facilities to meet its mission with the most efficient use of space and funding. This minimum building requirement prevents NASA from including another 6 buildings that could be used to meet the goal metric for number of buildings meeting the guiding principles.

Planned Actions NASA Centers will continue to partner with utility companies and energy service companies during FY 2014/2015 to implement the awarded projects and conduct assessments and audits leading to proposals for potential additional projects. NASA plans installation of combined heat and power systems at three candidate Centers, depending on the results of feasibility studies, to increase energy efficiency, reduce GHG emissions, and improve energy security. NASA HQ plans to complete the Sustainable Facilities Training course revision started in FY 2014, prior to the next Center offering, in order to incorporate new Federal guidelines and industry updates. NASA continues to revise NASA Procedural Requirements NPR 8831.2E, *Facilities Maintenance and Operations Management*, updating and revising applicable areas including energy and water use reduction and building commissioning to effectively and more efficiently operate and maintain its facilities. To date in FY 2015, NASA has achieved 339,000 square feet of facilities meeting the Guiding Principles, exceeding the FY 2014 total area by over 55 percent. Furthermore, by the end of FY 2015, NASA is planning to have over 700,000 square feet of facilities meeting the Guiding Principles for FY 2015, including two buildings that will also meet the requirements for USGBC LEED for Existing Buildings: Operations & Maintenance system, another method of rating sustainable buildings.

Success Examples

- Five buildings, with a combined area of 216,184 square feet, met the Guiding Principles; one facility received LEED Platinum certification and three others attained LEED Gold certification.
- Over the past few years, NASA installed geothermal heating ventilating and air conditioning systems at WFF to reduce the demand for fuel oil heat. The transition to geothermal reduced fuel oil consumption from 277 tons in 2013 to 130 tons in 2014.

Goal 3: Fleet Management

GOAL: Reduce petroleum use by 2% annually, compared to 2005; increase use of alternative fuels by 10% annually through FY2015

Status as of September 30, 2014	• 58.7% Reduction in fleet petroleum use since 2005. • 239% Increase in Use of Alternative Fuels in Alternative Fuel Vehicles (AFVs) and Flex-Fuel Vehicles (FFVs) compared to 2005, representing 40.3% of total fleet's fuel use in FY 2014.

Summary NASA is currently exceeding both fleet management goals. Monthly fuel consumption tracking reports allow NASA to ensure it remains on track to meet fuel-based metrics. Since 2005, NASA reduced its fleet inventory by 16% percent. NASA updates its Fleet Management Plan each fiscal year to ensure actions support the Petroleum Reduction and Alternative Fuel usage goals. Continued execution of its Fleet Management Plan maintains the following objectives: a) optimize use of the vehicle fleet; b) acquire and/or adjust the size and functional utility of each vehicle to match the program's needs and/or mission's requirement (right sizing the vehicle fleet); and c) acquire Alternative Fuel Vehicles, Flex Fuel Vehicles, Low Greenhouse Gas emitting and Zero Emission emitting vehicles during "end of life cycle" replacements, for the current vehicle requirements. NASA Center Transportation Officers (CTOs) manage and control all assigned vehicles and annually evaluate NASA's vehicle fleet for both existing vehicle assignments and new requests for transportation support. In FY 2011, Vehicle Utilization Review Boards (VURBs) projected a 10% reduction in vehicle fleet assets through FY 2015, and NASA represented this projected reduction as "NASA's 2015 optimal fleet" within the Vehicle Allocation Methodology (VAM) submitted to the General Services Administration in FY 2012. One challenge to the use of alternative-fueled vehicles is the lack of commercial infrastructure. NASA considers increasing alternative fueling infrastructure within a Center's campus, when such infrastructure allows for increased access to alternative fuel for NASA's mostly campus type vehicle use.

Planned Actions NASA plans to continue its VAM process of annual review by Centers to evaluate vehicle requirements for both existing and new requests. VAM reviews ensure right sizing of the NASA fleet, allowing NASA to identify end of life vehicle assets and consider opportunities for optimal AFV, FFV, low GHG and zero emission replacement selections.

Success Examples

- Acquisition of Zero Emission Vehicles
- Exceeded petroleum reduction and alternative fuel usage goals
- Reduced the Agency vehicle inventory
- Increased the Low Speed Electric Vehicle inventory

NASA's Electric Vehicle Pilot Program

To further the president's goals of reducing the country's dependence on oil imports by one-third by 2025 and putting 1 million advanced technology vehicles on the road, NASA participated in the government's first Electric Vehicle Pilot Program. The pilot is a targeted investment to incorporate electric vehicles and charging infrastructure into the federal government's vehicle and building portfolios, providing support to the burgeoning EV market. NASA was among a select group of Agencies to take advantage of the Electric Vehicle Pilot Program by identifying and accepting five plug-in electric vehicles as replacements for petroleum based vehicles in 2014, with an additional six vehicles expected in 2015. These plug-in electric vehicles will aid in implementing Executive Order 13693 requirements for reducing fleet-related greenhouse gas emissions and including zero emission or plug-in hybrids in the fleet's composition.

Once the 11 electric plug-in vehicles are deployed in the pilot, they are expected to annually save almost 2,250 gallons of gas, reduce greenhouse gas emissions by 20 metric tons, and save taxpayers almost $9,000 in fuel costs.

Goal 4: Water Use

GOAL: Reduce potable intensity (gallons/sq ft) by 2% each year, compared to 2007; reduce use for industrial, landscaping, and agricultural by 2% each year, compared to 2010

Status as of September 30, 2014	• Reduction of potable water intensity since 2007 is 34.8% • Reduction of water for industrial and landscaping since 2010 is 70%.

Summary NASA is well beyond the goal for potable water intensity reduction with reductions achieved thus far of 34.8% versus the goal of 26% by FY 2020 and exceeds industrial, landscaping, and agriculture water reduction goals . The Agency continued to implement major water infrastructure upgrades by replacing aging distribution systems to address leaking pipes, install meters, retrofit bathroom fixtures and reduce the use of landscaping water systems at multiple agency sites in FY 2014. NASA uses its annual DOE Energy/Water report, semi-annual OMB Scorecard, NETS database and results from triennial Environmental and Energy Functional Reviews and internal Baseline Performance reviews to track water use. NASA integrates water conservation into planning efforts through regularly scheduled meetings with the Center Sustainability Officers, Environmental Management Panel, Energy Efficiency Panel, the Sustainability Working Group, and the Community of Practice for Energy/Water. Centers are responsible for installing water efficient technologies in all new buildings and upgrades/maintenance of existing buildings. They conduct water conservation audits and leak detection programs and these efforts have resulted in water distribution system repairs at several Centers. NASA Centers are responsible for reducing the use of landscape irrigation to reduce water use, while considering safety (e.g., fire protection) and mission requirements. Many Centers, particularly those located in western States, already use water-efficient landscaping. NASA Centers review their current systems and deploy water closed-loop, capture, recharge, and/or reclamation systems as appropriate. Many Centers have already converted equipment to closed-loop systems and several Centers have partnered with local communities to use reclamation systems. Centers also are responsible for reviewing industrial and landscaping uses (no agricultural water uses) and installing meters where justified. Centers have some industrial and landscaping water uses, but most of this type of usage has historically been captured under potable water use. Landscaping is often associated with a building and is part of that building's water use. Some of the industrial water uses may merit separate metering and this will be evaluated. Repair of distribution systems often requires significant construction to facilities.

Planned Actions NASA Centers will continue to assess their water distribution systems, conduct leak detection audits, and replace/repair components, as appropriate, considering available resources. NASA Centers will continue to evaluate utilizing or expanding the use of water-efficient landscaping to reduce water use. For industrial water uses, NASA will continue to evaluate the need for additional metering. Centers will also continue to assess whether it is appropriate to deploy additional water closed-loop, capture, recharge, and/or reclamation systems.

Success Examples

- Implemented 9/80 work schedule at one additional Center saving water consumption on 26 additional off-days per year.
- Water infrastructure upgrades continue at many Centers, including:
  - Installation of building level water metering through large water system upgrade projects.
  - Upgraded irrigation system with evapotranspiration controls, new low flow sprinkler heads, and trip systems. Also installed low flow water fixtures through ESPC project. These combined updates are expected to save an additional 18 million gallons of water annually.
  - Installation of 15 ultrasonic advanced water meters to identify water supply to Center and identify leaks in distribution lines. Leak detection project and management review of control system data could result in significant reduction of consumption.

- Installation of water meters on potable and non-potable water lines in several buildings, which were connected to the Energy Management Control System (EMCS) for reporting, trending, and monitoring water consumption on the Center, while providing a means to detect leaks and other areas where consumption patterns and recommended operational changes can be made.

Bottle Filling Station and High-Efficiency Cooler

New water bottle filling stations in eight buildings at Marshall Space Flight Center are 50% more energy efficient than the average water cooler. Water conservation bubblers and the sensor activated bottle filler reduce water usage by almost 40%.

This system conserves water and reduces the energy, water, and waste associated with plastic water bottles.

Goal 5: Waste Reduction

GOAL: Divert 50% of solid waste (excluding construction and demolition debris); divert 50% of construction and demolition debris

Status as of September 30, 2014	• Diversion of non-construction solid waste: 57% • Diversion of construction and demolition waste: 79%

Summary NASA continued to exceed the EO diversion goals for construction and demolition debris and non-construction solid waste. Currently, the Agency tracks waste generation and disposition rates through the NASA Environmental Tracking System (NETS). Since recycling rates are the product of a complex interaction of multiple factors (e.g., maturity of the program, varying regional waste collection resources, type of commodities accepted, communication, and workforce engagement), these rates vary from Center to Center making a "one-size-fits-all" approach difficult. Successful implementation and continuous improvement of Center recycling programs depend on the Center's flexibility to identify and to explore new waste stream opportunities as resources allow. These successes can then be modified to suit other Centers' needs and requirements (shared as best practices). NASA utilizes several avenues to support and improve solid waste diversion efforts: 1) the Recycling and Sustainable Acquisition (RSA) Principal Center provides technical resources and program implementation support for waste prevention, recycling, and sustainable acquisition; 2) a web-based collaboration tool is used to share RSA work and to organize program activities and initiatives on both individual and team levels; 3) an Environmental Management System is used to focus Center attention by employing a selection of priority aspects which are measured and evaluated on a continual basis; and 4) encouragement of the workforce is accomplished through various awards programs, notably the Agency's Blue Marble Awards program and Presidential GreenGov Awards which recognizes individuals and teams with exemplary environmental performance, including waste diversion goals.

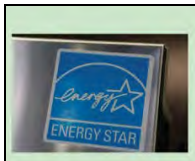
Planned Actions NASA plans to continually improve the NETS data collection on solid waste diversion and hydrofluorocarbon (HFC) usage and expand the NASA dashboard within NETS to provide visual representation and trending analysis to identify opportunities for improvement. The Agency will continue to utilize other electronic means (e.g., paperless contracting and other internal web based systems) to streamline processes and enhance communication. Also, via the Environmental and Energy Functional Reviews, NASA will complete representative sample contract reviews of each Center to reference the use of language related to pollution prevention and solid waste diversion. The Agency will also investigate opportunities to provide additional training to environmental and procurement professionals and provide other support, including contractual examples of single stream recycling (SSR) implementation to Centers considering SSR.

Success Examples

- Continuation of garnet and jet fuel recycling which provides waste disposal cost savings.
- Continuation and maturation of single stream recycling programs at multiple NASA Centers. Several Centers have transitioned to single stream recycling, increasing employee participation and solid waste diversion opportunities.
- Volunteers at Johnson Space Center expanded the Coffee-to-Compost Program and also increased the shredded paper collection for compost in FY 2014.
- Continued expansion of paperless contracting, resulting in reductions in associated paper use and printing costs.
- Several Centers incorporate specific procedural requirements, environmental clauses, plans, or instructions into contracts to support solid waste diversion efforts.
- Continued use of C&D waste diversion principles into day-to-day maintenance operations to increase diversion rates (e.g., concrete, scrap metal and wood recycling).
- The Principal Center for RSA supported NASA's diversion goals by hosting quarterly Web-based platforms to share best practices and lessons learned with regard to solid waste diversion.

Waste HDPE piping from a Stennis Space Center potable water line replacement project has been stockpiled in a recycling staging area for possible recycling opportunities.

A local recycling company just 15 miles from the Center picked up 3,338 pounds of HDPE pipe, diverting it from the Center's landfill. The Center received $2,275 that will be used in another recycling project.
Waste Diverted + Revenues = Win, Win



Goal 6: Sustainable Acquisition

GOAL: >95% of applicable new contract actions meet federal mandates for acquiring products that are energy efficient, water efficient, biobased, environmentally preferable, non-ozone depleting, recycled content, or are non-toxic or less toxic alternatives

Status as of September 30, 2014	• >95% of applicable new contract actions meet federal mandates for acquiring products that are energy efficient, water efficient, biobased, environmentally preferable, non-ozone depleting, recycled content, or are non-toxic or less toxic alternatives, where these products meet performance requirements

Summary NASA currently meets the requirement that 95 percent of applicable new contract actions comply with federal procurement mandates for green products and services. NASA's contracting officers examine environmental sections completed by the intended acquisition end users; NASA Centers have the option to perform additional pre-solicitation and pre-award reviews. To improve coding, NASA recently recommended improvements to the Federal Procurement Data System (FPDS) – Next Generation Data Dictionary in the Sustainability area. Subsequent to that opportunity, Change Control Board members were asked to vote on proposed improvements. NASA's improvements were voted into a future SPRINT (work delivery mechanism) with the goal that coding quality will improve for all federal buyers. Moreover, GSA recently finalized (FPDS) Sustainability Coding Guidelines that will be officially released as part of the update to the General Services Acquisition Manual Part 523 on Sustainable Acquisition. This guidance is designed to help the acquisition workforce fill out the two current sustainability fields in FPDS.

Planned Actions NASA will update the NASA Procedural Requirement 8530.1A for Sustainable Acquisition. NASA will also use other existing review mechanisms, the Procurement Management Review (PMR) and Environmental and Energy Functional Review (EEFR) performed at each NASA Center. NASA plans to utilize the lessons learned from these reviews to inform development of specific training tailored to spur continual improvement at each Center. NASA will annually review 25 percent of the Master Specifications under its control and revise them to ensure that sustainable products are included as appropriate. This number of reviews will result in 100 percent of the total specifications under NASA's control being reviewed for applicable sustainable products during a four year cycle. NASA plans to offer USDA BioPreferred and biobased program training to Agency procurement specialists, request originators, and other interested parties, utilizing classroom and remote web-based options for Continuous Learning Points (CLP) that fulfill training requirements for Contracting Officers and Contracting Officer Representatives status.

