



## 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



Code 250, 8800 Greenbelt Road

Greenbelt, MD 20771

301-286-6137

[www.nasa.gov/goddard](http://www.nasa.gov/goddard)

<http://environment.gsfc.nasa.gov>

Federal Agency

Member since September 2009

## Management and Leadership



### Environmental Policy Statement

*The Goddard Space Flight Center missions expand knowledge of the Earth and its environment, the solar system, and the universe. To maintain our nation's leadership in this endeavor, GSFC is committed to conducting missions in a manner that promotes environmental stewardship. Our policy, GPD 8500.1, commits GSFC 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 policies can be found on our website:*

[http://code250/environmental/env\\_management.cfm](http://code250/environmental/env_management.cfm)

*These commitments enable each of us to do our part for environmental stewardship in our community.*

*In addition to working toward our environmental management goals, we created a sustainability program in 2012. Goddard views sustainability as a way to approach our work with consideration for the impacts our activities may have*

*on the environment and natural resources. We acknowledge that Goddard's activities affect natural systems, resources, and local communities. At all levels, the Center is developing strategies to minimize these effects.*



### **Environmental Team**

*Goddard Space Flight Center (GSFC) has a number of environmental teams to aid in accomplishing environmental goals and is inclusive of general Center employees:*

- 1. A reduce, reuse, and recycling green team to promote waste reduction meets regularly throughout the year and participates in a number of center events for internal outreach to employees. There is also a big celebration of America Recycles Day planned by this team. There is an internal employee website to share information about how to reduce waste and recycle on center.*
- 2. Goddard has spearheaded a "Freecycle@NASA" system for exchanging small office supplies. After Goddard successfully implemented the exchange program it was taken in by all the other NASA centers. There is a team of center representatives for this activity.*
- 3. A hazardous waste management system has been implemented at Goddard which has aided a minimization team to evaluate 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.*

*Of recent Goddard has started a Goddard Green Office program for facilitating more environmentally friendly practices within offices. The environmental team is awarding its first office a Goddard Green Office status.*

*Additionally, institutional managers implement most of the sustainability actions at Goddard and the science community promotes and supports science-based management as implemented through the Climate Adaptation Science Investigators (CASI) program. CASI is a partnership between earth scientists and institutional stewards at each facility. CASI conducts local workshops to introduce and improve planning for climate change, provides analysis of climate data and predictions tailored to each facility, develops climate impact and adaptation toolsets, and pursues facility-specific research and engagement in climate issues. CASI workgroups at Greenbelt are pursuing research objectives that will inform 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. These research efforts will provide the data needed to develop sustainable facilities resilient to climate change.*



## **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.*

*In the pursuit of sustainability at Goddard will:*

- *Ensure that NASA's missions are not adversely affected by changes to the climate, environment, natural resources, or energy supplies.*
- *Mitigate the impact of Center operations on the natural environment.*
- *Enhance the efficiency of Goddard operations by reducing the demand for non-renewable energy sources.*

*Additionally, as part of Goddard's Environmental Management System (EMS) objectives and targets (O&T)(or goals) are set on the high-priority aspects and reviewed each year. The objectives and targets are as follows: 1. Reduce Energy Consumption - Reduce from a 2003 baseline 3% per year from 2006 to 2015 or 30% by FY2015. 2. Determine cause(s) of copper discharge exceedances of GSFC's National Pollutant Discharge Elimination System (NPDES) Permit Limits and implement measures to eliminate future copper noncompliances. Preventative measure implemented by 6/30/2015. 3. Develop a Sustainability Status Report for GSFC that describes and evaluates specific projects the Center is considering implementing that will support the Agency's pursuit of Strategic Sustainability Performance Plan (SSPP) goals, GSFC's collaboration with regional environmental initiatives, and compliance with ongoing updates to environmental regulations.*



## **Environmentally Preferable Procurement**

*Goddard follows federal guidelines for green purchasing. Goddard purchases recycled content and bio-based products where applicable. Goddard purchases energy efficient equipment. Goddard replaces eligible products from their supply catalog where a more environmentally friendly substitute is available.*



## **Environmental Restoration or Community Environmental Projects**

*Goddard environmental experts go out on invitation and talk to school groups, and have participated in an Earth Day event put on by Robert Goddard Montessori school and other local elementary level schools in the local area. The environmental team also facilitates environmental lessons with its own Goddard Child Development Center. In May of 2014 an 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.*

*Goddard has engaged in a number of environmental outreach endeavors internally to employees and externally to the public. Goddard has shared environmental management information at a number of public events, such as LaunchFest in September 2008; Goddard Space Center Day in February 2009 at the Miller Senate Office Building in Annapolis; and most recently at Maryland's Place in Space in May 2009 at the Baltimore Convention Center. Additionally, GSFC gives several internal events to engage people in the environment, such as America Recycles Day and Earth Day, and other Goddard general events.*

