

# JSC

# Annual Sustainability Report 2014

## FY2014

**Water Consumed:**  
321,317,991 gallons

**Energy Used:**  
1,006,600 MMBTU  
(gas, electric, fuel oil)

**Paper Purchased:** 94 tons

**Petroleum Fuel Used:**  
26,344 gasoline gallon equivalents

**Alternative Fuels Used:**  
15,800 gasoline gallon equivalents

**Johnson Space Center**  
4,416,220 Gross Square Feet  
Over 8,900 Parking Spots  
1,600 Acres  
Over 7,000 Employees

## FY2014

**Disposed Non-Hazardous Waste:** 1,360 tons

**Disposed Hazardous Waste:** 18 tons

**Renewable Energy Produced Onsite:** 375,521 kWh

**Composted:** 182 tons

**Total Materials Recycled:** 3,679 tons

(Includes paper, cardboard, bottles, cans, scrap metal, construction/demolition debris, office supplies, pallets, tires, Industrial Solid Waste, and electronics)

## FY2014

**Air Emissions:**

**Carbon Dioxide (CO<sub>2</sub>e):** 145,506 metric tons

**Particulate Matter (PM):** 15.5 tons

**Nitrogen Oxides (NO<sub>x</sub>):** 6.73 tons

**Carbon Monoxide (CO):** 6.65 tons

**Sulfur Dioxide (SO<sub>2</sub>):** 0.1 tons

**Volatile Organic Compounds (VOCs):** 20.63 tons

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# 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) 2014 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 2014.



## NASA and JSC Sustainability Goals

<b>1</b>	<b>Greenhouse Gases (GHG)</b>	Reduce direct GHG emissions by 18.3% and indirect emissions (e.g., commuting, travel) by 12.6% by FY 2020 compared to FY 2008.	
<b>2</b>	<b>Sustainable Buildings</b>	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.	
<b>3</b>	<b>Fleet Management</b>	Reduce petroleum use by 2% annually, compared to FY 2005. Increase the use of alternative fuels by 10% annually through FY 2015.	
<b>4</b>	<b>Water Use</b>	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.	
<b>5</b>	<b>Waste</b>	Divert 50% of solid waste and 50% of construction and demolition debris from landfill.	
<b>6</b>	<b>Sustainable Acquisition</b>	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.	
<b>7</b>	<b>Electronic Stewardship</b>	Procure energy-efficient equipment rated per Electronic Product Environmental Assessment Tool (EPEAT) standards, and use best practices for computer operation and disposal.	
<b>8</b>	<b>Renewable Energy</b>	For FY 2013 and beyond, ensure that 7.5% of total electricity consumption is from renewable energy sources.	
<b>9</b>	<b>Climate Change Resilience</b>	Evaluate climate change risks to identify and manage the effects of climate change on operations and Mission in both the short and long term.	

# 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 consumption, as well as renewable energy sources and building efficiency.

## Reduction

In FY 2014, JSC reduced electricity and natural gas consumption by 2.6%, which is equivalent to supplying electricity to 654 houses for an entire year.



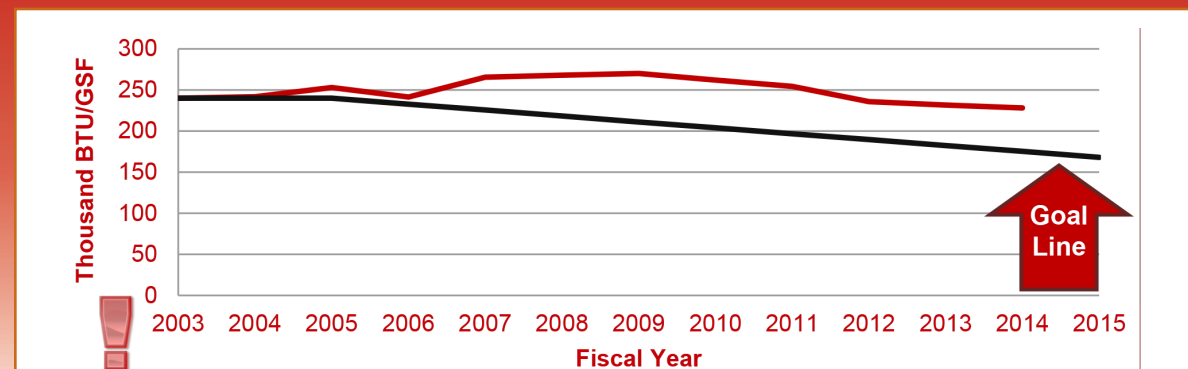
## Nights and Weekends

JSC reduces energy consumption by only 30% when personnel leave for nights and weekends. That means JSC is still running at 70% energy usage when most employees are not around.



