

JSC

Annual Sustainability Report 2015

FY2015

Water Consumed:
313,401,000 gallons

Energy Used:
11,021,038 MMBTU
(natural gas, electric, fuel oil)

Petroleum Fuel Used:
14,820 gasoline gallon equivalents

Alternative Fuels Used:
15,363 gasoline gallon equivalents

Johnson Space Center
4,467,253 Gross Square Feet
Over 8,500 Parking Spots
1,600 Acres
Over 7,000 Employees

FY2015

Disposed Non-Hazardous Waste: 1,243 tons
Disposed Hazardous Waste: 18 tons
Renewable Energy Produced Onsite: 366,231 kWh
Composted: 263 tons
Total Materials Recycled: 6,334 tons
(Includes paper, cardboard, bottles, cans, scrap metal, construction/demolition debris, office supplies, pallets, wood, tires, Industrial Solid Waste, and electronics)

FY2015

Air Emissions:
Carbon Dioxide (CO₂e): 136,965 metric tons
Particulate Matter (PM): 13.11 tons
Nitrogen Oxides (NO_x): 5.94 tons
Carbon Monoxide (CO): 5.78 tons
Sulfur Dioxide (SO₂): 0.09 tons
Volatile Organic Compounds (VOCs): 16.66 tons

Table of Contents

	Overview	1
	Energy	2
	Land	4
	Water	6
	Materials	8
	Air	10
	People	12
	Contact Information	Back Cover













Sustainability at JSC

Sustainability is a mindset that demonstrates a balance between economic vitality, environmental stewardship, and social responsibility when considering short and long-term planning. Businesses refer to this concept as the “The Triple Bottom Line.” The National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) has been implementing aspects of sustainability for over 20 years. With the NASA Strategic Sustainability Performance Plan (SSPP) providing specific sustainability goals and targets, JSC can provide a coordinated effort to reach and even surpass these goals.

JSC’s sustainability program includes six major resource areas: Energy, Materials, Water, Land, Air, and People. Each resource group identifies ways to meet Agency and Center sustainability goals within their purview.

The Fiscal Year (FY) 2015 Annual Sustainability Report documents these efforts over the past year and brings awareness to the JSC community. This is by no means an exhaustive list of accomplishments. More success stories and goal details are available on the [JSC Sustainability Web site](#). Each year, JSC makes strides towards achieving Agency and Center sustainability goals, and here is our status as of FY 2015.



NASA and JSC Sustainability Goals		
1 Greenhouse Gases (GHG)	Reduce direct GHG emissions by 18.3% and indirect emissions (e.g., commuting, travel) by 12.6% by FY 2020 compared to FY 2008.	
2 Sustainable Buildings	Reduce energy intensity (energy consumption per gross square feet) by 3% annually compared to FY 2003. Ensure that at least 15% of existing buildings meet Guiding Principles for High Performance Principles by FY 2015.	 
3 Fleet Management	Reduce petroleum use by 2% annually, compared to FY 2005. Increase the use of alternative fuels by 10% annually through FY 2015.	 
4 Water Use	Reduce potable water intensity (gallons consumed per square foot) by 2% each year, compared to FY 2005, and reduce use for industrial, landscaping, and agricultural by 2% each year compared to FY 2010.	
5 Waste Reduction	Divert 50% of solid waste and 50% of construction and demolition debris from landfill.	
6 Sustainable Acquisition	Ensure that over 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.	
7 Electronic Stewardship	Procure energy-efficient equipment rated per Electronic Product Environmental Assessment Tool (EPEAT) standards, and use best practices for computer operation and disposal.	
8 Renewable Energy	For FY 2013 and beyond, ensure that 7.5% of total electricity consumption is from renewable energy sources.	
9 Climate Change Resilience	Evaluate climate change risks to identify and manage the effects of climate change on operations and Mission in both the short and long term.	
10 Energy Performance Contrancs	Award Energy Performance Contracts and Utility Energy Services Contracts by the end of 2016.	

Energy

Energy resources include sources of energy that JSC uses to operate the site. The JSC goal for Energy is to reduce energy consumption while still accomplishing the Mission. Utilities consumed at JSC include electricity, natural gas, and fuel. Energy topics also include renewable energy sources and building efficiency.

Back to the Baseline

In FY 2015, a new Executive Order (13693) established new energy reduction goals for federal agencies. The new goals reset the baseline year to 2015, which gives JSC a fresh start to meet requirements.