Success Examples

- Released new NASA Procurement Notice that revises the NASA FAR Supplement to implement the sustainable acquisition requirements of EO 13514 and 13423 as further implemented through FAR Subpart 23.1 – Sustainable Acquisition Policy.
- Completed EEFR reviews at five NASA facilities, which includes best practices for improving contract language relating to sustainable acquisition.
- Completed PMR reviews at 3 NASA facilities.
- Sustainable Acquisition training was provided to NASA staff through several training methods, from on-site delivery and online refresher training, to other types of Center-specific training. Participants included members of the contracting and procurement community, purchase card holders, administrative staff, engineers and construction managers, and general requisitioners.
- The Agency is executing paperless contracting resulting in reductions in associated paper use and printing costs.
- LEED and Guiding Principles for Construction are drivers for several million dollars of additional sustainable acquisition related materials beyond federal procurement requirements.
- Green Cleaning programs and related procurements have been expanded throughout multiple Centers associated with high performance "Green Buildings".

Proactive Procurement

A Proactive Procurement process allows Environmental, Safety and Health professionals to review machinery, equipment, and hazardous chemicals prior to their introduction to the site. This program at Marshall Space Flight Center (MSFC) requires employees to complete a simple one page form and, if necessary, attach the associated safety data sheet. The program provides for up to 10 working days for review completion unless there is an emergency, in which case reviews are conducted within 24 hours. Environmental, Safety and Health personnel provide feedback to the user about how to safely and compliantly use the product. Feedback may include special storage requirements, required protective equipment or suggestions for alternative "green" products. This process has enabled substantial improvement in EPCRA reporting, specialization in personal protective equipment requirements, and fire safety. The process was piloted in 2012 and implemented Center-wide in 2013. Monitoring and implementation of improvements to the process during 2014 resulted in an increased percentage of employees using the process. Process use rate across MSFC jumped from 40% to 88% during 2014. In one specific example, a request for a parts cleaner, prompted focused review because the new parts cleaner would have required significant facility modifications due to air permit provisions. The Fire Protection Engineer worked with the requestor to identify an alternate piece of equipment not requiring facility modifications, resulting in cost avoidance of roughly $100,000.

Implementation of a Proactive Procurement process at MSFC resulted in:

- ✓ ***improvements in green purchasing***
- ✓ ***reduction in hazardous chemical use***
- ✓ ***cost savings***

Goal 7: Electronic Stewardship

GOAL: Procure energy-efficient equipment rated per Electronic Product Environmental Assessment Tool (EPEAT); use best practices for computer operation and disposal

Status as of September 30, 2014	• EPEAT: 95% or more monitors and PCs/laptops purchased in FY 2013 were Electronic Product Environmental Assessment Tool (EPEAT) compliant • Power Management: 100% computers, laptops and monitors have power management enabled • End of Life: 100% of electronics are disposed through GSA Xcess, CFL, Unicor or a Certified Recycler

Summary NASA maintains a 'green' status for its Electronic Stewardship and Data Center goal, measured by: ensuring procurement preference for EPEAT-registered products; implementing policies to enable power management, duplex printing, and other energy-efficient features; employing environmentally sound practices with respect to the disposition of electronic products; procuring Energy Star and FEMP designated electronics; and implementing best management practices for data center operations. Strategic planning for data center consolidation is done at the Agency level and data center consolidation and data center power monitoring is linked to the OMB's *25 Point Plan for Shift to a Cloud First* and *Develop a Strategy for Shared Services*. The data center power monitoring initiative has largely been abandoned due to budget reductions.

Challenges Several challenges remain with respect to metering data centers and measuring and achieving average data center CPU utilization percentages and power utilization effectiveness (PUE) targets (75% and 1.4, respectively). While NASA assessed its data centers in 2010 for meter placement, it has taken several years to install data center-specific meters; metering was typically done at the building level, not the room level. Other metering challenges remain, including: complexity of getting readings from chilled water feeds and isolating the energy for chilled water associated with data center room and building. Measuring average CPU utilization requires agents conducting continuous measurements rather than snapshot measurements, so NASA is able to only estimate that its supercomputing facilities and large science data production facilities operate at 65% CPU utilization or above. Other data centers will increase their utilization percentage as virtualization increases and more consolidation occurs. Once individual data center metering is complete, PUE measurement will be possible; however it is unlikely NASA will achieve the 1.4 PUE goal established. Buildings are old and the cost of modifications precludes making energy

efficient improvements and changes that would improve PUE substantially. As NASA increases the density in data centers by consolidation and has the opportunity to implement more energy savings best practices over time, PUE will improve, but is unlikely to get below 2 in most facilities. Most investment in data center power monitoring has been abandoned due to budget reductions.

Planned Actions NASA plans to reduce to 29 data centers by the end of FY 2015 and 27 data Centers by the end of FY 2016. In the years that have passed since the consolidation effort was initiated, NASA has implemented appropriate life cycle improvements in many of the data centers that will remain permanently, including replacement of mechanical equipment, replacement of computer hardware, the deployment of virtualization environments, size reductions and reconfigurations to improve hot/cold and airflow management. At this time, we consider those modifications to be substantially complete and the savings gained from them realized.

NASA has implemented an enterprise contract for support of desktop services to include network printers, multifunction devices (MFDs), and other printing devices. The enterprise contract contains specific energy efficient compliance clauses. Additionally, standardized configurations are implemented to ensure energy efficient settings are managed and monitored. NASA has implemented its office automation and end user services to this contract to ensure efficiencies in desktop services functions, costs, and compliance with federal initiatives. All NASA Enterprise IT Support and Services contracts contain clauses to ensure environmentally sound practices for disposition of all Agency excess or surplus equipment. As of May 2015, NASA achieved replacement of 100% of all office automation systems that comply with EPEAT standards and have been updated within the last 4 years. Note: Agency Consolidated End-User Services enterprise contract procured devices will be 100 percent.

Success Examples

- Using new virtual technologies to reduce the need for physical servers and replacing old servers with energy efficient models.
- Specific reduction in Data Center requirements as the agency transitions to Cloud services. During FY 2014, NASA transitioned its .nasa.gov web services infrastructure requirements to utilize a commercial cloud provider.

Goal 8: Renewable Energy

GOAL: For FY13 and beyond, 7.5% of agency's total electricity consumption is from renewable energy sources

Status as of September 30, 2014	• 8.9% of NASA's total electricity consumption came from renewable energy; 7.33% is from new sources

Summary NASA successfully exceeded this fiscal year's goal of 7.5%, building on NASA's Agency-wide strategy of emphasizing identification of large projects that can make a significant difference for the Agency, in addition to initiating smaller projects at each Center. Centers are trying to bundle solar projects with larger facility upgrades or ECMs to reduce payback periods. More than 69% of NASA's renewable energy is from REC purchases; about 11% comes from direct purchases. NASA completed its feasibility study for a solar plant installation at one facility and secured funding for about 1MW of solar. This solar project will provide renewable power and peak shaving for a groundwater remediation system, reducing significant energy costs over a long period of time. NASA is a member of the FEMP Renewable Energy Working Group and contributed to the development of the FEMP Playbook for Large-Scale Renewable Energy Projects. NASA completed revision of its Energy Management Program procedural document and associated Energy Guidance Handbook. The NASA Energy Efficiency Panel (EEP) initiated a subcommittee to evaluate NASA's renewable energy program, and submit recommendations to the EEP. This subcommittee has communicated with DOE on their "Deep Dive" program for possible solutions.

Challenges NASA continues to address issues relating to the lack of authority to enter into long term (10+ years) Power Purchase Agreements (PPAs) with vendors for renewable energy contracts (unless within an

ESPC). In addition, an OMB policy - *'the Federal government must retain title to the installed capital goods at the conclusion of the contract*' - lessens the financial incentive of third party investors or providers to enter into ESPCs with a renewable energy component[1]. NASA is working through NREL to resolve these issues. Furthermore, although NASA is successfully using several renewable energy technologies - solar thermal, geothermal, and steam generation from renewable sources – some of these renewables energies cannot be counted in the renewable energy metric because they do not generate electricity. The Energy Policy Act of 2005 requires that no less than 7.5% in FY 2013 and thereafter, of *total electricity consumed* by the Federal Government come from renewable energy. A Presidential Memorandum issued December 5, 2013 added a provision that 20% of electricity must be from renewable sources by 2020. NASA is reviewing its renewable energy policies regarding this new requirement. Unless barriers to implement on-site renewable energy generation are removed, NASA may not be able to meet the new requirements as REC costs increase and budget limitations may not permit the purchase of a sufficient number of RECs needed to meet the goal.

Planned Actions NASA will continue to work with DOE, FEMP, NREL, and other agencies to implement renewable energy projects by installing onsite renewable energy on its sites. NASA will complete a Phase 2 feasibility study for the CHP project, which - using landfill gas supplemented with natural gas - could produce roughly 95% of electricity for the Center. Another facility continues to work on incorporating a solar project into their ESPC. NASA is considering buying RECs at the HQ level, with Centers providing funding according to their local electricity use and other renewable resources.

Success Examples

- NASA Centers are including renewable energy projects in ESPC projects to leverage high capital investment and average out long payback periods.
- One Center is installing a 1 – 1.4 MW solar system using recycling funds and NASA HQ funding. This system will provide renewable power to operate a groundwater remediation system and also provide energy resiliency to a water supply system during extended power outages.
- Another Center installed a solar 33 kW roof-mounted PV array as part of a new building construction. This system provides 33.5 megawatt hours (MWh) of renewable electricity per year.
- One Center installed solar 75 kW solar panels providing 149.6 MWh of renewable electricity annually.
- Another NASA Facility installed 20kW single axis tracking solar PV system at their guard gate. This system provides 50 MWh of renewable electricity per year.

75 kW solar panel array

20kW single axis tracking solar PV system

33 kW roof-mounted solar PV array

[1] OMB Memorandum M-12-21 dated 9/28/2012, Subject: Addendum to OMB Memorandum M-98-I3 on Federal Use of Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs)

Goal 9: Climate Change Resilience

GOAL: Evaluate climate change risks to identify and manage the effects of climate change on the agency's operations and mission in both the short and long term

Status as of September 30, 2014	• Six of NASA's coastal facilities had hosted multi-day climate adaptation workshops • Cosponsoring/facilitating DC-area climate adaptation series with federal and non-federal neighbors. • Quarterly Center Sustainability Officer meetings include climate adaptation progress as an agenda item • Incorporating climate change factors into sustainable facilities design program and master planning policies

Summary Recognizing climate risks as a potential impediment to a sustainable NASA and the importance of "walking the talk" to drive culture change, science and institutional leaders have made adapting to climate risks a focus, participating actively in workshops, advocating for applicable research, and advancing relevant policies. NASA has developed and is applying a robust local adaptation workshop process at its installations, and has collaborated with key partners in the Washington, DC area to participate in community-wide adaptation efforts. Through the workshops process and post workshop efforts, NASA collaborates with local and regional organizations to manage common climate risks and search for solutions that have mutual benefits. In addition to participating in these workshops to provide climate adaptation science information, NASA's CASI team also conducts applied research and toolset development of direct benefit to NASA institutional climate risk managers and to surrounding area local organizations. NASA remains on the forefront of climate science, research, and computational modeling, providing vital information to the public and NASA institutional managers.

Planned Actions During FY 2015, NASA will build on the value of its adaptation workshops to reinforce early progress and extend momentum towards a more climate-resilient Agency. NASA also will continue to collaborate with National Capital Planning Commission and organizations in the Washington, D.C. area. Additionally, NASA has participated in two adaptation workshops sponsored by other organizations; one in Houston, TX, and the second in Hampton Roads, VA. Johnson Space Center is working with Houston organizations on post-workshop efforts. Similarly, Langley Research Center is working with Hampton Roads groups on post-workshop efforts. Scientists will continue making contributions to climate research and participating in efforts of the U.S. Global Change Research Program (USGCRP) and other organizations such as the Intergovernmental Panel on Climate Change. CASI scientists will update climate projections for NASA Centers, incorporating advancements in climate models. Wallops Flight Facility recently added the U.S. Army Corps of Engineers (USACE) to five other federal agencies and installations in its coastal resilience working group under the Wallops Board of Directors. The working group was assembled to develop long term coastal resilience strategies for the facility based on the best available science projections and engineering practices. USACE has long provided technical support to WFF to address coastal impacts, however, this new roll will leverage their technical expertise to support forward-looking planning to mitigate expected coastal impacts. NASA expects to undertake expanded efforts and activities in the adaptation area in support of the new Executive Order 13693, and its forthcoming guidance.

Success Examples

- NASA issued its first Land Management Policy, identifying flooding risk as a key vulnerability, protecting the high ground should managed retreat be advised, and limiting development in areas of greatest vulnerability. NASA Centers are in the process of implementing the new policy and NASA-HQ is monitoring the implementation process.
- Internally, NASA's Master Planning Community of Practice and Chief & Center Sustainability Officers coordination group are continuing to have dialogue on climate adaptation design and other climate issues at their scheduled meetings.
- NASA along with other Federal agency partners received an award from the American Planning Association in recognition of the Washington, DC, climate adaptation events and activities.

- The Cities of Gaithersburg and Bowie, MD, incorporated NASA-generated local climate information in their climate adaptation planning process. This action demonstrates the value of region-specific climate projections provided by NASA climate scientists.
- NASA continues to share its past experiences in climate adaptation planning with other government organizations on a one-on-one voluntary request basis. Over the past year NASA has provided help and advice to two governmental agencies.
- In early 2014, NASA Goddard Space Flight Center entered into an agreement with eight other Federal agencies, universities, and research institutions to establish the Mid-Atlantic Coastal Resilience Institute (MACRI). The institute will collaborate to promote resilience from sea level rise, extreme weather events, and coastal ecosystem degradation along 65 miles of coastline managed by the MACRI partners.

The coastal resilience program at Wallops Flight Facility has been active over the entire 70 year history of the facility, working to protect the $1 Billion dollars of federal infrastructure located on Wallops Island from the combined effects of sea-level rise and increased frequency and intensity of severe storm events.