## Did You Know

## JSC Energy Intensity



Goal: Reduce energy intensity by 3% annually (for a total of 30%) from FY 2003 through FY 2015. Energy intensity is British Thermal Units (BTUs) per gross square foot (GSF).

## Shine a Light on Energy Conservation

JSC replaced lighting and installed lighting controls in Building 46, which is estimated to save 364,000 kWh a year. That is enough saved energy to power 23 homes for an entire year.



## Got Gas?

In FY 2014, JSC installed additional natural gas meters in the 200 and 300 area buildings to help improve usage tracking and problem reporting. The more you know about usage, the more you can improve!

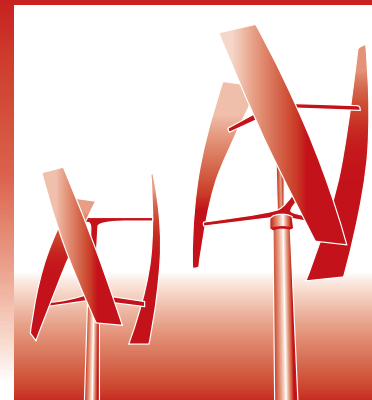


## Oughtn't You Better Audit?

Performing an energy efficiency audit on your building or home can help you find all kinds of ways to save energy and money, ranging from big projects to small improvements. In 2014, the JSC Energy Team performed comprehensive energy audits on 1.2 million square feet across the site to identify ways to conserve energy.



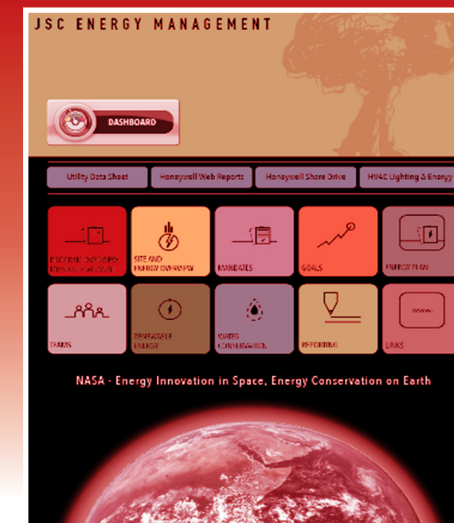
## Wild About Wind



Starting in FY 2014, JSC partnered with the U.S. Department of Energy to investigate how installing wind turbines on the roof of a building may change wind and rooftop conditions, especially when combined with a green roof. The study will help us better understand wind energy performance in urban areas and ultimately help improve wind turbine design.

## The More You Know...

The JSC Energy Team updated the Energy Dashboard on the JSC web site to include all of the Mall building steam and chilled water meter data, along with site-wide potable water meter data across the site. Now all employees can access building data to see how their efforts are making a difference!



## FY 2015 Focus Areas



1. Encourage behavior that saves energy, such as unplugging electronics when not in use and turning off lights in empty rooms.
2. Complete energy audits on 43 buildings (about 1.4 million square feet) to identify and prioritize energy efficiency projects and improve building and system operations.
3. Focus on reducing after-hour energy usage since usage only decreases by 30% when personnel leave for nights and weekends.



# 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.

## Footprint Reduction

In FY 2014, JSC reduced the Center's operational footprint by 29,631 square feet through strategic demolition of inefficient and outdated buildings. This reduction in footprint will allow JSC to construct more efficient facilities.



## Composting

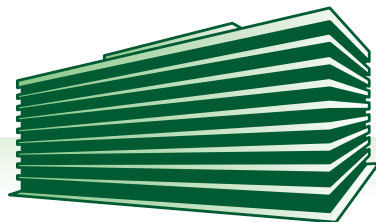
In FY 2014, JSC mulched and composted 182 tons of organic material to provide rich soil for JSC's onsite landscaping beds. That is well over the weight of the Shuttle Carrier Aircraft, a modified jumbo jet.



