
GODDARD SPACE FLIGHT CENTER

2020 Sustainability Report and Implementation Plan

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Rendering of Greenbelt B37 Instrument Development Facility

Goddard 2020 Sustainability Report and Plan

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Executive Summary

Goddard's Mission and Sustainability

With the release of Executive Order 13834, *Efficient Federal Operations*, May 2018, NASA continued its efforts to ensure the impacts of Agency operations don't overburden environmental systems that support us. As a global leader in Earth Science, NASA's Goddard Space Flight Center (Goddard) has a unique understanding and obligation to lead the way in identifying and implementing operation strategies to ensure continued human progress, productivity, and prosperity while sustaining natural species and systems and reducing Goddard's impact to environmental, institutional, programmatic, and operational risks. In doing so, we continuously improve the resilience of Goddard's space and ground assets, mission operations, and performance.

This document reports the status of Goddard's sustainability program and outlines initiatives the Center is pursuing to address the sustainability goals directed in the *Implementing Instructions for EO 13834*, April 2019, and the *NASA 2019 Sustainability Report and Implementation Plan*. This Plan reflects the performance of Goddard's principle facilities at Greenbelt in Maryland (Greenbelt) and the Wallops Flight Facility in Virginia (Wallops). Goddard's sustainability policy is to execute the mission without compromising the planet's resources so that future generations can meet their needs.

Sustainability Process and Successes

Goddard's sustainability team focuses on reducing environmental impacts of NASA operations by conserving energy and water, using energy savings performance contracts, replacing old, less efficient buildings with new sustainable facilities, commissioning existing buildings, procuring and using greener products and materials, reducing greenhouse gas emissions from facility and fleet operations, electronic stewardship, reducing waste generation and disposal, stormwater management, and increasing pollinator habitat and carbon sequestration through establishment of native meadows. Goddard continues to reduce the footprint of its built assets through strategic demolition and consolidation efforts and removed 317,000 gross square feet (GSF) of inefficient space from its inventory from fiscal year (FY) 17 - FY19. The operation of new and existing

sustainable buildings minimizes long-term infrastructure, energy, water, and maintenance costs. The Center's energy management program reduces risk to Goddard's mission by reducing our dependence on traditional energy resources and energy operating costs. The estimated energy savings from performance contracts for FY19 was \$2.2M¹. Goddard completed 8 Existing Building Commissioning (EBCx) studies in FY18, and 9 more in FY19 to optimize building performance. From FY15 - FY18, Goddard certified 3 facilities that meet the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (GP), and in FY20 certified 8 more buildings for a total of 620,534 GSF.

Future Sustainability Priorities

Goddard's strategic priorities and objectives for the future are to advance efficiency in Center operations, meet or exceed sustainability goals and requirements driven by the NASA Sustainability Plan, and achieve cost savings by:

- Expanding our renewable energy projects to reduce our carbon footprint and reliance on traditional carbon-based energy sources
- Completing Preliminary Feasibility Assessment (PFA) and Investment Grade Audit (IGA) at Greenbelt and Wallops to identify and implement energy conservation measures (ECMs)
- Continuing funding submissions to HQ's Existing Building Commissioning Program, which was initiated in FY18 and strives to bring existing buildings back to top performance
- Continuing to reduce the Center's footprint by demolishing old, inefficient buildings and replacing them, where necessary, with sustainable, high efficiency buildings
- Continuing sustainable acquisition
- Continuing outreach campaigns to increase awareness and support implementation of sustainability initiatives
- Improving waste disposal diversion and recycling rates
- Increasing low impact development through stormwater management and sustainable landscaping (filtration plantings, bio swales, stream restoration), to reduce impervious surfaces and improve stormwater quality
- Increasing pollinator habitat and carbon sequestration while reducing landscape maintenance costs through establishment of native meadows and reforestation

Implementation Summary: Facility Management

Facility Energy Efficiency



LED lights at new V27 Wallops Island Fire House

FY19 Energy Intensity Progress (Btu/GSF):

Reduced **35.3%²** from the FY03 baseline

(Agency Goal: reduce 30% from baseline)

Increased **1.2%** from FY18

(Agency Goal: reduce 0.5% from FY18)

FY20 Energy Intensity Plan:

1% reduction in FY20 from FY19

Implementation Status

Although Goddard has successfully exceeded the 30% facility energy intensity reduction goal from the FY03 baseline, Goddard's annual energy intensity increased slightly in FY19 from the previous year due primarily to a decrease in building square footage. This year-over-year increase reflects the challenges the Center is facing as more projects with the higher rates of return on investment (e.g., light-emitting diode (LED) lighting upgrades or heating, ventilation, and air conditioning (HVAC) upgrades), are completed. Many of the remaining conservation measures have higher costs, longer paybacks, and/or are located in highly specialized facilities. Therefore, while Goddard's long-term trend in energy reduction is still moving in the right direction, progress is slower, and operational issues or changes in operational tempo have greater influence on year-over-year metrics.