Wallops Flight Facility mitigates coastal risks by fortifying the island from intense wave energy and storm surge using a sea wall and expanded beach system, building flood tolerant buildings to withstand occasional low-energy flooding, and only siting launch-critical functions in the periodically flooded island launch area.

Goal 10: Energy Performance Contracts

GOAL: Award $73.9M investment value in Energy Savings Performance Contracts and Utility Energy Services Contracts by the end of 2016

Status as of September 30, 2014	• NASA awarded $45.7M investment value toward the President's Performance Contracting Challenge (PPCC).

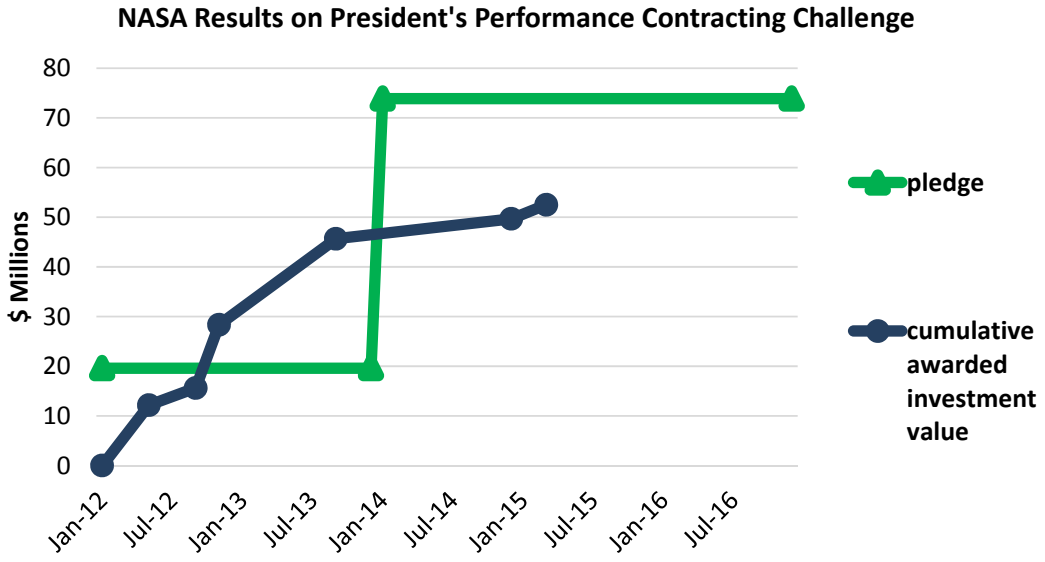
Summary For the second phase of the President's Performance Contracting Challenge, NASA voluntarily increased its pledge to $73.9M by the end of 2016. These Energy Savings Performance Contracts and Utility Energy Services Contracts guarantee energy savings pay for project construction costs through the realized cost savings. Thus far into Phase 2, NASA increased the cumulative investment value awarded to $52.5M. This represents 71% of NASA's pledged investment value with 20 months remaining in PPCC Phase 2.

Challenges NASA's remaining project toward the pledge addressed the challenge of reviewing and revising a complex proposal for combined heat and power at a Field Center.

Planned Actions On NASA's remaining project toward the pledge, the only development milestone remaining is to negotiate and award. Field Centers continue to pursue other potential ESPCs/UESCs.

Successes

- NASA became the first agency to fulfill its PPCC Phase 1 pledge of $19.6M by awarding a cumulative $28.3M investment value in November 2012.
- NASA ended PPCC Phase 1 having awarded a cumulative $45.7M investment value—more than double the Phase 1 pledge.



NASA has made significant contributions to the President's challenge to the federal community to enter into Energy Savings Performance Contracts and Utility Services Contracts. In the graph above, the large shift in the green line (Pledge) indicates the voluntary increase of NASA's pledge to $73.9M.

PROGRESS ON ADMINISTRATION PRIORITIES

Explain how your agency is addressing existing CEQ guidance and implementing instructions from the following documents.

Sustainable Locations for Federal Facilities of 9/15/11

Sustainable Practices for Designed Landscapes of 10/31/11, as supplemented 10/22/14

NASA locates new facilities at existing sites, and plans to continue in this fashion in keeping with the maximization of existing resources. Agency master planning and facility design policies promote infill development to leverage current infrastructure, minimize consequences for wildlife habitat, to be pedestrian, transit, and bike-friendly, and to limit the risks associated with climate and extreme weather. In addition to striving to meet the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings, NASA also utilizes the US Green Building Council's Leadership in Energy and Environmental Design (LEED) standard to measure the alignment of new construction and renovation projects with sustainability. NASA has no plans to establish new work sites in FY 2015 or FY 2016. Working with GSA concerning its Headquarters (its sole large lease) in recent years, NASA has favored locations with bike and multi-modal transit and other services consistent with local and regional growth management planning, and will continue to do so when planning for its future.

Federal Agency Implementation of Water Efficiency and Management Provisions of EO 13514 of 7/10/13

NASA reduced water intensity in FY 2014 by 34.8% from the 2007 baseline, exceeding the required 14% reduction goal for potable water. NASA also exceeded the FY 2014 goal of 6% for industrial, landscaping and agricultural water by a reduction of 70%. Besides installing water saving fixtures, NASA has started to include the installation of building level water meters as budget allow on projects replacing old water distribution systems at centers. As NASA is meeting its water goals, NASA HQs will monitor for continual improvement through the Annual Energy/Water Report, NETS database, and the triennial Environmental and Energy Functional Reviews (4-5 Centers/year). Since NASA has four field centers in California, we are participating in the EPA Mojave Desert project, which is evaluating drought impacts on federal facilities in those areas.

President's Performance Contracting Challenge

NASA awarded $52.5M investment value in Energy Savings Performance Contracts and Utility Energy Services Contracts toward our President's Performance Contracting Challenge pledge to award $73.9M by the end of 2016. NASA's remaining project toward the pledge addressed the challenge of reviewing and revising a complex proposal for combined heat and power at a Field Center; the only development milestone remaining is to negotiate and award. Field Centers continue to pursue other potential ESPCs/UESCs.

NASA's Climate Risk Management Plan Progress

NASA continues to focus on better understanding climate risks and climate resilience of its buildings and facilities as the impacts of a changing climate are affecting NASA's properties and operations. NASA recognized as early as 2005 that 'regional climate variability' could pose a risk to its operations and missions and identified it as a risk within NASA's risk management framework. Many Agency assets - 66% of its assets when measured by replacement value - are within 16 feet of mean sea level and located along America's coasts, where storm surges and sea level changes are a challenge. The scope of this risk includes launch capabilities, space operations and ground systems. In response to this risk, NASA is applying its scientific expertise and products to incorporate climate information into its decision making and planning; create innovative, sustainable, and flexible solutions; and share best practices, in order to create climate-resilient NASA Centers. NASA developed its 2014 Climate Risk Management Plan Agency to integrate consideration of climate-related risks into agency operations and overall mission objectives. NASA is updating its plan to incorporate information from the National Climate Assessment as well as planning efforts - specified by Executive Order 13693 – *Planning for Federal Sustainability in the Next Decade* - that focus on the climate resilience of NASA's buildings and facilities. The updated plan will be completed by early autumn 2015. NASA includes as Appendix C its Preliminary Plan for Climate Preparedness and Resilience at NASA Centers.

Size & Scope of Agency Operations

Table 1: Agency Size & Scope

Agency Size and Scope	FY 2013	FY 2014
Total Number of Employees as Reported in the President's Budget	17,894	17,715
Total Acres of Land Managed	329,395	329,462
Total Number of Buildings Owned	2,427	2,359
Total Number of Buildings Leased (GSA and Non-GSA Lease)	13	15
Total Building Gross Square Feet (GSF)	46,741,087	46,515,922
Operates in Number of Locations Throughout U.S.	42	47
Operates in Number of Locations Outside of U.S.	14	9
Total Number of Fleet Vehicles Owned	913	871
Total Number of Fleet Vehicles Leased	2,226	2132
Total Number of Exempted-Fleet Vehicles (Tactical, Law Enforcement, Emergency, Etc.)	226	249
Total Amount Contracts Awarded as Reported in FPDS ($Millions)	1,281. 3	1493.0

[1] Building information should be consistent with FY 2013 and FY 2014 data submitted into the Federal Real Property Profile (FRPP)

Agency Progress toward Goals in E.O. 13514 and E.O. 13423

This section provides an overview of agency progress towards the sustainability goals established in E.O. 13514 and E.O. 13423. The subject of many of these goals has been carried over into E.O. 13693 and a review of past performance is useful to determine program effectiveness and development of strategies for future implementation.

NASA tracks progress and strategies for 10 goals. The following sections highlight NASA's progress to date through government fiscal year 2014.

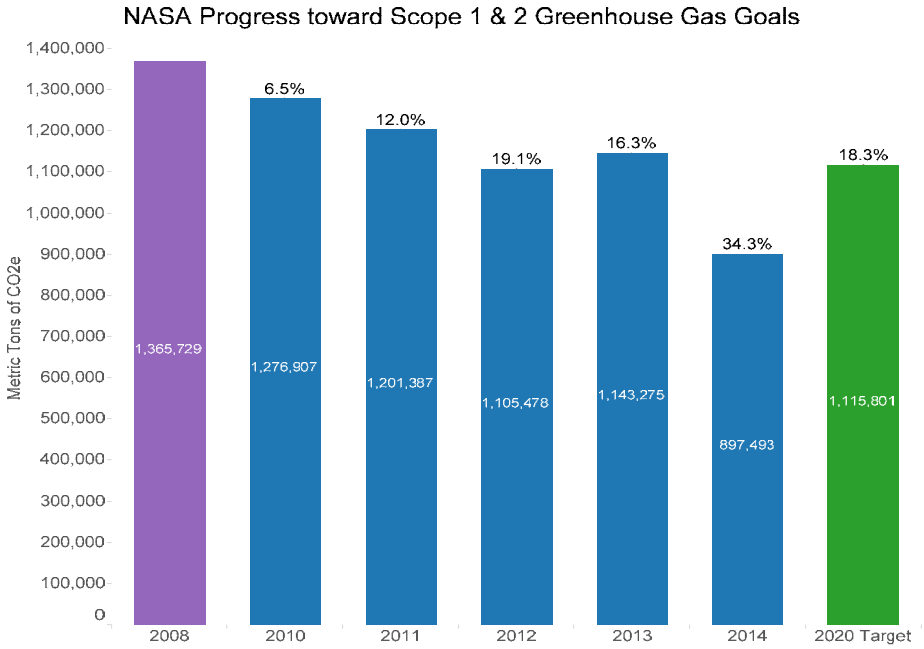
Goal 1: Greenhouse Gas (GHG) Reduction	Figure 1-1: Progress toward Scope 1 & 2 GHG Goals Figure 1-2: Progress toward Scope 3 GHG Goal
Goal 2: Sustainable Buildings	Figure 2-1: Progress toward Facility Energy Intensity Reduction Goal Figure 2-2: Progress toward Total Buildings Meeting Guiding Principles
Goal 3: Fleet Management	Figure 3-1: Progress toward Fleet Petroleum Use Reduction Goal Figure 3-2: Progress toward Fleet Alternative Fuel Consumption Goal
Goal 4: Water Use Efficiency & Management	Figure 4-1: Progress toward Potable Water Intensity Reduction Goal
Goal 5: Pollution Prevention & Waste Reduction	Progress toward Pollution Prevention & Waste Reduction
Goal 6: Sustainable Acquisition	Figure 6-1: Progress toward Sustainable Acquisition Goal
Goal 7: Electronic Stewardship & Data Centers	Figure 7-1: Progress toward EPEAT, Power Management & End of Life Goals
Goal 8: Renewable Energy	Figure 8-1: Renewable Energy Percentage of Total Electricity Usage
Goal 9: Climate Change Resilience	
Goal 10: Energy Performance Contracts	Figure 10-1: Progress in Meeting President's Performance Contracting Challenge (PPCC) Goal

GOAL 1: GREENHOUSE GAS (GHG) REDUCTION

Progress toward Scope 1 & 2 GHG Goal

E.O. 13514 required each agency establish a Scope 1 & 2 GHG emission reduction target to be achieved by FY 2020. The purple bar represents the agency's FY 2008 baseline. The green bar represents the FY 2020 target reduction. The blue bars represent annual agency progress towards achieving this target. The percentage at the top of each bar represents the reduction or increase from the FY 2008 baseline.

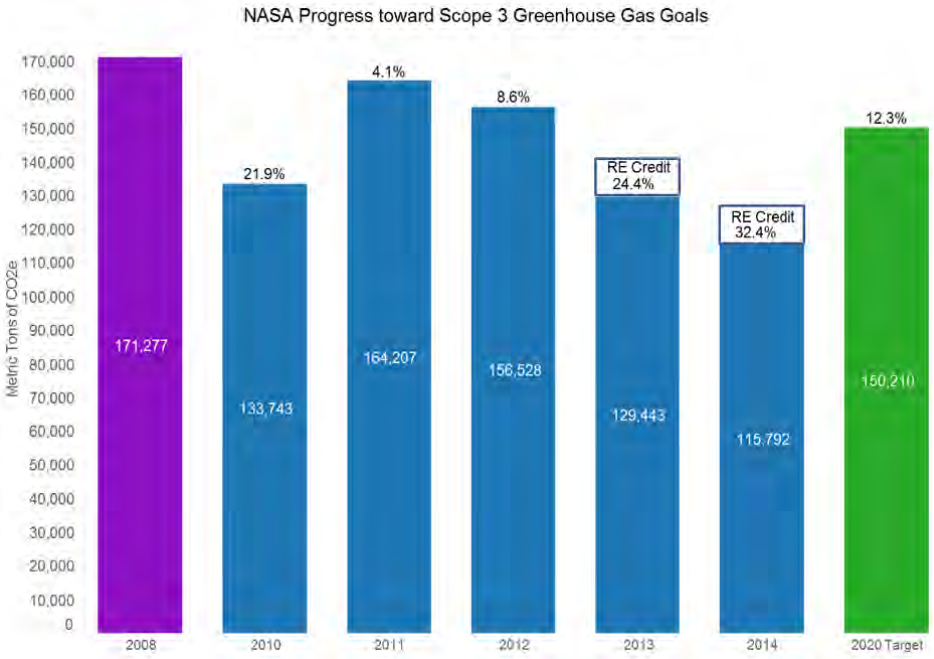
Figure 1-1



Progress toward Scope 3 GHG Goal

E.O. 13514 required each agency establish a Scope 3 GHG emission reduction target to be achieved by FY 2020. The purple bar represents the agency's FY 2008 baseline. The green bar represents the FY 2020 reduction target. The blue bars represent annual agency progress on achieving this target. The percentage at the top of each bar represents the reduction or increase from the FY 2008 baseline.