## Did You Know

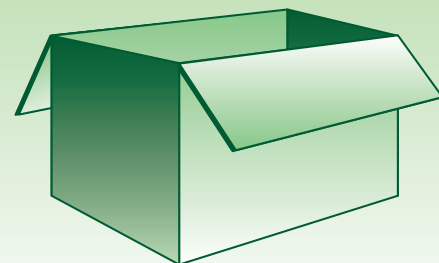
## JSC Making History

In FY 2014, JSC completed a 50-Year Historic and Architectural Survey, which identified 45 buildings throughout JSC, EF, and SCTF that are eligible for the National Register of Historic Places (NRHP).



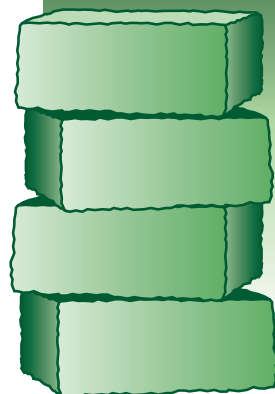
## Movin' On Up

To increase efficiency and recapture under-utilized space, JSC coordinated over 300 personnel / office moves to fill the Central Mall Area to design capacity. This allowed JSC to reclaim over 11,000 square feet of excess space and allows occupants to conduct housecleaning and excess old equipment and materials.



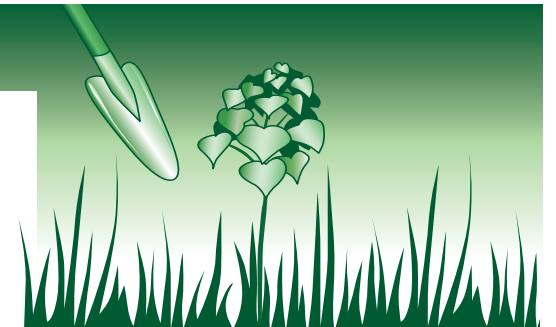
## Making Room for Efficiency

In 2014, JSC demolished Buildings 225 and 226 to make room for new, more efficient buildings. Building 226 was the first building constructed at JSC in December 1962, known then as NASA's Manned Spacecraft Center (MSC). The bricks from this eligible historic building will be reused onsite with a sign noting their special origin.



## Fighting the Invaders

As part of a larger effort to rehabilitate the native prairie and native forest onsite in FY 2014, JSC removed the invasive Chinese tallow tree from 13 acres and planted 12 acres with native Coastal Prairie seeds using a "no-till drill," a specialized seeder to prevent soil impacts from plowing.



## JSC's Future

In FY 2014, JSC started working to develop the next **JSC Master Plan**, which will determine the direction the Center will take from an operational standpoint over the next 20 years and beyond. Incorporating sustainability and resiliency principles into the Master Plan will help JSC increase efficiency in facilities and meet Federal and Agency goals.



## Reducing Wildlife Conflicts

In FY 2014, JSC worked with employees to increase awareness about wildlife interactions with humans. Consequently, deer-vehicle collisions were reduced by 85%, and bird-window strikes are down by 90%. JSC personnel also responded to 90 wildlife conflict calls during the year.



## Continuing on the Path to LEED

In FY 2014, JSC began construction on one of two new buildings that will be Leadership in Energy and Environmental Design (LEED) certified to add to the already 8 LEED certified buildings onsite. The Building 45 Annex and the new Building 21 Space Life Sciences Laboratory are both planned for completion in FY 2015.

## FY 2015 Focus Areas



1. Develop the Space Life Sciences Laboratory facility and finish renovating the Building 45 annex.
2. Continue removing invasive species and restoring 500 acres of Coastal Prairie habitat.
3. Maximize the use of laboratories and other Center spaces to reduce resource use.
4. Continue optimizing space utilization to help increase efficiency in facility use and to reduce the Center's operational footprint and required maintenance costs.



# 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 321 million gallons of potable water in FY 2014, which is a 0.6% decrease from FY 2013 water intensity. JSC's savings could provide water to 350 houses for a month.