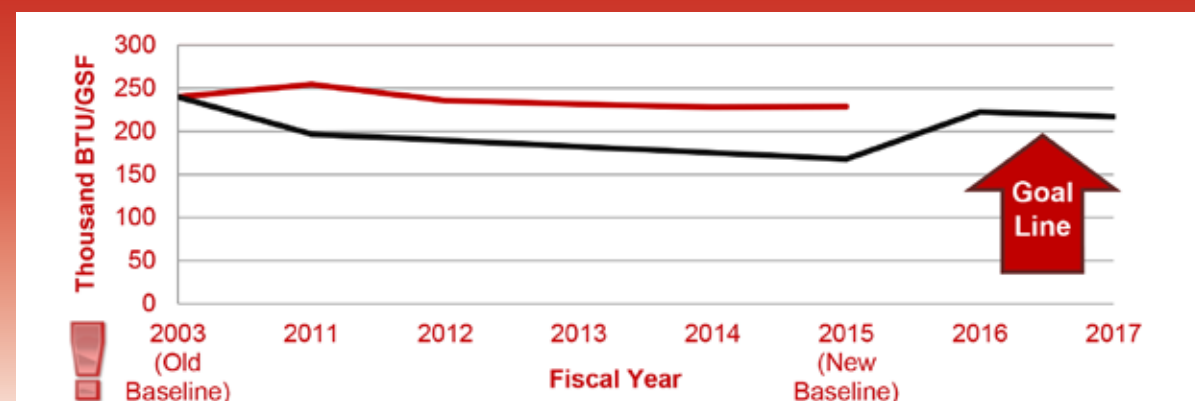
JSC Electricity Usage

In FY 2015, JSC used 163 million kilowatt hours, which is enough electricity to power 15,000 homes for an entire year.



Did You Know

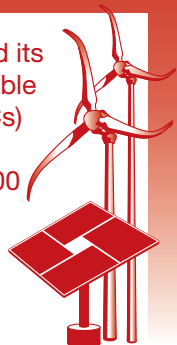
JSC Energy Intensity



Goal: Reduce energy intensity by 3% annually from FY 2003 to FY 2015 and 2.5% annually from FY 2015 to 2025. Energy intensity is British Thermal Units (BTUs) per gross square foot (GSF).

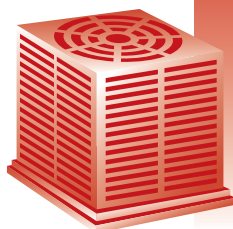
Renewable Energy Credits

JSC almost doubled its purchase of renewable energy credits (RECs) in FY 2015 from FY 2014 (over 23,700 MWh). RECs help JSC meet federal requirements for renewable energy.



Anticipated Energy Savings

Based on energy audit results, JSC made improvements to Building 7, 9, and 46 to improve their air conditioning system efficiency in FY 2015. Overall, the three projects are expected to save over 811,000 kWh of energy a year, saving JSC over \$65,000 annually in utility costs.



CHP for 2016

In FY 2015, JSC awarded the Energy Savings Performance Contract for the construction of a Combined Heat and Power (CHP) installation at Building 24, which is a more efficient way to generate electricity than paying to bring electricity onsite from an electric company. The project will decrease JSC's overall energy usage while providing a more secure source of power during emergencies (i.e., hurricanes and storms).



LEDs Brighten Up the Place



Over the past several years, JSC has begun to switch out older, more inefficient lights with LED lights and fixtures. In addition to requiring less energy, lasting longer than traditional lights, and producing less heat, LEDs eliminate costly recycling fees that fluorescent bulbs require. JSC's LEDs are even made locally, saving in transportation costs. Here are the LED projects finished so far:

- Exterior of Building 24
- Interior and Exterior of Building 28
- Interior and Exterior of Building 48
- Parking Lot of Building 330
- Exterior Canopy of Building 13
- Parking Lot of the Sonny Carter Training Facility

Onsite Renewables

In 2015, JSC generated enough renewable energy onsite to provide electricity to 30 homes for a year. JSC's renewable energy sources include daylighting, geothermal heat pumps, wind turbines, solar panels, solar water heaters, and solar powered parking lots in specific areas onsite.