Figure 1-2

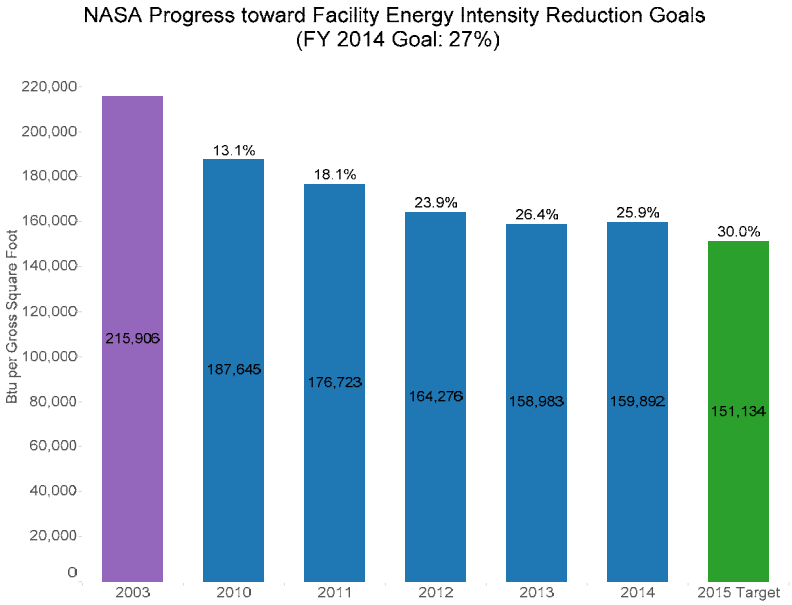


GOAL 2: SUSTAINABLE BUILDINGS

Progress toward Facility Energy Intensity Reduction Goal

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

Figure 2-1

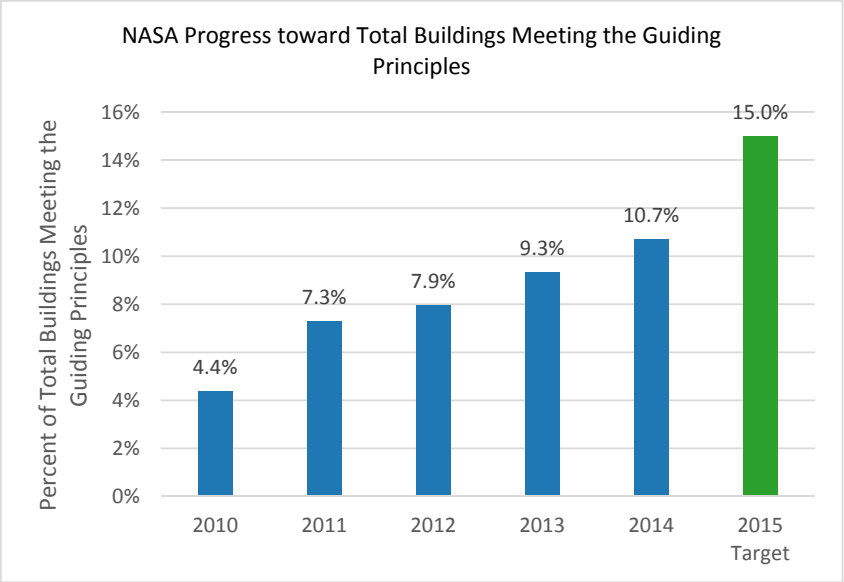


Progress toward Total Buildings Meeting the Guiding Principles

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

With the addition of another 216,184 square feet meeting the Five Guiding Principles in FY 2014, NASA achieved 15.3% of its inventory meeting the Five Guiding Principles when measured by gross square feet.

Figure 2-2

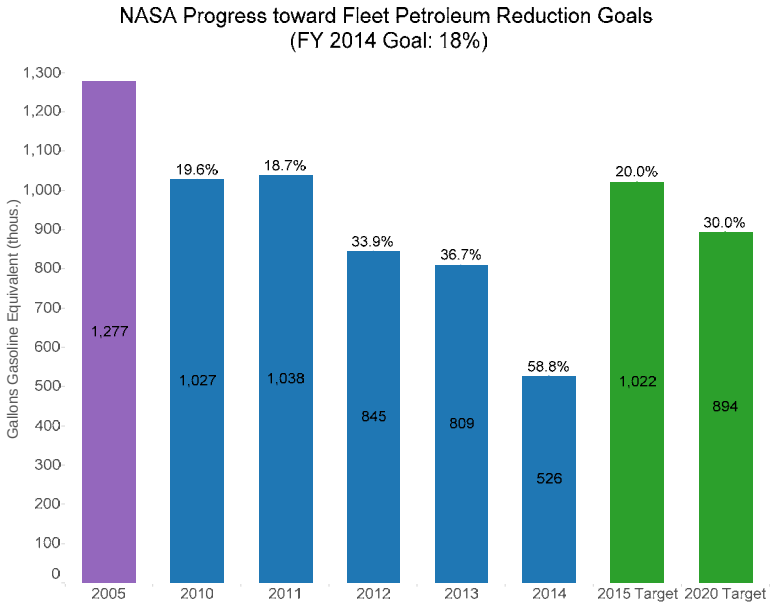


GOAL 3: FLEET MANAGEMENT

Progress toward Fleet Petroleum Use Reduction Goal

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

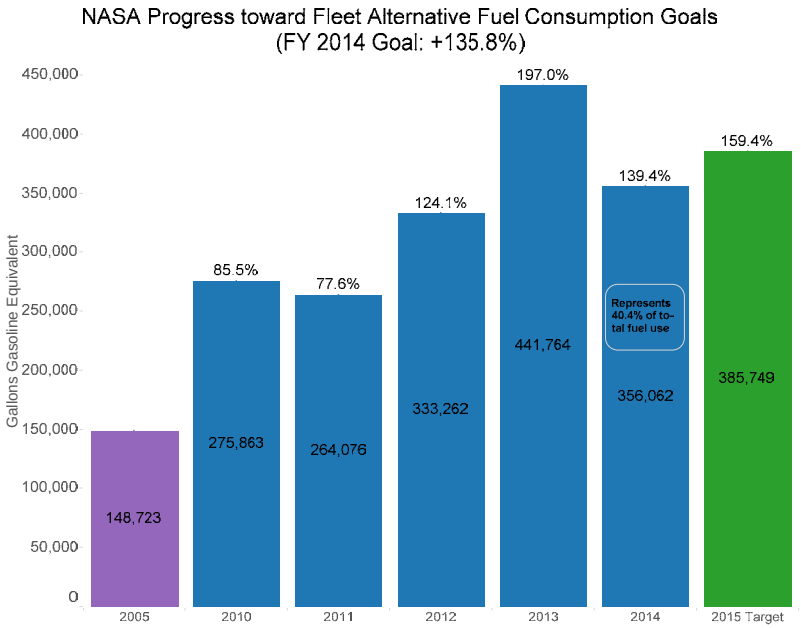
Figure 3-1



Progress toward Fleet Alternative Fuel Consumption Goal

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

Figure 3-2

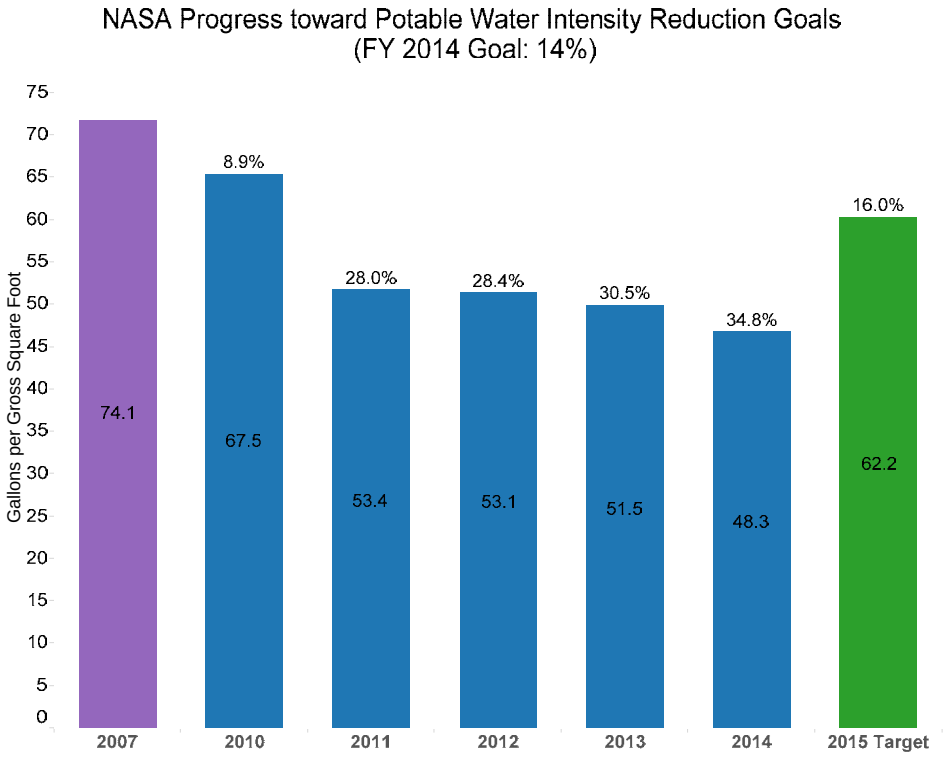


GOAL 4: WATER USE EFFICIENCY & MANAGEMENT

Progress toward Potable Water Intensity Reduction Goal

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

Figure 4-1



GOAL 5: POLLUTION PREVENTION & WASTE REDUCTION

Progress toward Pollution Prevention & Waste Reduction

E.O. 13514 required that Federal agencies promote pollution prevention and eliminate waste. The E.O. requires agencies to minimize the use of toxic and hazardous chemicals and pursue acceptable alternatives. It also requires agencies minimize waste generation through source reduction, increase diversion of compostable materials, and by the end of FY 2015 divert at least 50% of non-hazardous and 50% of construction and demolition debris.[1]

NASA exceeds these goals; as of September 30, 2014, the diversion of non-construction solid waste is 57% and the diversion of construction and demolition waste is 79%.

[1] New waste accounting guidance will be issued and accounting and data reporting for waste reduction will begin in FY 2016.

GOAL 6: SUSTAINABLE ACQUISITION

Progress toward Sustainable Acquisition Goal

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

Figure 6-1

Progress toward EPEAT, Power Management & End of Life Goals

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

Figure 7-1

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:

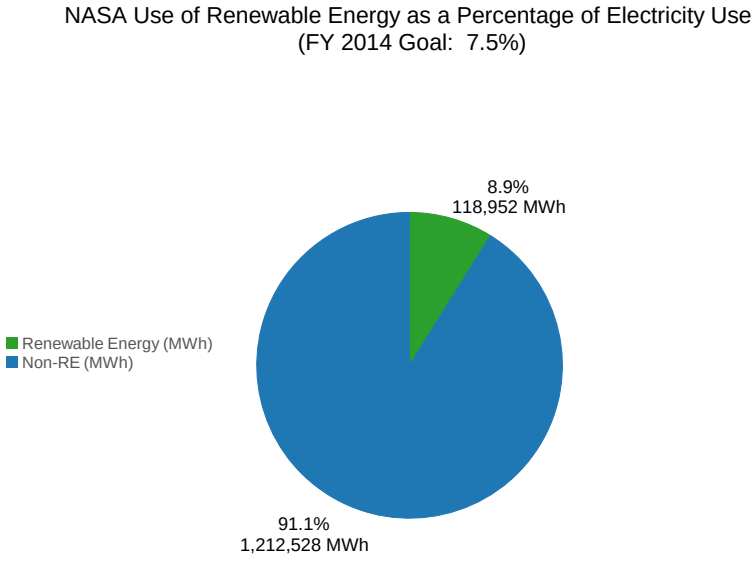
	100% of electronics tracked at end-of life, demonstrating 100% disposal through GSA Xcess, CFL, Unicor, USPS Recycling Program or Certified Recycler (R2, E-Stewards). *Submitted annual report to GSA for Federal Electronics Assets furnished to non-Federal recipients.*
	100% of electronics tracked at end-of 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. *No annual report submitted to GSA for Federal Electronics Assets furnished to non-Federal recipients.*

GOAL 8: RENEWABLE ENERGY

Renewable Energy Percentage of Total Electricity Usage

E.O. 13514 requires that agencies increase use of renewable energy. Further, EPACT 2005 requires agencies to increase renewable energy use such that 7.5 percent of the agency's total electricity consumption is generated by renewable energy sources for FY 2014 and beyond. For FY 2012, the required target was 5 percent of an agency's total electricity consumption. In 2013, a Presidential Memorandum entitled Federal Leadership on Energy Management revised the Federal agency target for agency renewable energy percentage of total electricity usage to reflect a goal of 20% by 2020.

Figure 8-1



GOAL 9: CLIMATE CHANGE RESILIENCE

Climate Change Resilience

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

This goal is addressed through qualitative commitments on the part of each agency and a summary of progress may be found in the Executive Summary at the beginning of this document.

A Preliminary Plan to address the climate preparedness and resilience requirements of section 13(a) and (b) of EO 13693 is included as an appendix to this SSPP.