Goddard reduces energy consumption and cost through many methods. Core strategies include energy efficiency and renewable energy project implementation, operations and maintenance (O&M) best practices, sustainable building design, construction, and renovation, and employee

training, outreach, and awareness through events such as Energy Awareness and Earth Day Activities and newsletters.

Energy efficiency projects and initiatives in progress or completed recently with \$1,752K estimated cost savings include the following:

- Greenbelt Central Utility Plant (CUP) optimization – \$360K
- Greenbelt IT LED lighting project – \$21K
- Greenbelt Energy Management Control Systems upgrade – \$1,000K
- Greenbelt Gold Days – \$150K
- Wallops heating, ventilation, and air conditioning (HVAC) optimization – \$221K

Priority Strategies & Planned Actions

Goddard will continue to invest in life-cycle cost-effective energy efficiency projects using all available funding streams, including appropriated funds, financing, and Enhanced Use Lease (EUL) Agreements. For example, in FY18 NASA launched a cyclical Existing Building Commissioning Program using the Agency 35% of EUL net revenue (Congress provides NASA authority to lease non-excess but underutilized Agency assets to tenants, and to retain and utilize lease net revenue beyond expenses of hosting tenants; the authority returns 65% of net revenue to the Center that hosted the lease, and provides 35% to the Agency level for use at any Center).

Efficiency Measures, Investment, and Performance Contracting

FY19 Performance Contracting Progress:

\$10.6M³ ESPC value based on estimated life cycle cost savings – initiated Phase 3a of the Wallops Airfield PV project

FY20 Performance Contracting Plan:

Implement Phase 3b of the Wallops PV ESPC project and establish a new UESC at Wallops

Implementation Status

Goddard utilizes Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs) in concert with other mechanisms to improve system efficiencies and reduce utility expenditures in support of Goddard’s mission. Phase 1 and 2 of Wallops ESPC, awarded in 2010 and 2012 respectively, are valued at \$50.5M⁴ based on estimated life cycle cost savings. In addition to conventional energy conservation measures, projects are now implementing more

challenging and complex measures with longer development cycles such as the 3.5 MW renewable energy photo voltaic (PV) solar project completed this year for Wallops ESPC Phase 3a. In 2017, Greenbelt implemented UESC project under the GSA area wide contract with the local utility provider PEPCO. The UESC program enabled GSFC to implement new technology and infrastructure upgrades, while earning additional rebate funds of \$937K⁵ that are being reinvested for future energy projects.

Priority Strategies & Planned Actions

Goddard will implement the last phase (Phase 3b) of the Wallops ESPC applied to construct an estimated 4.9 MW of PV and 4 electric vehicle (EV) charging stations. Wallops is also initiating a new UESC with the local utility provider ANEC, which will allow the center to conduct a preliminary base-wide facility assessment on 100% of their assets to identify additional energy conservation measures (ECMs).

Renewable Energy



Wallops Airfield Phase 3a Photo Voltaic Panels



Rendering and actual Wallops F6 solar parking canopies

FY19 Renewable Energy Use Progress:

< 7.5% of total electricity consumption was from a renewable source

(Agency Goal: 7.5% of total electricity used from a renewable source)

FY20 Renewable Energy Plan:

7.5% of total electricity used from a renewable source

Implementation Status

Goddard Centers employ a diverse mix of renewable electric and thermal energy sources and technologies, including on-site geothermal heat pump systems, solar PV systems, landfill gas, direct purchases, and Renewable Energy Certificate (REC) purchases.

This year, Greenbelt electric utility bankruptcy late in the fiscal year interfered with the purchase of RECs for the Center, causing the Center to not meet the 7.5% renewable energy goal.