FY 2016 Focus Areas



1. Start construction on the new Combined Heat and Power (CHP) project at Building 24 that will reduce JSC's overall dependency on electricity generated offsite and increase JSC's overall energy efficiency.
2. Complete energy audits on selected buildings to identify and prioritize energy efficiency projects and improve building and system operations.
3. Continue to plan for future energy-efficiency projects, such as Mall-Area window replacements and net-zero building designs that will yield the greatest energy reductions.
4. Conduct an energy reduction competition during the summer to foster energy awareness and encourage energy efficient behavior in JSC buildings.



Land

Land resources include any physical structures, infrastructure, and land-based natural resources that JSC owns, maintains, builds, protects, or uses to operate the site. The JSC goal for Land is to develop and maintain sustainable and high-performing facilities. Specific topics include landscaping, wildlife, agriculture, vegetation, roads, planning, and buildings, including green buildings and historic facilities.

Green Space

As of FY 2015, JSC has over 272,458 square feet of Leadership in Energy and Environmental Design (LEED) certified space. With the new Building 45 Clinic Annex, JSC will have more than 288,000 certified square feet. LEED buildings are designed to be more efficient in resource use than traditional office space.



It's Raining Deer?

Wildlife studies completed in FY 2015 link an increase in deer populations to increased rainfall in the late winter and in spring. JSC's deer population passed 200 in FY 2015, the first time in over a decade.



Did You Know

Making Room

In 2015, JSC demolished Buildings 262A, 262B, and 264, which covered approximately 6,000 square feet, to make room for new, more efficient buildings.



Flying High

JSC has a Bird-Window Collision Program that reduces the number of migratory bird collisions with windows. By FY 2015, the program has reduced bird-window strikes by more than 75%, saving the lives of hundreds of migratory birds flying through JSC.



Fighting the Invaders

Not only does JSC fight invasive plant species, JSC Wildlife Managers also relocate non-native cats and ducks from JSC in an effort to reduce invasive animal species.



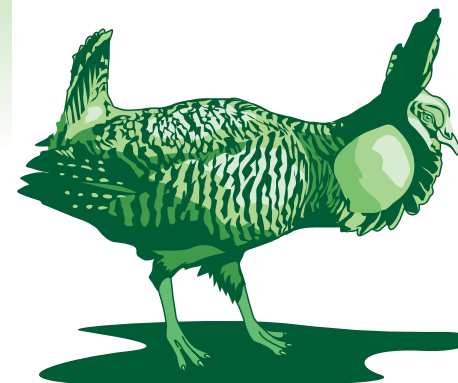
Egrets and Alligators

Egrets and other protected waterbirds maintain a large nesting-colony onsite. Patrolling alligators underneath the heronry keep egg-stealing predators at bay. Over 400 waterbirds nested and hatched their young on JSC in 2015. Species include anhingas, little blue herons, cattle egrets, black-crowned night herons, snowy egrets, and green herons.



Fighting Extinction

In partnership with the Houston Zoo, JSC provides a quiet breeding place for 45 Attwater's prairie chickens, a critically endangered species native to Texas. In 2015, the JSC birds contributed to the 257 chicks released into the wild to fight the threat of extinction.



Texas Leading in LEED

Texas made Top 10 states for LEED-certified projects in 2015. 15% of all the LEED projects certified in the U.S. in 2015 were in Texas.



FY 2016 Focus Areas



1. Finish construction of the Human Health and Performance Laboratory facility (Building 21), which will be JSC's 10th LEED-certified building.
2. Continue optimizing space utilization to help increase efficiency in facility use and to reduce the Center's operational footprint and required maintenance costs.
3. Finalize and obtain NASA Headquarters approval of the new JSC Master Plan.



Water

Water resources include the water that flows in and out of the site. The JSC goal for Water is to reduce consumption and protect local water resources from potential pollutants. Topics covered in this area include potable water, water reuse, fire suppression water, wastewater, and stormwater. Because JSC is close to several bodies of water, it is critical that we manage our water resources appropriately and operate sustainably.

Water Usage

JSC used over 313 million gallons of potable water in FY 2015, which is a 4% decrease from FY 2014's water intensity. JSC's savings is enough water to fill 12 Olympic swimming pools.

