



Maryland Green Registry MEMBER

The Maryland Green Registry promotes and recognizes sustainable practices at organizations of all types and sizes. Members agree to share at least five environmental practices and one measurable result while striving to continually improve their environmental performance.

NASA/Goddard Space Flight Center



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Federal Agency

Member since September 2009

Management and Leadership



Sustainability and Environmental Policy Statements

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. With the release of Executive Order 13834, Efficient Federal Operations, May 2018, NASA continues its efforts to ensure the impacts of Agency operations don't overburden environmental systems that support us. Goddard's sustainability policy is to execute the mission without compromising the planet's resources so that future generations can meet their needs.

Goddard is committed to conducting missions in a manner that promotes environmental stewardship. Our environmental policy, GPD 8500.1, commits Goddard to:

- *Comply with environmental laws;*
- *Prevent pollution and conserve natural resources;*
- *Explore advances in environmental technology;*
- *Communicate with the Goddard family, our partners, and the public;*
- *Integrate environmentally sustainable practices into our daily work activities; and*
- *Continually improve our environmental performance.*

More on official environmental policies can be found on our website: <http://environment.gsfc.nasa.gov>. The Goddard Sustainability Report and Implementation Plan is also on this website and provides an update on how the Center is meeting Federal and Agency sustainability goals and requirements, as well as describing the Center's sustainability plans for the oncoming year.

Environmental Teams

Goddard Space Flight Center (GSFC) has a number of teams that aid in accomplishing sustainability and environmental goals, and is inclusive of Center employees:

1. A reduce, reuse, and recycling Green Team promotes waste reduction and participates in Center events for internal outreach to employees. The celebration of America Recycles Day is planned by this team. The team maintains an internal employee website to share information about how to reduce waste and recycle on center.

2. Goddard spearheaded a "Freecycle@NASA" system for exchanging small office supplies around the Center to reduce waste and save money. After Goddard successfully implemented the exchange program, it was adopted by other NASA Centers. Each Center has a Freecycle@NASA team and exchanges are now made nationally Agency-wide.

3. The hazardous waste management system at Goddard is supported by a waste minimization team that evaluates opportunities to reduce hazardous waste. This system and the team have been successful in establishing amongst other management actions, a hazardous materials reuse center to circulate usable products rather than disposing of them as waste. Some materials, such as phased out refrigerants, may even be shared nationally between NASA Centers as equipment is being replaced.

4. Goddard's science community supports sustainability concerns by developing science-based management tools through the Climate Adaptation Science Investigators (CASI) program, Mid-Atlantic Coastal Resilience Institute (MACRI), and general Earth Science research. CASI, MACRI, and other scientists work with NASA management, the NASA Engineering Construction Innovation (ECIC) Climate Change Subcommittee and regional partners to support planning for environmental resilience using state-of-the-art science-based projections of future environmental conditions relevant to each facility — e.g. flooding risk, salt water intrusion in fresh water supplies, temperature regime changes, etc. Initiatives involving the NASA research community are informed by the Global Precipitation Mission (GPM) Core Observatory satellite.

The CASI partnership has grown between NASA, educational institutions, community interest groups, local, state and federal agencies. CASI conducted local workshops to introduce and improve planning for climate change, provided analysis of climate data and predictions tailored to each facility, developed climate impact and adaptation toolsets, and pursued facility-specific research and engagement in climate issues. CASI workgroups at Greenbelt researched objectives that informed institutional decision making in the interest of averting impacts associated with climate change on Goddard's assets and activities. Examples include preparing a hydrologic analysis of Greenbelt, evaluating relationships between urban heat island effects, land cover and stormwater management practices. The ECIC working group helped inform Agency and Center new construction building policies.

The CASI and ECIC working groups have completed their contributions and do not have active projects for next year, but local government offices associated with the Wallops Flight Facility (WFF) are still interested in pursuing regional partnering opportunities with the MACRI.



Annual Goals

Goals are set both in the area of sustainability and through Goddard's Environmental Management System (EMS) objectives and targets for high-priority aspects which are reviewed each year. Goddard's sustainability goals are described in the Goddard Sustainability Report and Implementation Plan, <http://environment.gsfc.nasa.gov>. Current sustainability goals are established for energy and water conservation, renewable energy, performance contracting, sustainable facilities, GHG emissions, transportation & fleet management, waste management & diversion and sustainable acquisition and are described in more detail in the following sections.