GOAL 10: ENERGY PERFORMANCE CONTRACTS

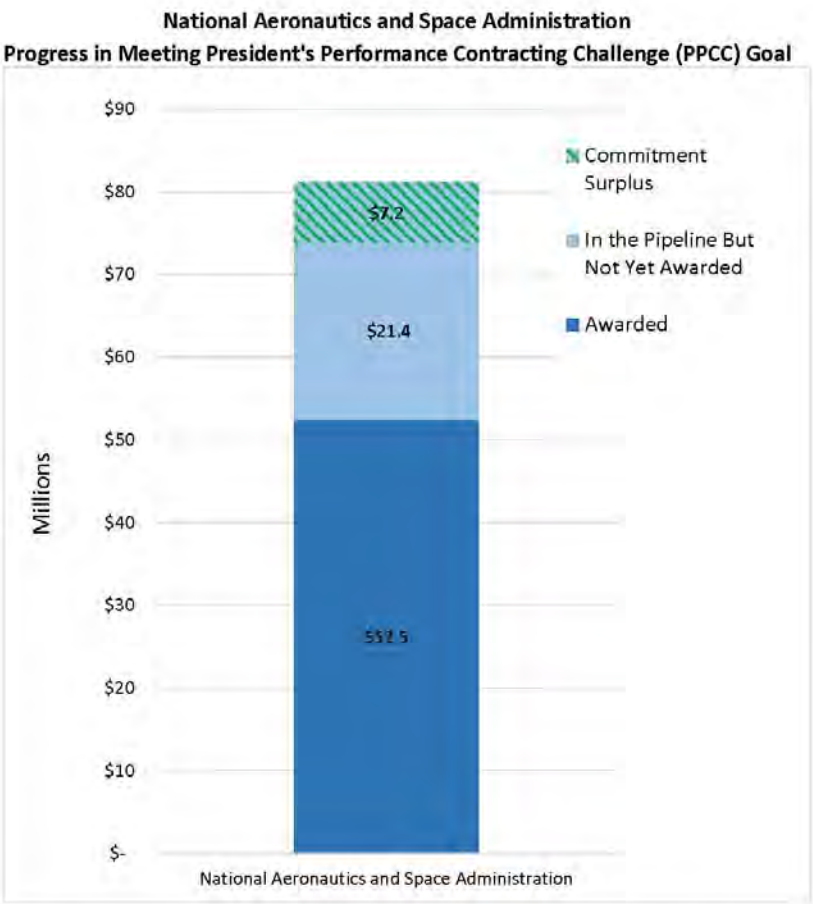
Progress toward Goal - Awarded Energy Performance Contracts

Energy Performance Contracts, including both Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs), enable agencies to obtain energy efficiency investments in buildings and deploy on-site renewable energy through long-term contracts with the private sector, which are in turn paid through savings derived from those investments.

The chart below represents the agency's performance contracting commitment and progress toward that commitment as reported through April 15, 2014 (for agencies subject to the 2011 President's Performance Contracting Challenge). The bar graph shows the total dollar value (in millions) of (1) already awarded projects, (2) projects in the pipeline but not yet awarded, and (3) the pipeline shortfall or surplus depending on whether the agency has reached their commitment goal.

NOTE: All agencies are to meet or exceed their initial target no later than June 30, 2014.

Figure 10-1



Note: This chart indicates agency progress toward the 2016 Performance Contracting goal as of April 15, 2015.

Agency Strategies to Meet Goals of E.O. 13693

This section contains NASA's FY 2016 selected strategies for the goals under E.O. 13693. Each agency is required to select five strategies per goal from the CEQ/OMB Template which provided tables containing "required" and "recommended" strategies. The "required" strategies are those required under E.O. 13693; the "recommended" strategies represent strategies that have been successfully implemented by the Federal community and may also be adopted as priority strategies. Where noted, NASA added its own strategies.

Goal 1: Greenhouse Gas (GHG) Reduction

Table 1-1: Strategies – Scope 1 & 2 GHG Reduction

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Required Strategy under E.O. 13693			
Use the FEMP GHG emission report to identify/target high emission categories and implement specific actions to resolve high emission areas identified.	Yes	NASA will evaluate the FEMP GHG emission report annually to determine the top 3 emission categories and investigate alternatives for implementation. NASA will also continue to implement energy efficiency and alternative energy projects.	1) Updated evaluation of FEMP GHG emission report and alternatives completed in 12 months. 2) Continue to explore options concerning HFC while working towards strategic partnerships with other Agencies to form better strategies for reducing HFCs.
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.	Yes	Explore Technology Spin-In approach linked to DOE RD&D programs to reduce lag time to commercial technology adaptation: 1) Quadrennial Technology Review, 2) DOE Strategic Plan, 3) (ARPA-E)	Explore DOE and APRA-E RD&D programs, specifically: 1) DOE Quadrennial Technology Reviews, 2) DOE Strategic Plans, 3) APRA-E documents
Identify and support management practices or training programs that encourage employee sustainability and greenhouse gas consideration.	Yes	Explore developing a core training GHG module for multiple purposes, available electronically through either the NASA GHG website or NETS.	Explore developing a core training GHG module for: 1) energy managers, 2) sustainability coordinators, 3) NEPA coordinators, 4) transportation planners
Determine unsuccessful programs or measures to be discontinued to better allocate agency resources, human and otherwise.	Yes	Due to fluctuating mission requirements for R&D, NASA GHG emissions from fugitive release of high-GWP chemicals have been extremely episodic; a new statistical approach is desirable.	Explore developing a new statistical approach; such as "rolling average," to allow long-term reduction planning despite large annual fluctuations.
Employ operations and management best practices for energy consuming and emission generating equipment.	Yes	Achieving reduction targets will require NASA Centers to aggressively implement best practices through a setting Center targets using parametric technology spin-in approach (technology knowledge curves and technology learning curves).	Work with NASA Center energy and environmental staff to translate Agency-wide targets to achievable Center-level equivalents using the parametric technology spin-in approach.

Table 1-2: Strategies – Scope 3 GHG Reductions

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Required Strategy under E.O. 13693			
Reduce employee business ground travel.	Yes	1) Reductions will be implemented through telework and remote meetings. 2) Reductions will be implemented through webinar training events and other remote training methods. 3) Will continue to look for alternative metrics for measuring success other than reduced emissions through the Workplace Strategies working group.	1) NASA hosted Interagency Forum on Climate Change Impacts & Adaptation offered remotely and through webinar. 2) NASA training events hosted remotely.
Reduce employee business air travel.	Yes	1) Reductions will be implemented through telework and remote meetings. 2) Reductions through reducing the number of Agency business travel credit cards. 3) Will continue to look for alternative metrics for measuring success other than reduced emissions through the Workplace Strategies working group.	1) NASA will move toward incorporating new FY 2014 commuter survey data as a better metric for assessing remote meeting and interaction opportunities. 2) Investigate opportunities to reduce number of available travel credit cards. 3) Continue identifying potential new metrics through Workplace Strategies working group and additional information sources, as available.
Use employee commuting survey to identify opportunities and strategies for reducing commuter emissions.	Yes	1) Continue to assist with more detailed analysis at additional Centers regarding commuting incentives and strategies. 2) Continue to determine potential Center level opportunities and strategies in keeping with individual Center needs or limitations.	1) Perform a more detailed review of the Agency-wide dataset, including producing statistical data to prepare for the next survey. 2) Determine if lack of a NASA business travel credit card influenced whether to travel? 3) Using the biennial commuter survey data, engage NASA HR more thoroughly and directly to improve strategies.
Increase number of employees eligible for telework and/or the total number of days teleworked.	Yes	1) Engage with Human Resources and other NASA policy experts to identify opportunities for increased telework. 2) Utilize Workplace Strategies working group meetings to increase awareness and participation.	1) Continue to discuss with Centers their successes and challenges related to initial testing activities. 2) Use results from the most recent biennial commuter survey process and engage NASA HR more thoroughly and directly to improve strategies.
Provide bicycle commuting infrastructure.	Yes	NASA will continue to add new projects in a steady and long-term program to increase bicycle infrastructure, eventually moving beyond the pilot phase.	1) NASA will highlight in its quarterly meetings with Center Sustainability Officers the opportunity to reduce GHGs through bicycle infrastructure. Concept is also included in NASA's Sustainable Facilities training course. 2) Bike racks on Center Buses. 3) NASA HQ may be able to assess participation rates in the DC Capital Bikeshare program.

Goal 2: Sustainable Buildings

Building Energy Conservation, Efficiency, and Management

Section 3(a) of E.O. 13693 states that agencies will promote building energy conservation, efficiency, and management. Section 3(a)(i) requires agencies to reduce building energy intensity by 2.5% annually through the end of FY 2025 (measured in British thermal units per square foot), relative to a FY 2015 baseline and taking into account agency progress to date, except where revised pursuant to section 9(f) of E.O. 13693.

Building Efficiency Performance, and Management

Section 3(h) of E.O. 13693 states that agencies will improve building efficiency, performance, and management.

Section 3(h)(iii) requires that agencies identify, as a part of the planning requirements of section 14 of this order, a percentage of the agency's existing buildings above 5,000 gross square feet intended to be energy, waste, or water net-zero buildings by FY 2025 and implementing actions that will allow those buildings to meet that target. Targets will be established in 2016.

Section 3(a)(ii) of E.O. 13693 states that agencies must improve data center efficiency at agency facilities. Section 3(a)(ii)(C) requires that agencies establish a power usage effectiveness target in the range of 1.2-1.4 for new data centers and less than 1.5 for existing data centers.

Table 2-1: Strategies – Sustainable Buildings

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Required Strategy under E.O. 13693			
Implement space utilization and optimization practices and policies 3(a)(E)	Yes	NASA will continue to work on space utilization policies and include leased space.	By June 2016, establish space utilization and daylighting design standard to be applied to new administration and office space.
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)	Yes	Pursue NASA's Net Zero Energy Buildings roadmap developed in 2014 as a strategic approach to planning, design, construction and operation of Net Zero Energy buildings.	For Discrete projects >$10M funded for Facility Planning and Design in FY16, at least one new tactic identified in NASA's roadmap will be piloted for each project.
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)	Yes	In keeping with the EO, NASA will incorporate criteria for energy efficiency in its performance specifications or selection criteria for leased spaces over 10,000 SF.	By June 2016, Policy will be developed requiring all new leases to include these criteria.

(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
(A) Recommended Strategy			
Incorporate green building specifications into all new construction and major renovation projects.	Yes	NASA continues to apply Agency sustainable building policies for all new construction and major renovation projects, with updated policy issued in2014.	Develop verification process during design phase to ensure appropriate projects include LEED objectives.
Develop and deploy energy and sustainability training for all facility and energy managers.	Yes	Sustainable Facilities training course continues to be refined and updated after each course offering to meet emerging sustainable practices and strategies.	Training course will be offered twice by June 2016.

Table 2-2: Strategies – Data Center Efficiency

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Required Strategy under E.O. 13693			
Ensure the agency chief information officer promotes data center energy optimization, efficiency, and performance 3(a)(ii)(A)	Yes	The OCIO tracks data center utilization and capacity for optimizing data center utilization, performance, and efficiencies. As part of NASA's CAP and API goals, the OCIO is progressing on a Data Center consolidation effort. Over the past 3 years Data Center have been reduced from 79 to 29 with a goal of getting to 20 by FY16. The OCIO will continue to track data center utilization and capacity for optimizing data center utilization, performance, and efficiencies.	Metrics are reported as part of the Agency's PortfolioStat, CAP, and API goals
Install and monitor advanced energy meters in all data centers by fiscal year 2018 3(a)(ii)(B)	"Yes	At this time, since the deployment of meters in data centers would not actually create savings and since the savings the meters would measure have already been realized, NASA sees no value in a plan to deploy meters between now and 2018. The limited funds that we have to invest would be better spent supplementing our efforts to migrate to the cloud and move equipment OUT of the data centers. NASA intends to include metering sufficient to capture PUE in the construction of any new data centers that might be built to the extent that the cost of inclusion does not result in the elimination of any significant capabilities or significant reduction in capacity.	Metrics are reported as part of the Agency's PortfolioStat, CAP, and API goals

(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
(A) Recommended Strategy			
Optimize agency Data Centers across total cost of ownership metrics.	Yes	NASA just completed a Business Services Assessment Review. An element of that review was the analysis of the Agency's data Center health, utilization, and consolidation activities. A resulting implementation plan is being developed to address issues identified in the assessment	There are hundreds of metrics tracked in the Total Cost of Ownership plan from OMB. We will not repeat them here. Within each data center we will work the metrics that are appropriate to that specific data center and can be addressed within a reasonable scope of time and money.
Improve data center temperature and air-flow management.	Yes	NASA intends to model PUE in at least core data centers using a Computational fluid dynamics software tool and taking some basic temperature and airflow measurements which should address the missing PUE fields in PortfolioStat.	PortfolioStat reporting will be used to report and measure the agency's performance against other agencies.
Identify and consolidate obsolete and underutilized agency computer servers into energy efficient data centers.	Yes	As part of NASA's CAP and API goals, the OCIO is progressing on a Data Center consolidation effort. Over the past 3 years Data Centers have been reduced from 79 to 29 with a goal of getting to 20 by FY16.	Agency CAP and API goals have been published with OMB have specific milestones and reported annually.

Goal 3: Clean & Renewable Energy

Agency Clean Energy Share of Total Electric and Thermal Energy Goal

E.O. 13693 3(b) requires that, at a minimum, the percentage of an agency's total electric and thermal energy accounted for by renewable and alternative energy shall be not less than: 10% in FY 2016-17; 13% in FY 2018-19; 16% in FY 2020-21; 20% in FY 2022-23; and 25% by FY 2025.

Agency Renewable Energy Share of Total Electricity Consumption Goal

E.O. 13693 3(c) sets a second schedule that addresses specifically renewable energy. It requires that renewable energy account for not less than 10% of total electric energy consumed by an agency in FY 2016-17; 15% in FY 2018-19; 20% in FY 2020-21; 25% in FY 2022-23; and 30% by 2025.