4%

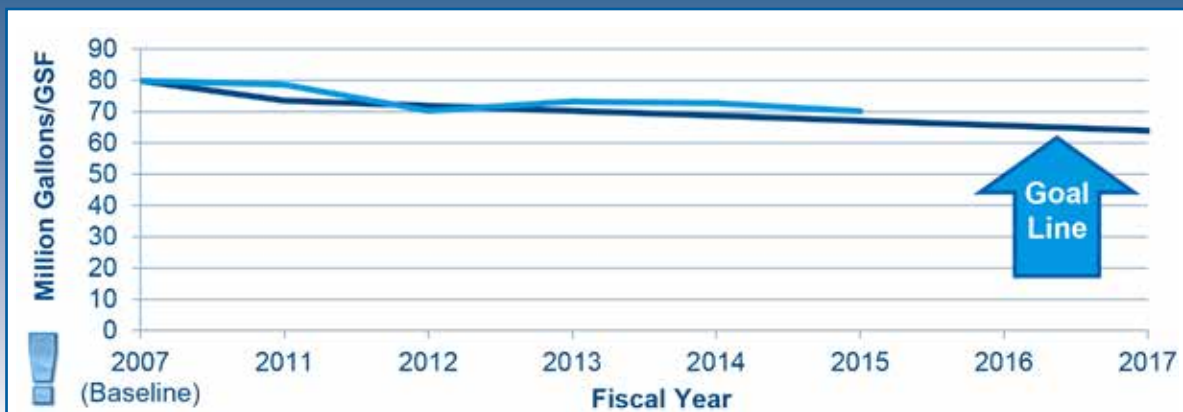
Let It Rain

In 2015, Hobby airport reported 77.12 inches of rain to the National Oceanographic and Atmospheric Administration. That is 70% above the average rainfall for Houston (45.28 inches), according to U.S. Climate Data.



Did You Know

Water Consumption



Goal: Reduce potable water use by at least 26% from FY 2007 through FY 2025. Water intensity is gallons per gross square foot (GSF).

New Water Distribution System

In FY 2015, JSC finished installing the new water lines around site. The 150,000 linear feet of new water pipe is enough to stretch from JSC to Downtown Houston's Toyota Center.



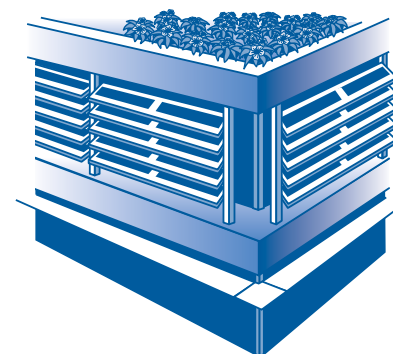
Shake Your Tail Fins

Visitors can now see the new Space Center Houston exhibit "The Shuttle and 747 Carrier" above the tree line on Saturn Lane. In FY 2015, JSC worked with Space Center Houston to provide water and sewer capabilities for the new exhibit.



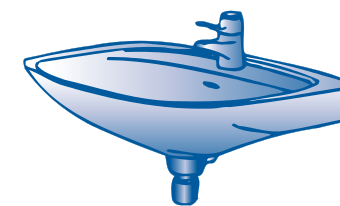
The Roof and Runoff

Green roofs help reduce stormwater runoff, and the Building 12 roof has diverted over 7.5 million gallons of stormwater since August 2012.



Waste Water

JSC generated and sent 229 million gallons of wastewater to the wastewater treatment plant. This is a 16% increase from FY 2014 generation.



FY 2016 Focus Areas



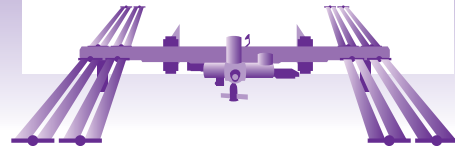
1. Initiate the renewals of the 5-year stormwater permit for JSC.
2. Initiate a project to update and rehabilitate JSC's sanitary sewer lines and lift stations.
3. Start development on a Nitrification Action Plan and associated sampling for the federal and state new drinking water requirements.
4. Encourage employees to listen for "rogue water flow" and help keep trash out of stormwater and storm inlets.
5. Continue identifying water conservation and recycling opportunities at JSC to reduce consumption.

Materials

Materials resources include anything that JSC buys, uses, sells, or disposes of to keep the site running and to accomplish the Mission. The JSC goal for Materials is to reduce unnecessary material purchases, reduce toxic material use, reduce waste generation, and convert waste into new materials, resulting in procurement and disposal savings. Specific topics include green purchasing, reuse, recycling, and pollution prevention.