Goddard's Environmental Management System (EMS) objectives and targets are set for the high-priority aspects and reviewed each year. The objectives for the high priority aspects at our Greenbelt campus this year include:

- 1. Wastewater Quality/Stormwater Discharge
 - a. Meet permit requirement to restore 20% of the Center's impervious surface by 2025*
 - b. Resolve periodic exceedances of permitted copper levels in stormwater discharge**
- 2. Wastewater Quality/Sanitary System Discharge
 - a. Resolve exceedances of permit limits in plating facility wastewater discharges**
- 3. Energy Management: Satisfy and maintain Federal law and NASA policy – reduce energy intensity by 30% plus 0.5% reduction between FYs; and cost avoidance by reducing energy use.*

Environmentally Preferable Procurement

Goddard follows federal guidelines and Executive Orders and includes standard language in our contracts for green purchasing. Goddard's procurement practices are driven by the NASA Procedural Requirement (NPR) 8530.1B for Sustainable Acquisition. In accordance with the NPR, Goddard purchases products and services with recycled content as designated by the Environmental Protection Agency, bio-preferred and bio-based products as designated by the U.S. Department of Agriculture, energy and water efficient products and services qualified by Energy Star, the Federal Energy Management Program, Water Sense, and uses other products and services certified by Safer Choice, SmartWay Transport partners and products. Goddard uses safer, environmentally preferred chemicals as designated in the Significant New Alternative Policy (SNAP).

Environmental Restoration and Community Environmental Projects

Goddard has a comprehensive Environmental Restoration Program in which sites that may pose a threat to human health or the environment are investigated through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) from initial site inspection, through the remedial process, and site closure. Goddard works closely with the Environmental Protection Agency, Maryland Department of the Environment, and Virginia Department of Environmental Quality to identify, manage, and restore sites, and encourages public input through the restoration process. At the Greenbelt MD campus, Goddard has closed 16 sites and continues to actively monitor groundwater. At WFF, Goddard has closed 22 Petroleum Program sites and 14 CERCLA sites. WFF currently has five active CERCLA sites and one Petroleum Program site. In addition, Goddard manages the U.S. Army Corps of Engineers Formerly Used Defense Sites program at WFF with 11 active sites.

Goddard engages in several environmental outreach endeavors internally to employees and externally to the public. Goddard environmental representatives speak to school groups and participate in Earth Day events at local elementary schools in the area. The environmental team supports its own Goddard Child Development Center. In May of 2014 a native rain garden was planted in front of the school to provide a living classroom for the preschool students age 2 through Kindergarten level. This past year (FY19) the Greenbelt Child Care Center successfully renewed its Maryland Green School certification. 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.

Goddard shares environmental management information at a number of public events, such as the Explore Goddard information booth on Sept. of 2015. The event drew over 20,000 visitors. The demonstration had attractions for both adults and children, including a demonstration of the flow of stormwater and effects on the Chesapeake Bay.

Goddard supports initiatives such as developing a native meadow demonstration on campus as a partnership with the University of Maryland Extension Service since 2016 and hosted workshops for master gardeners and other leaders in the natural resource local community looking at meadows as a sustainable landscape option.

Additionally, GSFC conducts several internal events to encourage sustainable practices with employees such as America Recycles Day, Earth Day and Energy Awareness Month.

Independently-Audited Environmental Management System (EMS)

GSFC's EMS is audited by NASA Headquarters every three years. This comprehensive Environmental and Energy Functional Review (EEFR) fulfills the requirement for an independent third-party audit. The last EEFR was conducted in May 2017. The EEFR scheduled for March 2020 has been delayed due to COVID-19, but will be conducted as soon as employees are able to return to the campus and normal operations and activities resume. The audit assesses GSFC's EMS implementation against the NASA Procedural Requirement (NPR) 8553.1, NASA Environmental Management System, which is based on ISO 14001:2004.

Waste

Solid Waste/Material Use Reduction and Reuse

Goddard carefully manages and monitors construction projects and continues to exceed the Agency's 50% waste diversion goals for Construction & Demolition (C&D) debris. In FY19, Goddard diverted 96.7% of our C&D debris from landfill disposal through material use reduction, recycling and reuse.