Additionally, in FY19/20, the following renewable energy projects were in progress:

Wallops ESPC: (3.5 MW Phase 3a and 4.9 MW phase 3b) Photo Voltaic (PV)

- On-site solar energy self-generation for double renewable energy credits
- Makes use of unbuildable space next to airfield
- Meets Wallops renewable electricity goal
- Includes electric vehicle charging stations
- Meets 89%⁶ of Wallops peak load
- Eliminate estimated 19,880 tons of greenhouse gas (GHG) emissions – equivalent to 4,257 cars removed from road each year

Priority Strategies & Planned Actions

Goddard will construct Phase 3b of the solar PV project and will continue to use geothermal heat pumps and landfill methane. Additionally, beginning in FY20, NASA will centralize REC purchases to reduce costs and gain administrative efficiencies for the Agency.

High Performance Sustainable Buildings



Greenbelt B26 Management Operations Building – LEED Gold and GP certified

FY19/20 Sustainable Buildings Progress:

Added **8 buildings** that meet GP – **17%** of Goddard buildings are sustainable
(Agency Goal: 22% GSF or 22% of the number of buildings meet GP)

FY20/21 Sustainable Buildings Plan:

FY20 - 25% of GSF meet GP
FY21 – 26% of GSF meet GP



Greenbelt B34 Exploration Sciences Building – LEED Gold and GP certified

Implementation Status

From FY10 - FY18, Goddard constructed 3 new sustainable facilities (B36, E110, V27), and renovated or improved 4 existing buildings (B26, B34, B35, E109), to meet the Silver or Gold certification level for Leadership in Energy and Environmental Design (LEED). Buildings E109, E110 and V27 also meet the Federal Guiding Principles (GP) for sustainable buildings. Sustainable building elements include use of sustainable sites, energy and water efficient equipment and fixtures, green roofs, reserved parking for alternative fuel, energy efficient and van pool vehicles, recycling areas on each floor, water efficient landscaping, bio retention basins and Filtera boxes, innovative sustainable design, indoor air quality, construction with recycled content and regionally sourced materials.

Between FY18 and FY19, Goddard completed 17 Existing Building Commissioning (EBCx) studies on Buildings 1, 3, 8, 10, 11, 13, 14, 21, 28, 29, 30, 31, 32, E100, F5, F6, and J20, as the first step towards meeting the Guiding Principles, to bring the facilities back to top performance, and making them more efficient and sustainable.

In FY19, in coordination with HQ NASA, Goddard completed a Post Occupancy Evaluation (POE) on B36 to further the Agency's knowledge on the impact of investments in LEED certified sustainable buildings.

In FY19 and FY20, after completing additional informational requirements, the remaining 4 LEED certified buildings at Greenbelt (B26, B34, B35, B36), were confirmed to meet the Guiding Principles, and 4 buildings at Wallops (E100, F5, F6 and J20) were commissioned and GP certified, bringing the number of the Center's sustainable buildings that meet the Guiding Principles up to 17% for a total of **620,534 GSF**.



Greenbelt B35 Logistics Facility – LEED Silver and GP certified

Priority Strategies & Planned Actions

In FY19, the Agency initiated a review of *NASA Procedural Requirement (NPR) 8820.2G, Facility Project Requirements*, to incorporate new project funding requirements and new requirements for High Performance Buildings including utility management strategies, and other facility project processes, that will drive more sustainable facilities in the future.

At Greenbelt, a state of the art facility for development of instruments and new technology for space flight mass spectroscopic instruments is in construction. When completed and certified, it will provide Goddard with an additional 54,000 square feet of sustainable LEED certified buildings that meet the Guiding Principles. At that point, 15.3% GSF (674,435 GSF) or **18.5%** of Goddard's buildings will meet the Guiding Principles, moving the Center closer towards meeting the Agency's 25% sustainable buildings goal.

Additionally, the remaining 13 Greenbelt buildings with completed EBCx studies (1, 3, 8, 10, 11, 13, 14, 21, 28, 29, 30, 31, and 32), will be repaired, upgraded and commissioned, moving them towards meeting the Guiding Principles for sustainable buildings. After completing the needed repairs and upgrades for buildings 3, 14, 28, and 32, the Center is estimated to realize an annual energy cost savings of **\$395K**.