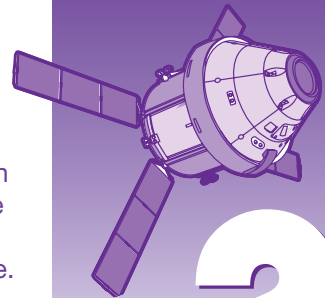
Diversion

JSC recycled 58% of its trash and 99% of construction and demolition debris in FY 2015, equaling 13.1 million pounds diverted from landfill. That is more than the weight of 14 International Space Stations.



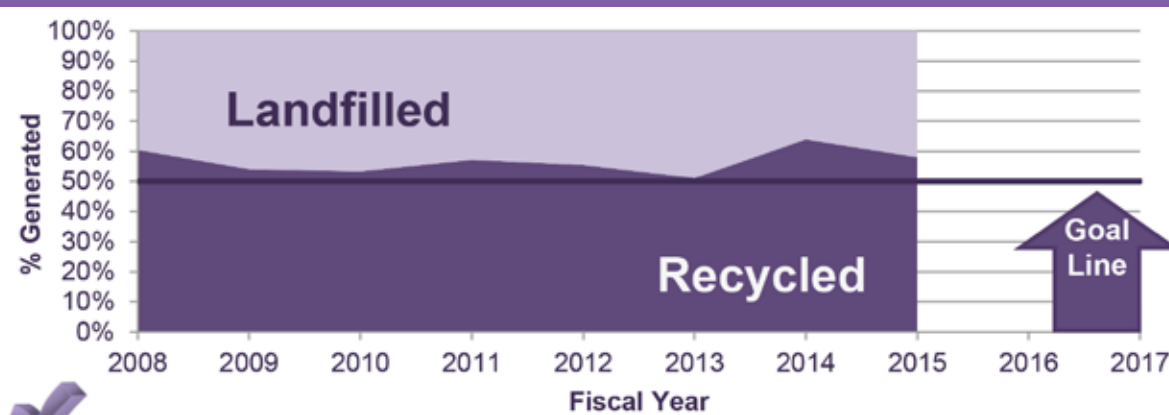
Making the Mock Up

In 2015, JSC personnel received over \$92,000 worth of excess parts, tools, and materials from the Reutilization and Distribution Branch to use in the construction the Orion mock up and operator console.



Did You Know

JSC Waste Diversion Goal



Goal: Divert at least 50% of nonhazardous trash from landfills by 2015.

Purchasing Power

The federal government spends a significant amount of money on supplies and equipment. Requiring the federal government to purchase environmentally preferable products leverages its enormous purchasing power to help create demand for cost-competitive environmentally preferable products.



Putting Organic Waste to Good Use

In FY 2015, JSC composted over 363 tons of organic material. That's over 10% of all nonhazardous waste generated at JSC.



Switch to Single Stream

In February of 2015, JSC switched to a combined recycling program. Now, JSC collects loose paper, loose cardboard, and bagged drink containers in one compactor. JSC now accepts #2 plastics and chipboard (i.e., cereal boxes) for recycling.



New Recycling Programs

In FY 2015, JSC implemented four new recycling programs: clean wood, x-rays, garnet from industrial water knives, and oily wastewater from skimmers. These programs diverted more than 50,000 pounds in the first year of implementation.



Tire Take Back

Aircraft tires are expensive and difficult to recycle. Now, JSC participates in an aircraft tire take-back program that saved JSC \$20,000 in recycling costs in FY 2015.



Perky Plants

In FY 2015, JSC composted over 18,000 pounds of coffee grounds, a 5,000-pound increase from FY 2014. That's a lot of caffeinated compost for JSC's plants.



Pollution Prevention

Compared to FY 2014, JSC reduced hazardous waste by 62% in FY 2015, and EF reduced hazardous waste by 11%. The 29,000-pound reduction helped JSC reduce hazardous waste disposal costs.



FY 2016 Focus Areas

1. Encourage greater participation in waste diversion programs, such as composting, recycling, and reuse.
2. Encourage employees to reduce printer and copier paper use.
3. Encourage the use of designated biobased products (i.e., products made from plants instead of petroleum).
4. Continue improving data quality for tracking recycling, disposal, and purchasing data.



Air

Air resources include both indoor and outdoor air quality. The JSC goal for Air is to maintain regulatory compliance with air regulations and work with regional efforts to reduce the release of specific air pollutants. Topics covered in this area mainly focus on outdoor air quality, greenhouse gas emissions, and reductions in toxic chemical use. Air quality is a topic that affects the whole Houston area, and JSC works with neighboring cities to improve air quality throughout the region.