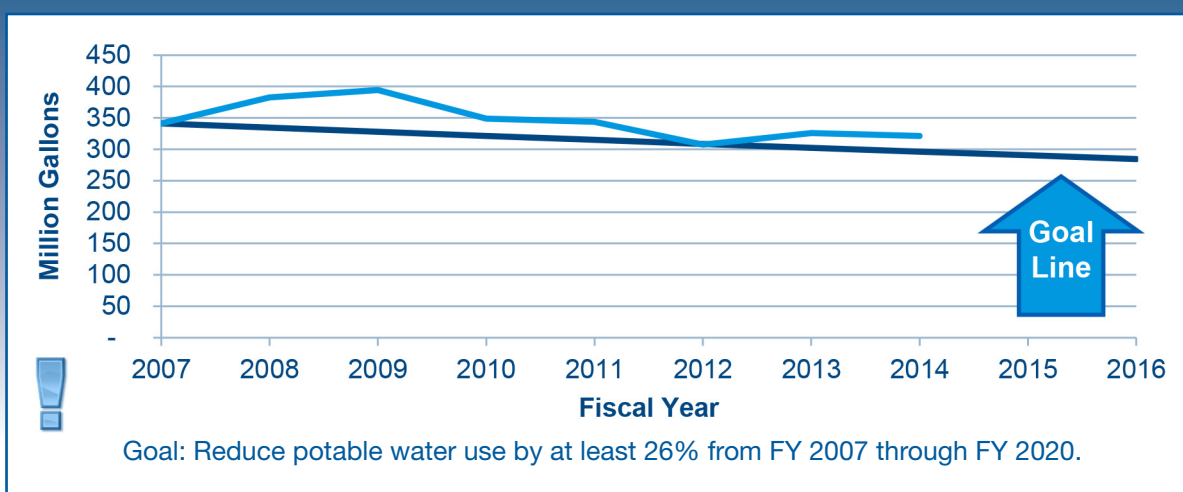
## Low Flow

Bathrooms use the largest percent of water in a single household, about 27% of overall water consumption. JSC helps reduce those impacts onsite by installing low-flow faucets and toilets in new and renovated buildings, such as Buildings 3, 20, and 12.



## Did You Know

## Water Consumption



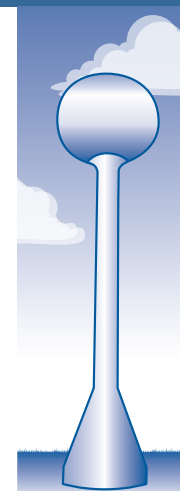
## Water Works

Since there are now water meters on all buildings, JSC added water meter data to the Energy Dashboard. Now employees can see how their energy and water consumption changes over time.



## Tower Upgrades

In FY 2014, JSC updated the automatic controls for the Building 40 Water Tower for potable water to ensure more efficient water usage.



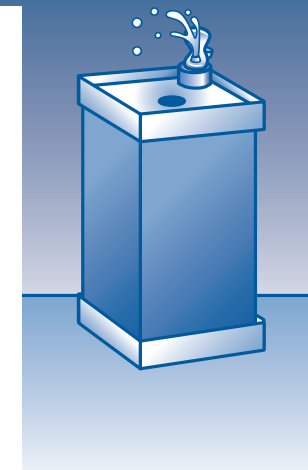
## Water Line Project Update

The water line project that started in 2011 to help update the aging, potable water system infrastructure is almost complete! The final step is to flush the lines to ensure the system is working properly. JSC will then be able to put an end to frequent waterline flushing!



## Drink up!

Did you know that the State of Texas requires JSC to test drinking water to make sure employees have safe drinking water? Instead of purchasing expensive bottled water, bring your own cup or mug to work and take advantage of all the water fountains throughout the site.



## Improving Sanitation

JSC finished replacing four sanitary sewer lift stations in FY 2014, which will help keep "the flow" moving. This next year, JSC will be gearing up to replace more aging sanitary infrastructure, which will increase efficiency and reduce the potential for problems across the site.