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Greenbelt B36 Flight Projects Building – LEED Gold and GP certified



Wallops E109 Engineering Building – LEED Silver and GP certified

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Wallops E110 Mission Operations Control Center – LEED Silver and GP certified



Wallops V2 Island Fire House – LEED Silver and GP certified

Water Conservation



Greenbelt B36 Flight Projects Building green roof

FY19 Water Intensity Progress (Gal/GSF):

Achieved **40.5%** reduction from FY07 baseline

(Agency Goal: reduce 20% from baseline)

Achieved: **0.85%** reduction from FY18

(Agency Goal: reduce 0.5% from FY18)

FY20 Water Intensity Plan:

0.5% reduction in FY20 from FY19

Implementation Status

Goddard reduces potable water consumption and costs through all available methods. Core strategies include upgrading major water infrastructure and repairing/replacing aging distribution systems, retrofitting bathroom fixtures, installing water meters, using native water efficient plants and eliminating use of landscape irrigation systems. Decentralizing the Wallops steam distribution system in 2012 helped to reduce the facility's water consumption by over 28% from the FY07 baseline.

It's anticipated that Greenbelt's FY20 water leak study will identify a potential \$2K⁷ in annual cost savings. However, similar to energy intensity, Goddard is facing increasing challenges to reduce year-over-year water consumption and costs. Because Goddard does not exclude any facilities from the water intensity metric, mission activities and facility operations impact performance. For example, during each orbital launch at Wallops, over 230,000 gallons of water are used for flame suppression. At both campuses, large amounts of potable water are used to meet drinking water quality standards that require periodic flushing. Most water projects, whether storage tank maintenance, line replacement, or fire hydrant testing, require flushing. In FY17, Wallops increased water consumption by 23% due primarily to the airfield runway and pavement repair project.

Priority Strategies & Planned Actions

Goddard will continue to assess our water distribution systems, conduct leak detection audits, repair/replace components as appropriate, and add water meters. For industrial water uses, Goddard will evaluate options to use non-potable water sources for activities such as fire hydrant flushing and orbital launch flame suppression at Wallops. Alternatives to potable water resources will also be addressed for construction projects. This year, for dust suppression, Wallops anticipates the use of about 15,000 gal/day, 7 days a week, for 3 months needed for the beach replenishment project. Beach replenishment is required about every 5 years depending on the erosion severity from annual storms. A non-potable water alternative could save the facility approximately 1,260,000 gallons used for each beach replenishment project.

Waste Management and Diversion



Greenbelt B26 Recycling Area and B36 Recycling Pull-Out Drawers

FY19 Non-hazardous Waste Diversion Progress:

Diverted **96.7%** of Construction & Demolition (C&D) debris and **24.6%** of non-C&D waste from landfill disposal

(Agency Goal: Divert 50% of C&D debris and 50% of non-C&D waste from landfill disposal)

FY20 Non-Hazardous Waste Diversion Plan:

1% reduction in non-hazardous solid waste generated from FY19

Divert 50% and <50% sent to treatment and disposal facilities

Implementation Status

Goddard carefully manages and monitors construction projects and continues to exceed the Agency’s waste diversion goals for Construction & Demolition debris. Goddard reaches out to employees through newsletters, signage, a recycling website, and environmental events such as America Recycle and Earth Day, to provide pollution prevention awareness, but still faces challenges with recycling contracts, which has caused our non-C&D solid waste diversion rates to fall below 50%. Goddard reviewed our recycling processes and contracts, and also considered alternative waste disposal options such as waste to energy (incineration) or energy recovery, to improve solid waste diversion rates.



Greenbelt B33 Water Bottle Fill Station reduces waste of single use plastic water bottles

Priority Strategies & Planned Actions

Goddard will continue to provide outreach activities to increase employee participation in our pollution prevention efforts. Greenbelt initiated a contract with a new vendor for the collection of solid waste and recycling and continues to evaluate if single stream recycling is the best process for the facility.