Table 3-1: Strategies – Clean & Renewable Energy

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Recommended Strategy			
Install agency-funded renewable on-site and retain corresponding renewable energy certificates (RECs) or obtaining replacement RECs 3(d)(i)	Yes	NASA has evaluated and continues to evaluate renewable energy resources at Centers. The 2017 and 2018 budget requests include three 1 - 2 MW solar projects at specific Centers. The energy is planned for on-site use and the RECs will be retained by NASA. The Agency is planning to include at least one renewable energy project in annual budget requests. Centers are encouraged to include renewable installations with new construction and major building rehabilitation projects.	EPAct 2005 requirement for FY2015, ensure that 7.5% of electric energy used is accounted for from renewable sources. EO 13693 requirement for FY2016, ensure that 10% of electric energy used is accounted for from renewable sources.
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	NASA is pursuing several strategies to meet the Clean Renewable energy goal, including power purchase agreements.	NASA is pursuing a PPA option for a 1 MW roof top project at JPL.
Purchase electricity and corresponding RECs or obtaining equal value replacement RECs 3(d)(iii)	Yes	NASA Centers are responsible to procure RECS and renewable energy directly to meet Renewable energy requirements.	NASA HQ evaluates renewable energy performance during Q2 of FY to ensure Agency will meet goal. With current budget constraints and increasing prices, new increased goals, buying RECS will be more challenging and may result in not meeting goal in future.
Purchase RECs 3(d)(iv)	Yes	NASA is implementing several strategies to meet the renewable energy goal. The most cost effective path to satisfy the increasing requirements is the purchase of RECS. More than 67% of NASA's renewable energy is from REC purchases.	NASA continues to evaluate all clean renewable energy strategies.
Install combined heat and power processes on-site at Federal facilities 3(e)(ii)	Yes	"NASA actively pursues opportunities at Centers for CHP and works with the EPA CHP Partnership to perform initial feasibility studies to evaluate savings and life cycle costs. During the Environmental and Energy Functional Reviews, NASA HQ is working with possible candidates to perform preliminary surveys for possible projects.	
Identify opportunities to install fuel cell energy systems on-site at Federal facilities 3(e)(iii)	Yes	NASA is performing a level 2 feasibility study for CHP project that will include landfill gas for electricity and steam generation at the facility. NASA is also evaluating IGA for CHP project that will be funded through ESPC.	

Goal 4: Water Use Efficiency & Management

Potable Water Consumption Intensity Reduction Goal

E.O. 13693 section 3(f) states that agencies must improve water use efficiency and management, including stormwater management. E.O. 13693 section 3(f)(i) requires agencies to reduce potable water consumption intensity by 2% annually through FY 2025 relative to an FY 2007 baseline (measured in gallons per gross square foot). A 36% reduction is required by FY 2025.

ILA Water Consumption Reduction Goal

E.O. 13693 section 3(f)(iii) also requires that agencies reduce their industrial, landscaping and agricultural (ILA) water consumption (measured in gallons) by 2% annually through FY 2025 relative to a FY 2010 baseline.

Table 4-1: Strategies – Water Use Efficiency & Management

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Recommended Strategy			
Install high efficiency technologies (e.g., WaterSense).	Yes	NASA Centers are responsible for purchase and installation of water efficient technologies for new buildings, and during upgrades and maintenance of existing buildings. NASA Centers have built numerous LEED certified buildings and also installed many water efficient fixtures during building upgrades and maintenance projects. These efforts will continue with available resources.	Since NASA is meeting its water goals, NASA HQs will monitor for continual improvement through the Annual Energy/Water Report, NETS data base, and the triennial Environmental and Energy Functional Reviews (4-5 Centers/year).
Minimize outdoor water use and use alternative water sources as much as possible.	Yes	NASA Centers are responsible for reducing the use of landscape irrigation to reduce water use, while considering safety (e.g., fire protection) and mission requirements. Many Centers, particularly those located in western states, are already utilizing water efficient landscaping. In addition Centers are installing low flow sprinkler heads and control systems.	Since NASA is meeting its water goals, NASA HQs will monitor for continual improvement through the Annual Energy/Water Report, NETS data base, and the triennial Environmental and Energy Functional Reviews (4-5 Centers/year).
Design and deploy water closed-loop, capture, recharge, and/or reclamation systems.	Yes	NASA Centers are responsible for reviewing their current systems and deploying water closed-loop, capture, recharge, and/or reclamation systems as appropriate. Many Centers have converted equipment to closed-loop systems. A couple of Centers have partnered with local communities to utilize reclamation systems.	Since NASA is meeting its water goals, NASA HQs will monitor for continual improvement through the Annual Energy/Water Report, NETS data base, and the triennial Environmental and Energy Functional Reviews (4-5 Centers/year).

(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
Install advanced meters to measure and monitor (1) potable and (2) industrial, landscaping and agricultural water use.	Yes	NASA Centers are responsible for installing meters to measure and monitor potable and industrial and landscaping water use where the activity justifies metering. NASA is installing water metering with upgrades to aging water distribution systems. NASA Centers have no agricultural water use. The Centers have some industrial and landscaping water uses, but most of this type of usage has historically been captured under potable water use. Landscaping is often associated with a building and would be part of that building's water use. Some of the industrial water uses may merit separate metering and this will be evaluated.	Since NASA is meeting its water goals, NASA HQs will monitor for continual improvement through the Annual Energy/Water Report, NETS data base, and the triennial Environmental and Energy Functional Reviews (4-5 Centers/year).
Develop and implement programs to educate employees about methods to minimize water use.	Yes	NASA Centers utilize various communication tools and develop new programs to educate employees about sustainable practices, including methods to minimize water use. Tools include formal training on the NASA SATERN on-line training system, newsletters, bulletins, and events such as Earth Day. Centers also maintain environmental websites that provide information on sustainability to employees.	Since NASA is meeting its water goals, NASA HQs will monitor for continual improvement through the Annual Energy/Water Report, NETS data base, and the triennial Environmental and Energy Functional Reviews (4-5 Centers/year).

Goal 5: Fleet Management

Fleet Per-Mile Greenhouse Gas Emissions Goal

E.O. 13693 section 3(g) states that agencies with a fleet of at least 20 motor vehicles will improve fleet and vehicle efficiency and management. E.O. 13693 section 3(g)(ii) requires agencies to take actions that reduce fleet-wide per-mile greenhouse gas emissions from agency fleet vehicles relative to a new, FY 2014 baseline and sets new goals for percentage reductions: not less than 4% by the end of FY 2017; not less than 15 % by the end of FY 2020; and not less than 30% by then end of FY 2025.

E.O. 13693 section 3(g)(i) requires that, as a part of the Sustainability Planning process agencies should determine the optimum fleet inventory, emphasizing eliminating unnecessary or non-essential vehicles. This information is generally available from the agency Vehicle Allocation Methodology (VAM) process that is completed each year. To satisfy this requirement for 2015, please include the VAM results and the appropriate agency fleet management plan to the appendix of this document. Future versions of this plan will require similar submissions by agencies.

Table 5-1: Strategies – Fleet Management

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Required Strategy under E.O. 13693			
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	NASA currently has a Fleet Information Management System that allows for all fleet costs to be tracked and record at the asset-level. This strategy also combines the "Use a Fleet Management Information System……" strategy.	Fully functional MAXIMO for TRANSPORTATION software (projected FY 2016). Will provide ability to actually track and report all asset-level costs(including fuel usage.
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)	Yes	During leasing vehicle replacement cycles, identify specific fleet assets, which could be performed by zero emission vehicles and order such through GSA leasing program.	FY projected zero emission vehicles needed to meet the 2025 target would require the acquisition of 106 zero emission vehicles per FY.
(A) 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).	Yes	Each NASA Center conducts annual reviews of fleet vehicle utilization during the third quarter of the fiscal year. The reviews identify individual vehicles which fail to meet minimum utilization goals and then recommend actions to relocate, resize or disposition the subject vehicle(s).	Increase Mile per gallon efficiency, therefore reducing GHG per mile metric.
Increase utilization of alternative fuel in dual-fuel vehicles.	Yes	NASA considers increasing alternative fueling infrastructure within a Center's campus, when such infrastructure allows for increased access to alternative fuel for NASA's mostly campus type vehicle use.	Increase Mile per gallon efficiency, therefore reducing GHG per mile metric.
Minimize the use of "law enforcement" vehicle exemption and implementing the GSA Bulletin FMR B-33, *Motor Vehicle Management, Alternative Fuel Vehicle Guidance for Law Enforcement and Emergency Vehicle Fleets* of November 15, 2011.	Yes	Include LE and E/ER vehicles in annual Optimize/Right-sizing efforts.	Increase Mile per gallon efficiency, therefore reducing GHG per mile metric.

Goal 6: Sustainable Acquisition

Sustainable Acquisition Goal

E.O. 13693 section 3(i) requires agencies to promote sustainable acquisition by ensuring that environmental performance and sustainability factors are considered to the maximum extent practicable for all applicable procurements in the planning, award and execution phases of acquisition.

Table 6-1: Strategies – Sustainable Acquisition

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Recommended Strategy			
Update and deploy agency procurement policies and programs to ensure that federally- mandated designated sustainable products are included in all relevant procurements and services.	Yes	Issue revised NASA Procedural Requirement 8530.1A (Sustainable Acquisition).	Issue revised NASA Procedural Requirement 8530.1A (Sustainable Acquisition) by September, 2015.
Include biobased and other FAR sustainability clauses in all applicable construction and other relevant service contracts.	Yes	NASA has a process in place that includes contracting officers examining environmental sections completed by the intended acquisition end users and NASA Centers having the choice of additional pre-solicitation and pre-award reviews. Each Center has also investigated the potential issue of improper coding and provided targeted training to the contracting officers who process the awards most impacted by sustainable acquisition requirements. This training covers proper inclusion of sustainability clauses/provisions in solicitations and awards, as well as proper FPDS reporting.	Provide targeted training, as necessary, to all those involved in the acquisition process of applicable construction and other relevant service contracts - including requestors on proper completion of Form NF 1707 and contracting specialists and Contracting Officers who incorporate the applicable contract clauses capturing environmental requirements and process the awards.
Review and update agency specifications to include and encourage biobased and other designated green products to enable meeting sustainable acquisition goals.	Yes	NASA will annually review 25% of the Master Specifications under its control and revise them to ensure that biobased and other designated green products are included as appropriate. This number of reviews will result in 100% of the total number of specifications under the control of NASA being reviewed for applicable green products during a 4 year cycle.	25% of NASA controlled Master Specifications updated annually.
Use Federal Strategic Sourcing Initiatives, such as Blanket Purchase Agreements (BPAs) for office products and imaging equipment, which include sustainable acquisition requirements.	Yes	NASA will continue to investigate opportunities for agency-wide acquisition strategy for procurement of office products and imaging equipment.	95% of applicable office products and imaging equipment meet sustainable acquisition requirements.

(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
[NASA] Complete contract reviews for biobased and FAR sustainability requirements during selected Center EEFRs and PMRs.	Yes	Complete representative sample contract reviews for selected Center EEFRs including LaRC, AFRC, WSTF, ARC and MAF. Agency EEFR is a comprehensive environmental and energy review conducted at each NASA Center on a three year cycle. Complete PMRs at KSC, NSSC, LaRC, and SSC.	Complete representative sample contract reviews of all selected Center EEFRs.

Goal 7: Pollution Prevention & Waste Reduction

Pollution Prevention & Waste Reduction Goal

E.O. 13693 section 3(j) requires that Federal agencies advance waste prevention and pollution prevention. E.O. 13693 section 3(j)(iii) requires agencies to annually divert at least 50% of non-hazardous construction and demolition debris and section 3(j)(ii) requires agencies to divert at least 50% of non-hazardous solid waste, including food and compostable material, and to pursue opportunities for net-zero waste or additional diversion.

Table 7-1: Goal 7 Strategies – Pollution Prevention & Waste Reduction

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Recommended Strategy			
Establish a tracking and reporting system for construction and demolition debris elimination.	Yes	Master Plans and Capital Plans inform construction and demolition investments. NASA will execute the following: 1) Maintain NASA Environmental Tracking System (NETS) to include a comprehensive tracking and reporting database. 2) Continue to expand/refine NASA dashboard within NETS to provide visual representation and trending analysis for NETS information to identify opportunities for improvement.	Completion of annual data call by March, 2016. Additional development of modules as requested by Centers for solid waste diversion, including construction and demolition debris.
Inventory of current HFC use and purchases.	Yes	Maintain NETS to capture HFC purchase and use data.	Work with NETS staff to include additional analytical capabilities for HFC, including details on specific uses.
[NASA] Include within the existing Environmental and Energy Functional Reviews (EEFR's) contract reviews to ensure appropriate solid waste reduction language.	Yes	Complete representative sample contract reviews for selected Center EEFRs including LaRC, AFRC, WSTF, ARC and MAF. Agency EEFR is a comprehensive environmental and energy review conducted at each NASA Center on a three year cycle.	Will complete EEFR reviews at selected Centers.

(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
[NASA] Maintain and improve Agency Websites for Recycling and Sustainable (RSA) Acquisition Community of Practice.	Yes	Maintain and improve websites for RSA activities. Websites are a comprehensive collection of information for Center use.	Websites include external RSA site and internal SharePoint site. Periodically update websites as appropriate.
[NASA] Host quarterly series of web-based sessions for Agency participants.	Yes	Complete 4 sessions for Agency/Center updates and RSA related training.	Complete 4 sessions.

Goal 8: Energy Performance Contracts

Energy Performance Contracting Goal

E.O. 13693 section 3(k) requires that agencies implement performance contracts for Federal buildings. E.O. 13693 section 3(k)(iii) also requires that agencies provide annual agency targets for performance contracting to be implemented in FY 2017 and annually thereafter as part of the planning of section 14 of this order.

Table 8-1: Strategies – Energy Performance Contracts

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) 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)	Yes	NASA has utilized ESPC/UESC to support mission and contribute to Federal energy/water requirements since the 1990s and plans to continue utilizing these important tools.	Completion of investment grade audit/feasibility study on potential project.
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)	Yes	NASA awarded 71% of its pledged investment value and plans to continue pursuing the remaining 29% during the remaining 20 months.	Negotiation of remaining project toward 2016 pledge.
(A) Recommended Strategy			
Assign agency lead to participate in strategic sourcing initiatives	Yes	Designated lead on 9/25/13.	Participation in strategic sourcing initiatives interagency activities.
Ensure relevant legal and procurement staff are trained by FEMP ESPC/ UESC course curriculum	Yes	Review potential projects and confirm team training status per 5/14/13 NASA policy memo.	Staff training status list for teams supporting potential projects.

(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
Enter all reported energy savings data for operational projects into MAX COLLECT (max.gov)	Yes	Collect populated energy savings template from Centers for awarded projects.	Energy savings data for awarded projects in OMB MAX.

Goal 9: Electronic Stewardship

Electronic Stewardship Goal

E.O. 13693 section 3(l) requires that agencies promote electronics stewardship and requires ensuring procurement preference for environmentally sustainable electronic products as established in section 3(i);(ii) establishing and implementing policies to enable power management, duplex printing, and other energy-efficient or environmentally sustainable features on all eligible agency electronic products; and (iii) employing environmentally sound practices with respect to the agency's disposition of all agency excess or surplus electronic products.

Table 9-1: Strategies – Electronic Stewardship

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted. Only four strategies were provided in CEQ/OMB Template.