Air Quality Action Days

In 2015, Harris County had 20 days that the air quality index ranked "Unhealthy for Sensitive Groups" (USG) and five days that ranked "Unhealthy." This is an increase from the four days ranked USG and no days ranked "Unhealthy" in 2014.



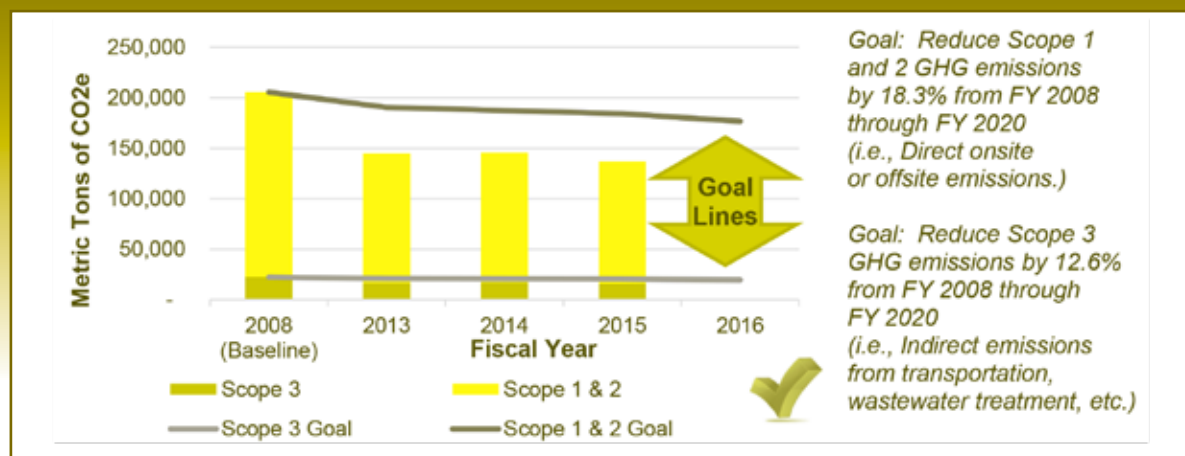
GHGs Going Down

From FY 2008 to FY 2015, JSC reduced total greenhouse gas emissions by 33%.

33%

Did You Know?

JSC Greenhouse Gases (GHG)



Cool as a Cucumber

Refrigerants can either be ozone depleting substances or greenhouse gases. In FY 2015, JSC improved the documentation to verify the "full charge" of refrigerants in chillers. This helps JSC comply with regulations concerning refrigerant leaks.



Fuel Efficient Fleets

JSC's fleet vehicles decreased their fuel consumption by 28% in FY 2015 compared to FY 2014. 51% of the total fuel consumed by JSC's fleet in FY 2015 was E85, an alternative to petroleum-based fuel.



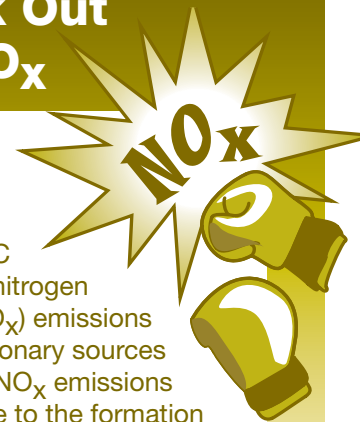
Air Quality? There's an App for That

Are you interested in today's air quality? Check out the Environmental Protection Agency's AIRNow website (<http://www.airnow.gov/>) that will give you daily air quality forecasts and notify residents about air alerts in their city. There even is an AIRNow app to get you information on the go.



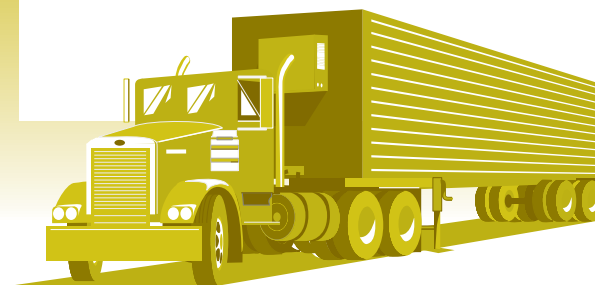
Knock Out the NO_x

From 2007 through 2015, JSC reduced nitrogen oxide (NO_x) emissions from stationary sources by 81%! NO_x emissions contribute to the formation of ground-level ozone and smog.