Implementation Summary: Fleet Management

Transportation/Fleet Management



Greenbelt B26 Management Operations Building electric cart parking and bike sharing program bicycles

FY19 Per-Mile GHG Reduction Progress:

Achieved **95.7%**⁸ reduction from FY08 baseline

(Agency Goal: From previous EO 13692 – reduce 30% from baseline)

Achieved **84.9%**⁹ reduction in FY19 from FY18

(Agency Goal: 0.0% increase in Per-Mile GHG Emissions in FY19 from FY18)

FY20 Per-Mile GHG Reduction Plan:

10% petroleum reduction from FY19

0.0% increase in alternative fuel use from FY19

Implementation Status

Goddard has reduced Scope 3 indirect and per-mile GHG emissions by **95.7%** since the 2008 baseline, and **84.9%** in FY19 compared to FY18, representing a significant reduction in fleet vehicle petroleum use. The Center has aggressively executed its Fleet Management Plan to optimize and right size the fleet to match program needs and mission requirements. This includes replacing standard fuel vehicles with alternative fuel vehicles (AFV), low GHG emitting and zero emission vehicles (i.e., electric carts) during end-of-life cycle replacements. The Vehicle

Utilization Review Board (VURB) reviews and evaluates vehicle requirements for both existing and new requests, and the Fleet Information Management System (FIMS) is used to improve data and cost information of the fleet.

The Center uses compressed natural gas (CNG)/85, a compressed natural gas alternative that produces less GHG emissions than gasoline and diesel fuels. Goddard reduces vehicle use on Center through bike sharing programs, shuttles, interconnected pedestrian friendly campuses, installed 13 Level 1 electric vehicle (EV) charging posts (Level 1 charging stations are 120 volt outlets that provide 2-5 miles of range per charging hour), at Greenbelt (B4, B24, B26, B31) and promotes video teleconferencing and carpooling between campuses.

Priority Strategies & Planned Actions

Because the Center has already optimized its Fleet Management Plan, we do not expect to see significant reduction in future fleet fuel use. However, Goddard will continue to evaluate other options to reduce our carbon footprint and Scope 3 GHG emissions. In FY20, Goddard plans to install 4 Level 2 EV charging stations (Level 2 charging stations are 240 volt charging stations that provide 10-20 miles of range per charging hour and can collect EV charging data), as part of the Phase 3b solar PV project at Wallops, a Level 1 charging station at B17 and a conduit for a future charging station at B37 at Greenbelt. Along with the increase in EV charging stations for government vehicles, Goddard will work with HQ to draft an EV charging policy to allow employees and visitors to charge their personal electric vehicles on a reimbursable basis, to promote the use of more electric vehicles on Center, further supporting Goddard's sustainability goals. Also, indirect Scope 3 GHG emissions will be reduced as transmission losses are reduced by increasing onsite renewable energy generation.

Implementation Summary: Cross-Cutting Operations

Sustainable Acquisition/Procurement

FY19 Sustainable Acquisition Progress:

78% of items purchased with recycled or bio-based content

(Agency goal: 17% of contract actions or 21% obligations have statutory environmental requirements)

FY20 Plan:

(Agency goal: 17% of contract actions or 19% obligations have statutory environmental requirements)

Implementation Status

Goddard relies on the HQ NASA Principal Center for Recycling and Sustainable Acquisition (RSA) for technical resources and program support, including training sessions for contracting, environmental and sustainability personnel, and periodic reviews to evaluate sustainable acquisition within contracts. Goddard requires the use of sustainable or energy efficient products such as Energy Star appliances, Electronic Product Environmental Assessment Tool (EPEAT) Gold-registered computer equipment, LED lighting, regional materials, certified woods, less toxic, bio based and recycled content products, low emission adhesives, paints, and flooring in all procurement actions, new construction projects, major renovations, facility repair and maintenance operations and custodial services whenever economically feasible.

Priority Strategies & Planned Actions

Goddard will continue to identify and explore new opportunities to increase the use of sustainable products. Wallops will evaluate disposable utensils and plates made from bio based and/or recycled content materials to decrease use of Styrofoam and plastics in the cafeteria.

Other Sustainability Highlights

Notable Projects and Initiatives

In addition to the primary sustainability priorities identified in the Executive Summary and Implementation sections of this Plan, Goddard has also implemented or plans to initiate the following sustainability initiatives and projects:



Greenbelt B32 Rain Garden and Bio Retention Basin

Greenbelt Stormwater Management

The Maryland Department of the Environment (MDE) issued a revised National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Storm Sewer System (MS4) permit to GSFC on October 9, 2018. The new permit requires 20% of the impervious area on GSFC receiving minimal or no stormwater management treatment to be removed or treated through best management practices by 2025. The permit applies to the total area of untreated impervious surface area that existed prior to the baseline year of 2006.