(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
(A) Required Strategy under E.O. 13693			
Establish, measure, and report procurement preference for environmentally sustainable electronic products 3(l)(i)	Yes	NASA will continue to measure and report procurement data for electronics	Report as part of OMB Scorecard Template as required.
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(l)(ii)	Yes	Policies/Procedures associated with the Agency's Desktop Outsourcing contract (ACES) now default to requiring power management and duplex printing.	Metric: 100% compliance for duplex, power save, and ink optimization settings across all enterprise printing devices. Metrics/Measurement strategy: Various contract compliance metrics for the contractors PRoviding for enterprise printing services to include Toner and Waste Disposal Plan (DRD-IT02).
Establish, measure, and report sound practices with respect to the agency's disposition of excess or surplus electronic products 3(l)(iii)	Yes	NASA will continue to measure and report procurement data for electronics	Report as part of OMB Scorecard Template as required.
(A) 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	NASA will continue to use eSteward and R2 electronic recyclers.	Metric: 100% compliance. Metrics/Measurement strategy: Annual waste/disposal reports are submitted to NASA Headquarters to complete the annual report on affirmative procurement, waste reduction, energy efficient procurement and ozone depleting substances.

Goal 10: Climate Change Resilience

Table 10-1: Strategies – Climate Change Resilience

Please note: Strategies in Column A are those provided by CEQ, unless otherwise noted.

(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
(A) Recommended Strategy			
Update agency emergency response procedures and protocols to account for projected climate change, including extreme weather events.	Yes	Emergency preparedness is one element of NASA's adaptation workshops, whether for our installations or in webinars/workshops with federal partners.	See last strategy; emergency readiness and resilience continues to be a part of climate adaptation activities.
Ensure agency principals demonstrate commitment to adaptation efforts through internal communications and policies.	Yes	NASA science and institutional leaders have made adapting to climate change a focus, participating actively in workshops, advocating for applicable research, and advancing relevant policies.	NASA Science and institutional leaders remain active leaders in planning, preparing for, and conducting climate adaptation workshops. Regular schedule meeting happen every 3-weeks.
Ensure that agency climate adaptation and resilience policies and programs reflect best available current climate change science, updated as necessary.	Yes	1) NASA is at the forefront of climate science, research, and computational modeling. 2) NASA's Climate Adaptation Science Investigator (CASI) team funds applied research and toolset development of direct benefit to institutional climate risk managers. 3) NASA continually improves its modeling capability by integrating new data.	1) Continue making contributions to climate research and to assessments such as the NCA and IPCC. 2) NASA's CASI program funds adaptation research and toolset development. 3) Updated climate projections for NASA Centers
Design and construct new or modify/manage existing agency facilities and/or infrastructure to account for the potential impacts of projected climate change.	Yes	NASA applies a multi-disciplinary approach to advancing its sustainable facilities design program.	1) Establish adaptive design standards working group and update capital investment requirements (NPR 8820, Facility Project). 2) NASA supports and participates in the National Institute of Building Sciences – Climate and Building Sciences Design Criteria Collaboration Group.
Ensure climate change adaptation is integrated into both agency-wide and regional planning efforts, in coordination with other Federal agencies as well as state and local partners, Tribal governments, and private stakeholders.	Yes	NASA has developed and applied a robust local adaptation workshop process at its installations. It partners with others to help other Agencies and local communities benefit from the adaptation expertise it continues to develop.	Together with federal and other community partners, develop, support, and participate in the following local efforts: 1) Washington, DC, Metro Area, 2) Hampton Roads, VA, 3) Houston, TX

APPENDICES

Appendix A	NASA 2015 Fleet Management Plan and Vehicle Allocation Methodology Results
Appendix B	Supply Chain Greenhouse Gas (GHG) Management Action Plan
Appendix C	Preliminary Plan for Climate Preparedness and Resilience at NASA Centers
Appendix D	Multimodal Access Plan (MAP) for Commuters

Appendix A

NASA 2015 Fleet Management Plan and Vehicle Allocation Methodology Results

FY 2015
Fleet Management Plan
and Budget Narrative

for the

National Aeronautics
and
Space Administration
(NASA)

(A) Introduction that describes the agency mission, organization, and overview of the role of the fleet in serving agency missions.

NASA conducts its work in four principal organizations, called mission directorates:

- Aeronautics: manages research focused on meeting global demand for air mobility in ways that are more environmentally friendly and sustainable, while also embracing revolutionary technology from outside aviation.
- Human Exploration and Operations: focuses on International Space Station operations, development of commercial spaceflight capabilities and human exploration beyond low-Earth orbit.
- Science: explores the Earth, solar system and universe beyond; charts the best route of discovery; and reaps the benefits of Earth and space exploration for society.
- Space Technology: rapidly develops, innovates, demonstrates, and infuses revolutionary, high-payoff technologies that enable NASA's future missions while providing economic benefit to the nation.

In the early 21st century, NASA's reach spans the universe. The Mars Rover Curiosity met its major science objective -- finding evidence of a past environment suitable for microbial life -- in the first eight months of a planned 23-month mission, and now is continuing to look for more information about the habitability of the Martian environment. Cassini remains studying the Saturn system, as Juno makes its way to Jupiter. The restored Hubble Space Telescope continues to explore the deepest reaches of the cosmos as NASA develops the James Webb Space Telescope.

Closer to home, the crews of the International Space Station are extending the permanent human presence in space and performing research that will help us understand how humans can live and work off Earth for long periods. Working with U.S. commercial companies to develop spacecraft capable of carrying humans and cargo to the International Space Station, NASA is helping to foster the development of private-sector aerospace while also building the Orion spacecraft and Space Launch System rocket to send humans into deep space.

Earth science satellites are sending back unprecedented data on Earth's oceans, climate and other features. NASA's aeronautics team is working with other government organizations, universities, and industry to fundamentally improve the air transportation experience and retain our nation's leadership in global aviation.

NASA’s Future

Even with the retirement of the agency's space shuttles in 2011, NASA has a robust program of exploration, technology development and scientific research that will last for years to come. Here is what's next for NASA:

- NASA is designing and building the capabilities to send humans to explore beyond Earth orbit, including the development of the Orion spacecraft and Space Launch System rocket, working toward a goal of sending astronauts to an asteroid in the coming decade and then to Mars by the 2030s.
- The International Space Station is fully staffed with a crew of six, and American astronauts will continue to live and work there in space 24 hours a day, 365 days a year. Part of the U.S. portion of the station has been designated as a national laboratory, and NASA is committed to using this unique resource for wide-ranging scientific research.
- U.S. commercial companies have begun delivering cargo to the space station, and commercial industry partners are working with NASA to develop new spacecraft and rockets to transport astronauts to and from low-Earth orbit, allowing NASA to focus its attention on the next steps into our solar system.
- NASA is researching ways to design and build aircraft that are safer, more fuel-efficient, quieter, and environmentally responsible. NASA also is part of the government team that is working to develop the Next Generation Air Transportation System, or NextGen, to be in place by the year 2025.
- NASA is conducting an unprecedented array of science missions that will seek new knowledge and understanding of Earth, the solar system and the universe.

NASA's vehicle fleet assets are provided for administrative infrastructure or to support funded mission(s) in order to accomplish activities approved as part of NASA's mission directorates.

NASA's end of FY 2014 fleet assets consisted of 3347 assets includinig; 344 Low Speed Electric Vehicles, 466 sedans, 1367 light duty trucks (including vans), 719 medium duty trucks, 348 heavy duty trucks, 19 ambulances and 84 buses.

(B) Criteria for justifying and assigning vehicles (including home-to-work vehicle assignments).

The process of justifying vehicle requirements is based on mission/program requirements, therefore establishing the approved fleet inventory for the Agency based upon approved Appropriated funded missions; allowing the vehicle inventory to adjust with NASA's administrative/mission changes inline with Appropriated funding approval, or upon reaching program/contracting milestones. Vehicle assets are reviewed and validated annually to ensure vehicle requirements are properly allocated and utilized base on those approved program/mission requirements.

NASA's policies provide guidance against assigning Government motor vehicles for the exclusive use of any one official unless such assignment is required by the nature of the individual's responsibilities or by the frequency, urgency, and extent of daily usage.

Additionally, NASA does not authorize the use of Government motor vehicles for the transportation of employees between their residences and places of work, except for:

- Individuals on valid travel authorization in accordance with the Federal Travel Regulations and NASA Procedural Reqirement # 9700.1 Travel.
- Office of the Inspector General's (OIG) personnel performing criminal law enforcement functions pursuant to statutory authority.
- Incumbents assigned as NASA Representatives located in Moscow, Russia.

(C) Vehicle Allocation Methodology (VAM) target development and explanation for reported fleet size and cost changes or not meeting agency VAM targets.

NASA Procedural Directives and NASA Procedural Requirements documents set forth transportation and general traffic management responsibilities and procedures governing the use of commercial and Government transportation resources.

Additionally, NASA provides guidance to Center Transportation Officers (CTOs) through NASA's Fleet Management Handbook for specific actions addressing the requirements of the Vehicle Allocation Methodology. These guidelines support NASA policies by requiring analysis and adjustments to be conducted during annual Vehicle Utilization Review Boards (VURBs) or in response to programmatic challenges.

NASA CTOs exercise management and control over all assigned vehicles. The CTOs annually evaluate NASA's vehicle fleet for both existing vehicle assignments and reviewing new requests for transportation support. Each Center maintains an approved list of vehicle assignments as part of their Table of Authorized Vehicles (TAV). The list includes contractor-furnished vehicles that are assigned, operated, and maintained by the contractors. Additional vehicle assignments must be related to mission change and supported with valid justification (Form NF 1759). NASA's HQ Agency Transportation Manager must approve any acquisitions that exceeds the approved TAV in advance of the acquisition. Centers are strongly encouraged to maintain a zero growth policy.

The following process/factors are considered as each CTO develops its vehicle baseline:

a) Require each customer to submit a written justification for each additional assignment using NASA Form NF 1759.
b) The CTO evaluates each submission, focusing on what the vehicle is used for in terms of passenger movement, cargo movement, material movement, or mission essentiality of the vehicle.
c) The CTO reviews the requirement and advises the best overall solution to support the smallest sized vehicle option, which still meets the requirements of the mission/program.
d) The CTO must consider other means of support besides assigning a vehicle asset; i.e., Privately-Owned Vehicle, taxi, bus, pool vehicle, rental vehicle, shared vehicle or Low Speed Electric Vehicle (LSEV).
e) Analyze past and expected utilization: if only 25% of average utilization is currently being met, continued assignment may not be warranted.
f) Types of assignments for each customer shall be based on the specific requirements of each customer. Therefore, assignment of Government-owned or leased vehicles may be permanent or temporary.
g) Develop preliminary TAV based on evaluation of the data captured on each Form NF 1759, showing current and recommended levels.
h) Coordinate findings with customers and offer opportunity for rebuttal, especially if recommendation is to reduce assignments.
i) Consider customer recommendations and then make final decision on baseline mix.
j) Retain TAV level and only adjust when mission changes warrant.
k) Once the customer baseline TAV is established, develop a baseline TAV for pool vehicles if applicable.

Note: *Center Transportation Officers who already have an established and approved baseline in place are not required to re-establish the baseline.*

NASA's Fleet Management Handbook, Chapter 4 sets performance metrics including utilization. As each Center varies in fleet size and mission, each Center establishes minimum miles and hours for determining underutilization. Travel log(s) can help evaluate vehicle utilization and their use is encouraged in sub-pools or other appropriate areas. If applied, the recommended transaction data recorded within travel logs should include; number of trips per month, mileage per trip, total mileage per month, check-out date and time, and check-in date and time.

Each NASA Center conducts annual reviews of fleet vehicle utilization during the third quarter of the fiscal year. The reviews identify fleet units that fail to meet minimum utilization goals and then recommends disposition of the subject vehicle(s), in accordance with Agency disposition policy.

During the 3rd quarter of the Fiscal Year, the CTO notifies organizations and the Center Director of vehicles not meeting the Center's stated utilization goals and that further action may be taken regarding the disposition of the their vehicle. Vehicles are on the Utilization Target List will be evaluated for possible actions that include:

a) Removal from the fleet
b) Re-assignment within the Center
c) Exchanged for another vehicle of a similar type with higher miles
d) Exchanged for a different type of vehicle that better suits the mission
e) Retention – provided additional justification

Vehicle users may request exemptions to the minimum mileage specified for assignment or retention of a fleet vehicle. Other utilization goals such as passengers or tonnage carried or hours used should be applied if mileage is not an accurate measurement for a particular vehicle's mission. Mileage accumulated on these types of vehicles should not be included in the annual mileage target for the fleet.

Vehicles that have undergone a complete dispute resolution process and were approved for retention should still be considered for exchange with higher mileage units of a similar type whenever possible in order to "balance" utilization for the overall fleet.

(D) Description of efforts to control fleet size and cost.

In FY 2011 NASA Center Vehicle Utilization Review Boards (VURBs), contractor input, including Center Transportation Officer(s) projected a 14% reduction in vehicle fleet assets through FY 2015, and NASA represented this projected reduction as "NASA's 2015 optima fleet" of 3,305 vehicles within the Vehicle Allocation Methodology (VAM) submitted in FY 2012.

Changes within administrative direction related to programming and/or mission funding have influenced the projected fleet inventory count for FY 2015 to a count of 3,314 vehicles.

Reported future cost projections are based upon historical trends and use a flat across-the-board 3.5 percentage increase on current FY acquisition and maintenance cost figures.

(E) Explanation of how law enforcement vehicles are categorized within the agency (See FMR Bulletin B-33).

NASA utilizes the law enforcement (LE) vehicle classification system described in GSA Bulletin FMR B-33. However, no vehicle, law enforcement of otherwise, has been exempted from NASA's VAM process.

(F) Justification for restricted vehicles.

NASA policy does not allow for "executive vehicles", as defined in 41 C.F.R. 102-34.50. NASA posts a negative report on it's public website in support of this policy.

(G) Description of vehicle replacement strategy and results.

NASA's Fleet Management Plan highlights the Agency's commitment to achieving all Fleet Performance metrics and the policies and processes we have established to assure success.

NASA's strategies are:

1) Acquire Alternative Fuel Vehicles (AFVs), Flex Fuel Vehicles (FFVs) or Low Greenhouse Gas (GHG) emitting vehicles during "end of life cycle" replacements, for the current vehicle requirements.