Transporting the SmartWay®

The Environmental Protection Agency's SmartWay Program allows freight transporters to improve supply chain efficiency and reduce greenhouse gas generation in a way visible to individuals choosing transportation companies. Look for SmartWay logos and SmartWay participants when choosing a transportation company.



FY 2016 Focus Areas



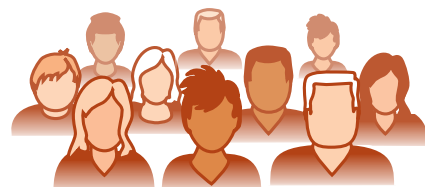
1. Renew JSC's main Title V Federal Operating Permit for air compliance.
2. Finalize the new Environmental database tracking system for air emissions to increase efficiency.
3. Continue providing air permitting and regulatory compliance support during procurement and construction phases of significant Facilities projects.
4. Develop an inventory of electrical switchgear equipment containing sulfur hexafluoride (SF₆), which has the highest global warming potential of all the greenhouse gases.

People

People affect every element of sustainability at JSC. Your decisions on how to accomplish tasks either use or save resources. Decisions like remembering to turn off lights and equipment when leaving for the day, following sustainable acquisition requirements, carpooling, or teleworking all make a positive difference. Increased awareness and communication, recognition and awards, strategic and environmental planning, and technology transfers all affect how individuals can get involved in making JSC more sustainable.

The Multiplier Effect

With around 10,000 employees, those small everyday changes can make a big difference when the entire site joins in. This year, pick one thing to improve the Center's footprint, and challenge your colleagues to do the same.



NASA Brain Power

The People Power of NASA is an incredible resource. NASA helps employees harness that power to solve all kinds of challenges through the [NASA at Work Challenge](#). Post a challenge, and let NASA brainpower help you solve it.



Did You Know

Sustainability Outreach Focus Areas

The JSC sustainability teams coordinate outreach efforts, focusing on specific topics over the course of the year. Each resource has two months to focus on outreach and increase awareness about how individuals can make positive changes to achieve Agency goals.

January February	March April	May June	July August	September October	November December
Land	Water	People	Air	Energy	Materials

New Employee Resource Groups

JSC added three more Employee Resource Groups (ERGs) in 2015:

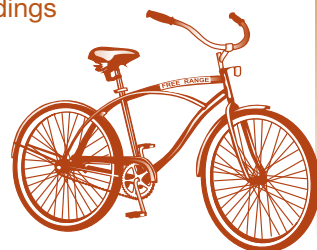
- Connecting Veterans ERG (ConVERG);
- No Boundaries ERG (NoBo); and
- Women Excelling in Life and Leadership ERG (WELL).



inclusion & innovation

Bikes are Better

In 2015, JSC started revitalizing the Free Range Bike Program. Efforts included repairing abandoned bikes throughout the site and making the bikes available for anyone onsite to use. Tire pumps are now available in several buildings for employee convenience.



Mind, Body, and Soul

Not only is JSC a fascinating place to work, JSC also has several resources that keep employees at the top of their game:

- Healthy and sustainable food options around site;
- Teleworking capabilities;
- Ergonomic assessments;
- Health and fitness opportunities and classes at the Gilruth Fitness Center; and
- [Employee Assistance Program](#) for assisting employees through transition periods or difficult times in their life.



Earth Right Now

NASA technology has provided an app called [Earth Now](#) that allows anyone to see the Earth's "vital signs." From a cell phone, anyone can now check out ozone levels, sea levels, water vapor, and the gravity field anywhere on the planet.