**Independently-Audited Environmental Management System**

*GSFC's EMS is audited by NASA Headquarters every three years. This comprehensive Environmental Functional Review (EFR) fulfills the requirement for an independent third-party audit. The last EFR was conducted in April 2011. 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 reuses several materials and has an excess warehouse where almost any type of office equipment and supplies can be sent for reuse. Goddard implemented a "Freecycle @ NASA" electronic exchange system for simple office supplies to share amongst organizations. The facility also piles wood crates and pallets and periodically chips them for landscaping reuse around the facility.*

*In Fiscal Year 2013 a project was completed for taking a building down under "deconstruction" methods and 98% of the 74,000 square foot building materials were recycled or reused with the project saving the government approximately a half of million dollars in cost of tear down and 18,772 tons of materials from the landfill.*

**Recycling**

*Goddard recycles comingled plastic, glass and aluminum cans; cardboard; white and mixed papers in which Goddard changed over to a single stream comingled system for these items in 2012. Laser toner cartridges; scrap metal; flourescent tubes; batteries, and a number of oils and fluids are all collected and*

recycled. Additionally, much of the construction waste for various LEED building projects is reused or recycled depending on the commodity.

**Hazardous Waste/Toxic Use Reduction**

*A Hazardous Waste Management System (HMMS) was implemented at the Greenbelt facility. This system has provided a comprehensive inventory of the hazardous materials used on the center. The implementation has reduced the amount of hazardous materials at Greenbelt by over 17% from a baseline year of 2012 in part by having this extensive inventory to more properly allocate cross utilization of the materials. And this has reduced over \$250,000 in hazardous material disposal costs. A chemical reuse program was developed to reutilize materials across the center.*

*Additionally, summer college interns have been utilized over the last three years to help complete the inventory as well as study and find reduction opportunities on the Center.*

## **Energy & Greenhouse Gas Reduction**

**Energy Efficiency**

*While several projects and goals have been achieved the last few years, such as exit light fixture replacement; roof replacement plans; improving building envelopes with replacing glass and placing window films; improving HVAC cycling schedules; and utilizing energy performance contracts within the federal government, new opportunities are being found to improve the energy efficiencies on the center. This includes:*

*I. Initiating a Lighting Audit*

*Such an audit would allow easy identification of traditional retrofit projects as well as upgrade-through-replacement projects that could be performed when less efficient lighting equipment needs to be replaced. Having readily available lighting equipment data from a comprehensive lighting audit would support numerous projects, which could be readily pursued using expiring end-of-year funding sources.*

*II. Utilizing Energy Benchmarking*

*Benchmarking tools, such as the EPA's, online ENERGY STAR Portfolio Manager, provide an objective comparison of how much energy and water a building should be using as compared to how much it is actually using based on its age, size, use, and other features. This level of analysis allows facility managers to compare a building's performance to its theoretical potential rather*

*than its historical performance. This level of analysis makes it possible to identify buildings that are underperforming regardless of age or changes to the building use. When considering the age of the buildings at Goddard, and frequent space reallocations, this kind of diagnostic tool would greatly enhance facility managers' abilities strategically to address energy consumption. Additionally, the ENERGY STAR program sponsors a performance based rating system for buildings based on their performance in the Portfolio Manager benchmarking application. Buildings performing at or above the 75th percentile for their size and use are eligible for ENERGY STAR certification, which documents superior energy performance.*

### *III. Renewable Energy Initiatives & Credits*

*GSFC was successful in implementing a landfill gas project, utilizing landfill gas in the center's boiler in lieu of natural gas and oil.*

#### *Investment and Savings*

*Total non-labor Investment by NASA: \$0  
Total Savings from 2003 thru 2008: \$11M*

*GSFC has no renewable energy that produces electricity. GSFC uses the landfill gas to heat water to make steam.*

*Over the last decade, renewable electricity generation initiatives—including wind, solar, and CHP using LFG—have been reviewed for potential application at Goddard. Other than recent research into LFG-CHP at Greenbelt, these technologies have not previously proved viable based on technical, financial, or environmental constraints; however, markets and technologies are rapidly evolving and creating new opportunities for on-site renewables.*

*Because Goddard does not currently operate or host any renewable electricity generation, the Center purchases Renewable Energy Credits to contribute 5.0 percent of their electrical energy, respectively, from renewable sources.*