## FY 2015 Focus Areas



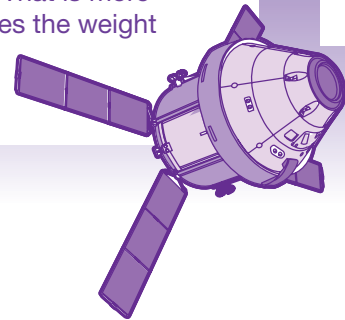
1. Encourage employees to conserve water whenever possible to get us back on track with federally mandated reduction goals.
2. Encourage employees to immediately report turf irrigation system leaks to Work Control (x32038) for repair.
3. Develop and implement projects to update pass-through water systems with circulating water systems to reduce water consumption.
4. Encourage employees to listen for "rogue water flow" and help keep trash out of stormwater and storm inlets.
5. Encourage employees to drink water provided site-wide rather than purchase expensive, bottled water.

# Materials

Materials resources include anything that JSC buys, 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 64% of trash and 98% of construction and demolition debris generated during FY 2014. Overall, JSC diverted 4.8 million pounds from landfill. That is more than 100 times the weight of an Orion spacecraft.



## Purchasing

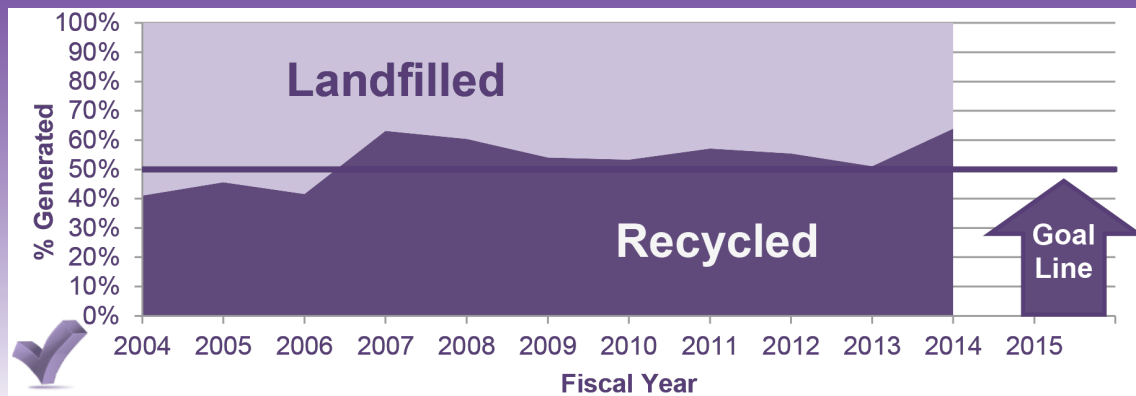
In FY 2014, JSC spent over \$2 million on environmentally friendly supplies, including items with recycled and biobased content that helped reduce environmental impacts.



## Did You Know



## JSC Waste Diversion Goal



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

## Caffeinated Compost

JSC's volunteer-driven Coffee-to-Compost Program expanded to include two new drop-off locations in the central Mall area, resulting in a 1,300-pound increase in shredded paper and more than a 10,000-pound increase in used coffee ground collection for composting.



## Improving Compliant Purchases



In FY 2014, JSC increased the amount of designated items purchased with recycled or biobased content from 54% to 76%. Choosing the environmentally conscious options for supply purchases reduces negative environmental impacts.

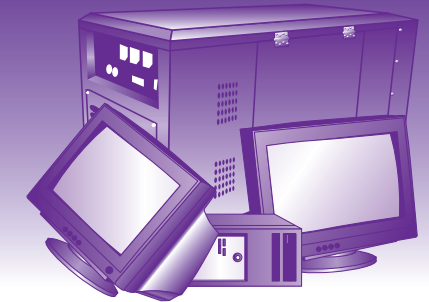
## Wood Recycling Pilot

After a successful pilot test that recycled 8,600 pounds of clean wood during a decommissioning project, JSC now is implementing a site-wide clean wood recycling program to help divert clean wood from landfills.



## Assessing the Excess

In FY 2014, JSC started tracking the amount of excess property that was diverted from landfill through sales and donations, which reported an additional 1.29 million pounds towards JSC's diversion rate.



## Industrial Solid Waste Recycling



There are regulated hazardous wastes that can also be recycled. In FY 2014, JSC recycled over 324,000 pounds of Industrial Solid Waste. Recycling these wastes avoids the need to incinerate these waste streams, which eliminates the environmental impacts from the combustion process.

## Paperless Procurement

JSC Procurement is in the process of going paperless, which would reduce paper usage by an estimated 1,618 reams (or 809,000 sheets) per year.