2) Optimize the assignment of current Alternative Fuel Vehicle assets to locations capable of providing access to Alternative Fuel.

3) Acquire gasoline dedicated Low Greenhouse Gas (CO2 emission) emitting vehicles in locations where alternative fuel is not available; including those locations where alternative fuel has a history of being commercially unrealable.

4) Conduct cost analysis to determine the best vehicle sourcing method(s) by comparing cost of owned vehicles to leased vehicles; including all direct and indirect costs projected for identical lifecycles.

NASA ended FY 2014 with a reduction within its fleet of 32 vehicles compared to its end of FY 2013 fleet and by 351 vehicles compared to its end of FY 2011 fleet. NASA's Vehicle Allocation Methodology has proven to be an

effective vehicle management tool by demonstrating a total vehicle reduction from a high point of 4,025 vehicles (FY 2006) to the current vehicle inventory of 3,314.

(H) Description of the agency-wide Vehicle Management Information System (See FMR Bulletin B-15).

NASA has traditionally collected Fleet Management Information System (FMIS) data at Center level (NASA has 14 Centers within its Agency), and rolled the data up to preform analysis or report Agency information.

In 2013, NASA HQ funded a Transportation Fleet Management System Development Plan, which should be fully functional by Oct of 2015.

This effort is to pursue an Agency-wide level Transportation FMIS meeting the standards set within 41 VFR 102-34.340 and that;

a) identifies and collects accurate inventory, cost and utilization data that covers the complete lifecycle of each motor vehicles (acquisition, operation, maintenance and disposal);

b) provides the information necessary to satisfy both internal and external reporting requirements including:

1) cost per mile,

2) fuel costs for each motor vehicle,

3) data required for Federal Automotive Statistical Tool (FAST).

The selection of an IBM product "Maximo for Transportation" and a contractor to perform the acquisition, installation and development of the MAXIMO system implementation has already been completed.

In an effort to integrate and simplify NASA's Fleet management reporting, NASA conducted research into the GSA suggestion of a single Fleet Management Information System.

- NASA discovered currently no system; **including GSA's FedFMS** offers a single software solution to Fleet Management reporting requirements.
- One observation noted was that GSA cannot/will not share its leased fleet information with other software systems.
- Even within GSA's FedFMS, Agency owned and GSA leased vehicle data is not collected and exacted within a single reporting software tool.
    - Agencies are required to enter into a second GSA system and download files from GSA's leased information system, then upload that information into the FedFMS prior to being able to exact entire vehicle fleet data information.
    - GSA's systems fails to merge leased vehicle data with owned vehicle data.
    - ***GSA's recommendation to use a single fleet management system is not attainable, even when using GSA's supported FedFMS.***

(I) Plans to increase the use of vehicle sharing.

NASA currently does not employ the use of "shared vehicle" fleets. However, NASA rents vehicles during high volume peaks of activity at Centers, with GSA Automotive Group being NASA's preferred vendor for this activity. NASA applies a vigorous process to vehicle sourcing, as documented in NASA's Fleet Management Handbook and as earlier identified. The Handbook Section 2.3.4, outlines actions to consider during acquisition, including alternatives. Additionally, Handbook Section 2.3.4.6 states: "*The most economical and efficient means of transportation will be provided in all cases.*" specifically addressing the intent of GSA's recommendation. NASA's Fleet Management Plan clearly identifies *"i.e., POV, taxi, bus, pool vehicle or Low Speed Electric Vehicle (LSEV)."*

(J) Impediments to optimal fleet management.

"Optimal" fleet inventory should be understood to be a moving target. Today's optimal fleet may or may not be the same as yesterday's optimal fleet, and may be outdated by next week.

"Optimal management of a fleet" is a more accurate name of NASA's process. NASA's fleet must be allowed to grow or shrink as program's/mission's scope increased or decrease. The pre-existing "optimal fleet" is reviewed and managed to meet the needs of new program or mission workloads through a management process; adjusting to those changes using established policies and practices. NASA fleet management adjusts today's fleet to meet today's needs, therefore making today's fleet "optimal".

NASA's primary impediment to optimal fleet management (as GSA calls it) is an outside belief that optimal fleet management can be predicted 5 years into the future to exact numbers, based on the needs of programs and missions that will be five years "out of date" when the 2015 fleet is reviewed.

Additionally, the availability of publicly available alternative fuel infrastructure in concerning. There will continue to be areas where there are no realistic solutions for AFVs, particularly in selected parts of the country.

(K) Anomalies and possible errors.

NASA subfleets sometimes report fuel, mileage and costs for "fleets" (within FAST), which appear to have no inventory.

In fact, during the pervous FYs (including current FAST FY14), those subfleets did in fact have inventory at some point during the FY. However, on the last day of the FY (Sept. 30) the entire fleet had been disposed, due to programing and/or funding approval. Therefore, FAST shows actual costs, fuel usage and mileage driven against a fleet inventory containing zero vehicles.

(L) Summary and contact information.

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VAM/FAST Inventory Year-to-Year Comparison for National Aeronautics and Space Administration
(from the Federal Automotive Statistical Tool database)

	VAM Summary						FAST Data Summary					
	Sedan	Other Passenger	Truck	Other	Total	% Mix	Sedan	Other Passenger	Truck	Other	Total	% Mix
	VAM 2011 Baseline Fleet						2011 Actual Inventory					
Conventional Fuel Vehicles	66	217	1,283	108	1,674	46%	56	223	1,265	109	1,653	45%
Alternative Fuel Vehicles	690	680	620	1	1,991	54%	700	679	633	0	2,012	55%
Exempted Vehicles	76	46	49	11	182							
Total	832	943	1,952	120	3,847		756	902	1,898	109	3,665	
% Mix	22%	25%	51%	3%			21%	25%	52%	3%		
	VAM 2012 Plan						2012 Actual Inventory					
Conventional Fuel Vehicles	52	176	1,111	104	1,443	42%	54	168	1,185	110	1,517	43%
Alternative Fuel Vehicles	673	622	685	1	1,981	58%	699	639	650	0	1,988	57%
Total	725	798	1,796	105	3,424		753	807	1,835	110	3,505	
% Mix	21%	23%	52%	3%			21%	23%	52%	3%		
	VAM 2013 Plan						2013 Actual Inventory					
Conventional Fuel Vehicles	41	142	984	104	1,271	38%	38	142	1,049	108	1,337	40%
Alternative Fuel Vehicles	675	645	761	1	2,082	62%	689	639	714	0	2,042	60%
Total	716	787	1,745	105	3,353		727	781	1,763	108	3,379	
% Mix	21%	23%	52%	3%			22%	23%	52%	3%		
	VAM 2014 Plan						2014 Actual Inventory					
Conventional Fuel Vehicles	40	138	946	103	1,227	37%	49	114	950	103	1,216	36%
Alternative Fuel Vehicles	676	633	787	2	2,098	63%	761	605	765	0	2,131	64%
Total	716	771	1,733	105	3,325		810	719	1,715	103	3,347	
% Mix	22%	23%	52%	3%			24%	21%	51%	3%		
	VAM 2015 Plan						2015 Planned Inventory (FY 2014 FAST Report)					
Conventional Fuel Vehicles	40	138	946	103	1,227	37%	48	112	922	100	1,182	36%
Alternative Fuel Vehicles	676	633	787	2	2,098	63%	771	582	775	4	2,132	64%
Total	716	771	1,733	105	3,325		819	694	1,697	104	3,314	
% Mix	22%	23%	52%	3%			25%	21%	51%	3%		
	VAM Optimal Fleet						2015 Planned Inventory (FY 2014 FAST Report)					
Conventional Fuel Vehicles	0	29	537	92	658	20%	48	112	922	100	1,182	36%
Alternative Fuel Vehicles	718	743	1,174	12	2,647	80%	771	582	775	4	2,132	64%
Total	718	772	1,711	104	3,305		819	694	1,697	104	3,314	
% Mix	22%	23%	52%	3%			25%	21%	51%	3%		

APPENDIX B

Supply Chain Greenhouse Gas (GHG) Management Action Plan

Background

Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, Section 15(b), requires, beginning with the 2016 NASA Strategic Sustainability Plan (SSPP), a "Procurement Plan:"

> "*to implement at least five new procurements annually in which the agency may include, as appropriate, contract requirements for vendors or evaluation criteria that consider contractor emissions and greenhouse gas emissions management practices. The plans submitted for consideration may include identification of evaluation criteria, performance period criteria, and contract clauses that will encourage suppliers to manage and reduce greenhouse gas emissions, and shall be implemented as soon as practicable after any relevant administrative requirements have been met.*

To initiate development of the Procurement Plan, the "2015 Federal Sustainability Plan Template" requires, a brief summary of actions planned to respond to the requirements of section 15(b). Following is NASA's proposed Action Plan.

NASA Supply Chain Greenhouse Gas (GHG) Action Plan

NASA will identify the responsible offices, e.g., procurement, facilities, environment, etc., for the development of its Agency Strategic Sustainability Performance Plan. Representatives of those offices will:

1. Establish methodology for selecting 5 new procurements annually.
2. Define reasons for selection, including, but not limited to, category, type, and goods or services to be acquired; time period; total value; evaluation criteria; requirements; etc., as requested by the Implementing Instructions for Executive Order 13693.
3. Employ language for the statements of work and contract clauses set out in the Federal Acquisition Regulation encouraging the contractors to measure and reduce greenhouse gas emissions, as appropriate.
4. Establish appropriate procedures and mechanisms for reporting, evaluating, and consolidating greenhouse gas emissions data..

APPENDIX C

Preliminary Plan for Climate Preparedness and Resilience at NASA Centers

Background

Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, Section 13 is concerned with Federal Facility Climate Preparedness and Resilience. Each agency is to ensure that its operations and facilities prepare for impacts of climate change by:

> *"(a) identifying and addressing projected impacts of climate change on mission critical water, energy, communication, and transportation demands and considering those climate impacts in operational preparedness planning for major agency facilities and operations; and*
>
> *(b) calculating the potential cost and risk to mission associated with agency operations that do not take into account the information collected in subsection (a) of this section and considering that cost in agency decision- making."*

The "2015 Federal Sustainability Plan Template" provides the option to include the Preliminary Plan for EO 13693 Section 13 in the 2015 SSPP. The following is NASA's preliminary plan.

Preliminary Plan for Climate Preparedness and Resilience at NASA Centers

As described in the NASA 2014 Climate Risk Management Plan, NASA's approach to adaptation is fundamentally a risk-management strategy. NASA has undertaken several efforts to identify climate vulnerabilities and climate-related risks at its facilities since 2007, including Encroachment Risk Assessment Workshops at all facilities and voluntary Climate Risk Management Workshops conducted at NASA's coastal facilities. Building upon these efforts, NASA Headquarters will develop a Plan for Climate Preparedness and Resilience at NASA Centers. The responsible Headquarters offices will include the facilities and environmental divisions. Over the next 24-months, representatives of those offices will collaborate across the Agency to conduct the following activities:

I. Provide climate information to NASA Centers
   - NASA Goddard Institute of Space Studies (GISS) will provide updated downscaled information and conduct periodic updating
   - NASA is a co-chair of the Interagency Forum on Climate Impacts & Adaptation which will continue to share best business-management practices and state of climate science for managing climate-related risks via open events (in person and on-line)

II. Identify climate-related vulnerabilities and risks at NASA Centers and integrate into existing processes and plans
   - Continue HQ and facility-level climate-related vulnerability and risk assessment activities in order to inform decision- making and planning processes
   - Conduct on-line screening-level survey of NASA Centers for current and historical weather-related vulnerabilities and understand the implications of increased mean sea level. Note: NASA thanks the Department of Defense (DoD) which granted permission to NASA to copy an existing DoD on-line tool it is utilizing.
   - Analyze future climate projections with the vulnerability information gathered during the on-line survey to determine mutual impacts, vulnerabilities, and risks across NASA facilities.
   - (Under consideration) Conduct water scarcity study of NASA Centers in Southwest U.S.

III. Work with others in leveraging resources to manage mutually shared climate-related vulnerabilities and risks. Examples include:

- Sites & Facilities Working Sub-Group of the Federal (Climate) Adaptation Community of Practice: GSA & NASA lead a multi-agency effort
- Federal Architects & Engineers Working Sub-Group of the Federal (Climate) Adaptation Community of Practice: NASA & GSA led multi-agency effort
- Climate & Building Sciences Collaborative on Design Criteria of the National Institute of Building Sciences (NIBS): NIBS led effort; NASA is the Federal Agency coordinating chair
- Federal Facilities Council of the National Research Council: NASA is a member

APPENDIX D

Multimodal Access Plan (MAP) for Commuters

Background

Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, Section 7(f), requires, beginning with the 2016 NASA Strategic Sustainability Plan (SSPP), a "Multimodal Access Plan (MAP) for Commuters:"

> "*to consider the development of policies to promote sustainable commuting and work-related travel practices for Federal employees that foster workplace vehicle charging, encourage telecommuting, teleconferencing, and reward carpooling and the use of public transportation, where consistent with agency authority and Federal appropriations law.*"

In order to promote sustainable commuting, the Instructions to EO 13693 provides the option to include in the 2015 SSPP an abbreviated MAP. Following is NASA's proposed template.

NASA Multimodal Access Plan (MAP) for Commuters

Several NASA Centers have already initiated efforts to evaluate and implement alternatives to traditional commuting using internal combustion engines. Building upon these initiatives and additional Center input, NASA Headquarters will identify the responsible offices, e.g., procurement, facilities, environment, logistics, and legal, for the development of an Agency Multimodal Access Plan (MAP) for Commuters. Representatives of those offices will evaluate the following:

I. Providing options to reduce the use of an internal combustion engine
   - Plan for Transit Oriented Development (TOD)
   - Plan for walkable, bikeable infrastructure
   - Provide shuttles, etc.
   - Provide amenities/services (Showers, changing rooms)
   - Install bike infrastructure (racks, lanes)
   - Evaluate usage and installation of charging stations

II. Giving employees alternative to solo commuting
   - Provide information/promotion of alternatives
   - Provide and promote transit subsidies, including the "bike to work" subsidy
   - Develop "work from anywhere" policy
   - Leverage external systems

III. Driving continuous improvement
   - Achieving support of program manager(s)
   - Benchmarking/Best Practices
   - Facilitating advocacy/communications
   - Identifying metrics/goals