GSFC completed a study in 2014 (revised in 2019) to determine the baseline impervious surface and restoration opportunities to achieve the 20% goal. Approximately 31 acres of impervious surface will need to be restored by 2025. In 2019, MDE approved GSFC's Impervious Area Restoration Work Plan. The Plan outlines projects and methods GSFC intends to pursue to meet the permit goal, such as redevelopment projects incorporating low impact development designs (e.g., bioretention basins) and building deconstruction. Other projects, such as stream restoration, are contingent upon funding.

Goddard is adding the stormwater restoration priorities to the Goddard Master Plan that is being updated this year and now includes stormwater development projects in all LEED certified new construction projects.

Wallops Beach Replenishment (Climate Change Resiliency)

Replenish 19,400 ft. of Wallops Island shoreline to the engineered profile established in 2012, by moving accumulated sand from the northern end of the shoreline down to the southern end, to protect our launch assets. The project includes constructing erosion control measures (shore breaks) to reduce future replenishment costs and provide added shoreline protection and resilience against climate change impacts.





Greenbelt Childcare Center Green School

Goddard’s Greenbelt Child Care Center successfully renewed its Maryland Green School certification in FY19. The Maryland Green School program promotes environmental awareness and sustainability in Pre K – 12 schools with goals of community stewardship, reducing pollution, increasing pollinator habitat, and limiting carbon emissions. Schools participating in the program re-certify every 4 years by demonstrating environmental and community stewardship in the curriculum.



Greenbelt Meadows Demonstration Project, Workshop and New B33 Meadow

Starting in 2016, in partnership with the University of Maryland Extension Service and many volunteers, Greenbelt EMD replaced a 0.1 acre area of turf grass with a native demonstration meadow in front of B33. Successful establishment of the meadow took several years and several phases. However, sustainability benefits include cost savings due to less mowing and landscape maintenance, creates pollinator habitat, supports stormwater management and permit requirements, recharges the water table, increases carbon sequestration, reduces fuel use and GHG emissions (from reduced mowing), reduces use of pesticides and fertilizers and improves soils.

In FY19, Greenbelt EMD hosted a community meadows workshop with State and Federal representatives, academia, utility companies, NGOs, and non-profit organizations, to discuss and strategize ways to overcome barriers to establishing native meadows.

This year Goddard, in partnership with the US Department of Agriculture, Natural Resources Conservation Service, is planning to replace another 1+ acres of turf grass with native meadow.

Wallops PV Project Meadow



Example of a similar PV project with a perennial meadow by Engie Distributed Solar and Prairie Restorations

Wallops is installing an estimated 24 acres of native meadows as part of the Phase 3b solar PV project that will reduce and control stormwater runoff, increase pollinator habitat and carbon sequestration, and reduce GHG emissions through decreased mowing.

EV Charging Station Research Project

Goddard will conduct an employee survey, and research the type and number of electric vehicles that employees would use to commute to work, to determine the potential environmental benefits (reduced fuel use and per-mile GHG emissions) of electric vehicle charging stations made available for government, employee and visitor use on a reimbursable basis. It is anticipated that this data will inform a new Goddard EV Charging Policy, and once we receive Agency approval, will promote the use of more electric vehicles on campus, to further support the Center’s sustainability goals.



Notes

1. FY19 NETS reports estimated performance contracting savings for Goddard is \$2.2M (Wallops ESPC Phase 1/\$1,893K + Phase 2/\$328K)
2. Data derived from FY19 NASA Environmental Tracking System (NETS) reports using weighted facility area average for Greenbelt and Wallops to determine the combined Goddard rates
3. FY19 NETS reported ESPC value based on life cycle cost analysis
4. NETS 2010 and 2012 ESPC data
5. \$937,156 rebate amount reported by Goddard Energy Manager Evelyn Baskin
6. 89% of peak load as reported by Wallops electric engineer Steve Mariner
7. \$2K estimated water savings from 2020 leak study reported in NETS
8. 2019 Scope 3 GHG reduction from baseline provided by HQ (Erick Tucker/Leidos) Goddard = $GB[(-94.8\%)(82\%)] + WFF [(-99.6\%)(.18\%)] = -95.7\%$
9. 2019 Scope 3 GHG reduction in FY19 from FY18 provided by HQ (Erick Tucker/Leidos) Goddard = $GB[(7.2\% - 94.8\%)(82\%)] + WFF [(27\% - 99.6\%)(.18\%)] = -84.9\%$