JSC Sustainability Teams

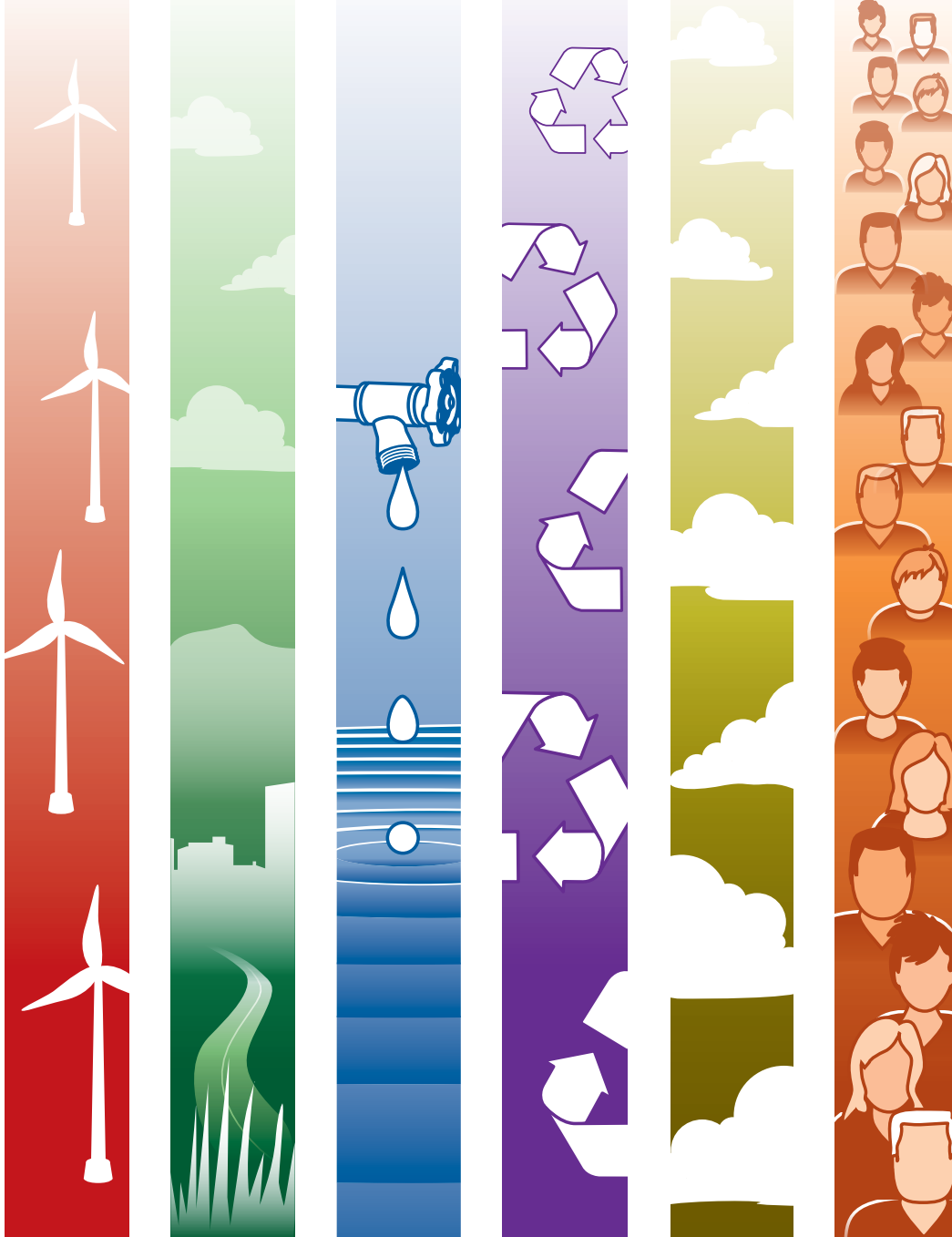
Do you want to get involved in improving JSC's sustainability? Join a team!

- The Sustainability Partnership Team (POC: JSC-Sustainability@mail.nasa.gov)
- The JSC Green Team (POC: JSC-Green-Team@mail.nasa.gov)
- The JSC Contractor Environmental Partnership (POC: [Jeni Morrison](#))
- The Environmental Stewardship Subcommittee (POC: [Sumera Ali](#))

FY 2016 Focus Areas



1. Coordinate an Energy Reduction Competition to encourage energy saving behavior among employees.
2. Coordinate a Bike-to-Work Day to encourage the use of alternative transportation to get to and through JSC.
3. Coordinate volunteer participation in the 2016 Trash Bash to clean up trash in waterways both onsite and adjacent to the Center in conjunction with local cleanup initiatives.
4. Increase participation from JSC employees and management in sustainable and environmentally friendly behaviors.



Are you interested in how JSC measures up against NASA's sustainability goals and targets? Check out JSC's sustainability status on the [JSC Sustainability Web page](#).

Do you have questions, suggestions, ideas, or success stories? Tell us about it! E-mail JSC-Sustainability@mail.nasa.gov with your story.

Join the JSC sustainability movement. Find out how you can help, and make a change.

Why? Because Every Effort Makes a Difference!