## FY 2015 Focus Areas

1. Evaluate Ellington Field's waste and recycling operations and assess future opportunities.
2. Encourage employees to reduce printer and copier paper use.
3. Compile a master list of products that are compliant with the various "green purchasing" program requirements, and make the list available to JSC purchasers and requestors.
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 (GHGs), 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.

## Fighting Smog

From 2007 through 2014, JSC reduced nitrogen oxide (NOx) emissions from stationary sources by 75%! NOx emissions contribute to the formation of ground-level ozone and smog.



## GHG Reductions

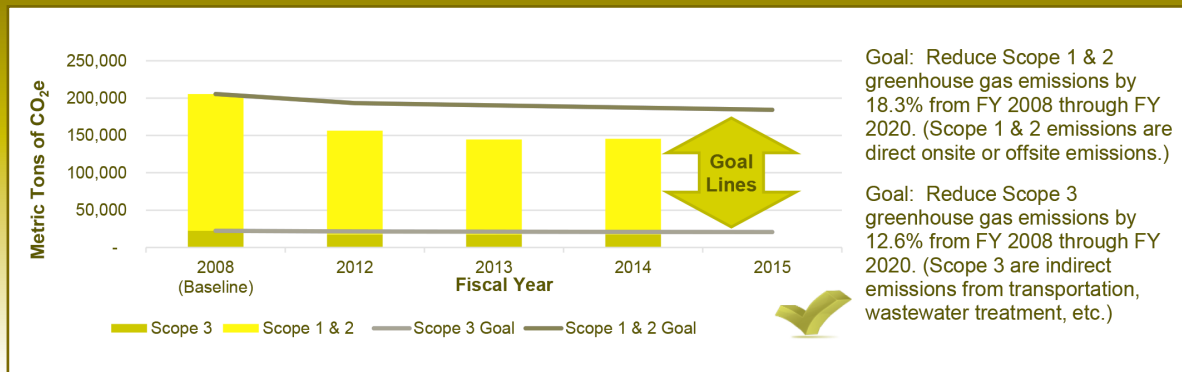
30%

From FY 2008 to FY 2014, JSC reduced total greenhouse gas emissions by 30%.



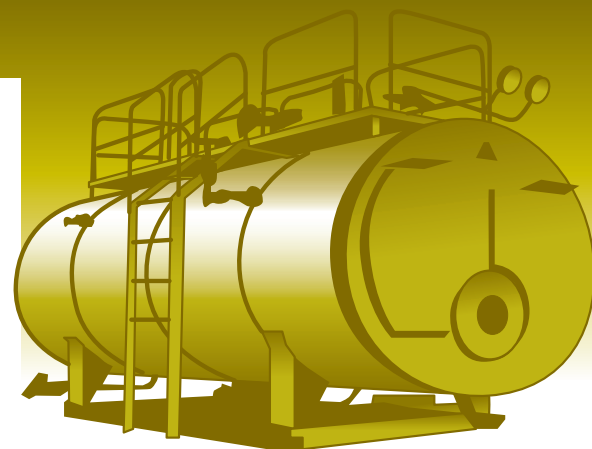
### Did You Know

## JSC Greenhouse Gases (GHG)



## The Power of Planning

Incorporating air pollution controls into the designs of projects can stop emissions before they start. In FY 2014, three significant projects included features for new air pollution controls, including the JSC Combined Heat & Power Energy Saving Performance Contract, the Building 24 Central Heating and Cooling Plant Boiler Replacement, and Building 48 Emergency Power System for Mission Control Repair Project.



## Tracking Generators

JSC now uses battery-powered Global Positioning System (GPS) tracking devices to easily track and document the 19 portable generators located across the site. This makes regulatory recordkeeping for air efficient and helps track locations at a moment's notice in case of emergencies.



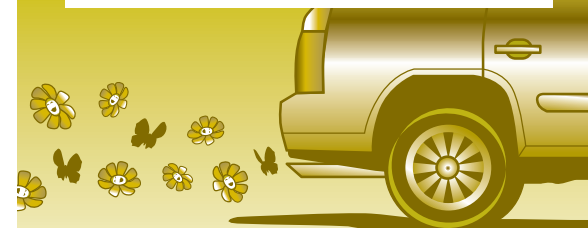
## Way to Go, Houston!