Recycling

In FY19, Goddard diverted 24.6% of non-C&D waste from landfill disposal. 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 strict contamination tolerance, which has caused our non-C&D solid waste diversion rates to fall below the

50% goal. Goddard reviewed our recycling processes and initiated a new recycling contract and is also considering alternative waste disposal options such as waste to energy (incineration) or off-base composting, to improve solid waste diversion rates. Goddard recycles comingled plastic, aluminum cans, cardboard, white and mixed papers. Laser toner cartridges, scrap metal, flourescent tubes, batteries, and a number of oils and fluids are also collected and recycled.

Hazardous Waste/Toxic Use Reduction

Goddard uses a cloud-based data management system to track hazardous material (HM) and hazardous waste (HW). This system provides a comprehensive inventory of HM on the center, allowing Greenbelt to find users for 693 pounds of unwanted HM from FY15 through FY19. This prevented 693 pounds of HM from becoming HW and eliminated the purchase of replacement HM. This system also tracks HW manifests, profiles, and inspections.

Pathways students and summer interns helped complete the HM inventory and identify HW reduction opportunities on the Center over the last 5 years.

Energy

Energy Efficiency

Goddard reduced its energy intensity 35.3% from the FY03 baseline. 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

Goddard also has a goal that 7.5% or more of its total electricity will be from a renewable source. Goddard campuses 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.

The Goddard Wallops Flight Facility in VA, will be completing the 2nd phase of a 8.4MW solar photo voltaic renewable energy system that includes solar carports and electric vehicle charging stations.

Transportation

Efficient Fleet Vehicles

*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.*

Efficient Business Travel

The Center uses compressed natural gas 85% ethanol blend (E85), a fuel 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.

Water

Water Conservation

Goddard has reduced its potable water usage by 40.5% from the FY07 baseline. 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. It's anticipated that Greenbelt's FY20 water leak study will identify a potential \$2K in annual cost savings.



Stormwater Management and Site Design

Greenbelt employs stormwater BMPs including a rain garden and a bio retention pond that was installed adjacent to the parking lot at Building 32. Both serve to slow, filter, and infiltrate stormwater, reducing runoff volume and pollution. Additionally, to address Federal requirements for stormwater management in new construction, the Flight Projects Building (Building 36), completed in 2018, was designed to manage all runoff from the site using a green roof and bio retentions basins and the Instrument Development Facility (Building 37), being completed this year, also includes bio retention basins and a bioswale.

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., bio retention 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.

Greenbelt has also designated several "no mow" areas on campus and is planting native trees where possible. The deeper rooting vegetation that flourishes in unmowed areas promotes stormwater infiltration and slows runoff into local surface waters. These areas can be observed in the lawn area near the parking lot between Buildings 16 and 23, to the north and east of Building 8 and near Building 31. In addition to stormwater management, on-site infiltration increases evaporative cooling to reduce possible urban heat island effects at the Center.

Green Building



LEED Silver and Gold

From FY10 - FY18, Goddard renovated 3 existing buildings (B26, B34, B35), and constructed 1 sustainable facility (B36) at Greenbelt to meet the Silver or Gold certification level for Leadership in Energy and Environmental Design (LEED). Sustainable building elements include use of sustainable sites, energy and water efficient equipment and fixtures, green roofs, reserved parking for alternative fuel/energy efficient vehicles, recycling areas on each floor, water efficient landscaping, bio retention basins, innovative sustainable design, indoor air quality, construction with recycled content and regionally sourced materials.

Between FY18 and FY19, Goddard completed 13 Existing Building Commissioning (EBCx) studies on Buildings 1, 3, 8, 10, 11, 13, 14, 21, 28, 29, 30, 31, and 32, as the first step towards meeting the Federal Guiding Principles for high performance sustainable buildings, 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 4 LEED certified buildings at Greenbelt (B26, B34, B35, B36), were confirmed to meet the Guiding Principles. This year, Goddard will complete construction of the new B37, which will be certified LEED Gold and meet the Federal Guiding Principles, increasing the number of Greenbelts sustainable buildings that meet the Guiding Principles up to 14.7%, moving the Center closer to the FY20 NASA goal for sustainable buildings of 25% .

Profile Updated July 2020



Help build a greener, more sustainable Maryland through voluntary practices that reduce environmental impacts and save money.

Learn more at green.maryland.gov