### *IV. Telecommuting and Mobile Video Conferencing*

*Telecommuting at NASA helps reduce Scope 3 GHGs associated with commuting and operating buildings while also facilitating the continuity of operations when the Center must close for inclement weather or other events. The Office of Human Capital Management is actively researching and promoting telecommuting or "work from anywhere" practices at all Goddard facilities to enhance these benefits.*

*A new data collection system was implemented in early CY 2013 to monitor telework rates. At these rates, the Goddard telework program is*

*projected to save more than 35,000 round-trip employee commutes and 37 MWh of Goddard provided electricity per year—the equivalent of roughly 140 full-time workers eliminating their GHGs from commuting and electricity used at Goddard entirely or approximately 0.1 percent of total Goal Subject GHGs.*

#### **V. IT Equipment Containerization**

*Use data from Containerization is an IT management strategy that involves physically housing servers in dedicated container housings instead of inside buildings. Cloud computing is an IT management strategy wherein commonly used applications are hosted on remote servers and made available to users over a network or the internet, reducing the equipment requirements of individual desktop machines while providing access to shared hi-spec cloud IT equipment. Server virtualization involves moving from a traditional management philosophy of hosting one application on one server to consolidating numerous server applications on a fewer number of servers to reduce hardware needs. In all, these strategies increase efficiency and can reduce capital and operating costs because of the more efficient use of IT hardware and improved thermal properties of purpose-built container housings.*

*Both the Information Technology and Communications Directorate (ITCD) and the Computational and Information Sciences and Technology Division (ISTD) are beginning to explore these strategies and all three are implemented at the NASA Cloud Services. The NASA Cloud Services container at Greenbelt began operation in October 2012 and ITCD estimates there is enough server demand to justify a total of three server containers at full build-out.*

## **Water**



### **Water Conservation**

*GSFC has implemented many water savings initiatives in order to meet the Center's goal of reducing water use by 2% per year from a Fiscal Year 2007 baseline from Fiscal Year 2008 until Fiscal Year 2015 or 16% by Fiscal Year 2015.*

#### ***I. On-Site well water for non-potable use***

*Greenbelt has two groundwater wells that provide makeup water for evaporative losses in the HVAC boilers and cooling towers. The benefit of using locally sourced water is the ability to avoid using energy to treat water to a potable standard and pump it through a municipal drinking water distribution system. In 2011, Greenbelt used an average of 186,032 gallons per day of well-sourced makeup water.*

## II. Low-Flow Toilets and Automatic Faucets

*Facilities Management Division replaced approximately 700 three-gallon-per-minute (gpm) faucets at Greenbelt with 1.5-gpm sensor-operated faucets. Each faucet saves \$105 per year and the entire faucet replacement project has a simple payback period of 5.6 years. Toilets and urinals on Center were also retrofitted with low-flow devices, which resulted in similar savings.*

## III. Heating System Retrofits Result in Water Savings

*In addition to saving energy, Greenbelt's Building 25 geothermal heating and cooling system saves 560,000 gallons of well water per year. This savings is realized through a decrease in evaporative losses due to reduced demand on the cooling towers and boilers as well as a decrease in leakage losses due to reduced demand on the steam and chilled water distribution network. Likewise, the Wallops LPG heater retrofit saves roughly 1,000,000 gallons of water per year by replacing the old, leaky boiler core.*



## **Stormwater Management and Site Design**

*Greenbelt has begun to employ stormwater BMPs in two pilot projects: a rain garden and a bioretention area 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 new Flight Projects Building (Building 36), projected for completion in FY 2015, was designed to manage all runoff from the site using BMPs.*

*To ensure early adopters of BMPs get credit for their early action, MDE plans to set 2002 as the expected baseline year for the restoration requirements under the new MS4 permit. Therefore, Greenbelt is likely to get credit for these initiatives under the 20 percent restoration requirement in the new permit.*

*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

*NASA has numerous goals relating to building management that Goddard is actively pursuing in order to meet building energy and GHG goals. NASA-promoted sustainable building initiatives involve large-scale facility planning activities to ensure the most efficient use of buildings as well as technical initiatives to improve building performance. The Agency pursues such technical initiatives using the Guiding Principles for Federal High Performance and Sustainable Buildings and certification by the U.S. Green Building Council's LEED rating system.*

### LEED Gold

*Goddard has a total of three LEED Gold certified buildings:*

- *Goddard's Exploration Sciences Building was completed in the summer of 2009 and was certified LEED Gold for New Construction. The first LEED building at Goddard was cause for an 2010 Earth Day celebration was held to receive the certification.*
- *Goddard's building 26 was renovated and certified LEED Gold in 2013.*
- *Two other buildings under construction are slated LEED certification in the 2015 timeframe.*

**Profile Updated August 2014**



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

*Learn more at [www.green.maryland.gov/registry](http://www.green.maryland.gov/registry)*