Did you know that Houston's ground-level ozone levels have improved 29% between 2000 and 2014, even with a population increase of over 34 percent? Way to go, Houston! Everyone can make a difference in air quality!



## New Car? Breathe Easier

Compared to 1970 vehicle models, new cars, SUVs, and pickup trucks are roughly 99% cleaner for common pollutants (hydrocarbons, carbon monoxide, nitrogen oxides, and particle emissions).



## No More Acid Rain

Over the past 30 years, power plants have cut sulfate emissions that cause acid rain by more than 55% across the eastern United States.



## FY 2015 Focus Areas



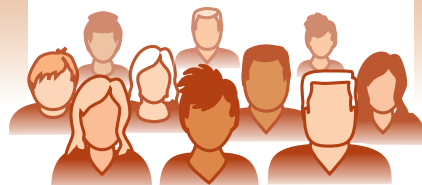
1. Renew JSC's main Title V Federal Operating Permit for air compliance.
2. Finalize the new Environmental database tracking system for air emissions to increase efficiency.
3. Continue providing air permitting and regulatory compliance support during procurement and construction phases of significant Facilities projects.
4. Encourage employees to replace high-VOC coatings and solvents with low- or no-VOC alternatives where possible.

# 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.

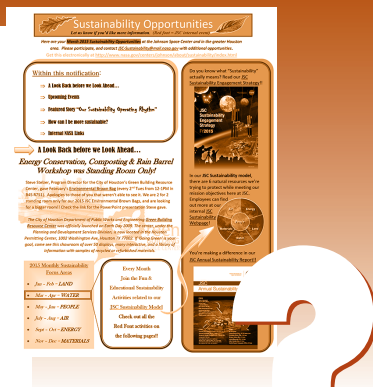
## JSC Population

JSC has about 7,000 employees and about 8,900 parking spaces. That is almost as big as the population of the City of Webster.



## External Web Site

JSC now has an external sustainability web site, where anyone can see the strides JSC is taking to become more sustainable. Check out JSC's external [Sustainability Web Site](#) today to find out how you can get involved.



## 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.

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

## Award-Winning Center Hero

In 2014, JSC Center Director and Center Sustainability Officer Joel Walker received a GreenGov Presidential Award for being a sustainability hero. Mr. Walker received the national award for his multi-faceted management approach to integrate a culture of sustainability at JSC.



## Employee Assistance Program

Every person will face challenges during their life, and the JSC [Employee Assistance Program \(EAP\)](#) provides services that assist employees and their dependents in adapting to changing environments. Topics include family and relationship problems, finances, grief and loss, stress and time management, conflict resolution, and more.



## JSC Sustainability Teams

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

- The Sustainability Partnership Team  
POC: Mike Ewert
- The JSC Green Team  
POC: JSC-Green-Team@mail.nasa.gov
- The JSC Contractor Environmental Partnership  
POC: Jeni Morrison
- The Environmental Stewardship Subcommittee  
POC: Alan Amor

## What Interests You?

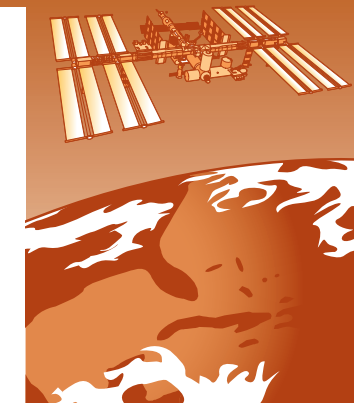
In FY 2014, JSC held nine very successful Environmental Brown Bag discussions during lunch breaks throughout the year, helping to educate employees on new technology, good environmental practices, and sustainable options for work and home. Suggest topics that interest you for upcoming discussions by emailing [JSC-Environmental-Office@nasa.gov](mailto:JSC-Environmental-Office@nasa.gov).



## Technology

Facilitating the transfer of space technology to applications here on Earth is an important part of the NASA and JSC Mission. Here are three ways you can find out more about NASA technology:

- NASA's [Spinoff Web site](#) provides information on technology currently demonstrating benefits to the public.
- NASA's [Tech Transfer Portal](#) provides information on NASA technology and software available for licensing and/or use.
- NASA's [TechPort Web site](#) provides information on ongoing NASA projects and technology development.

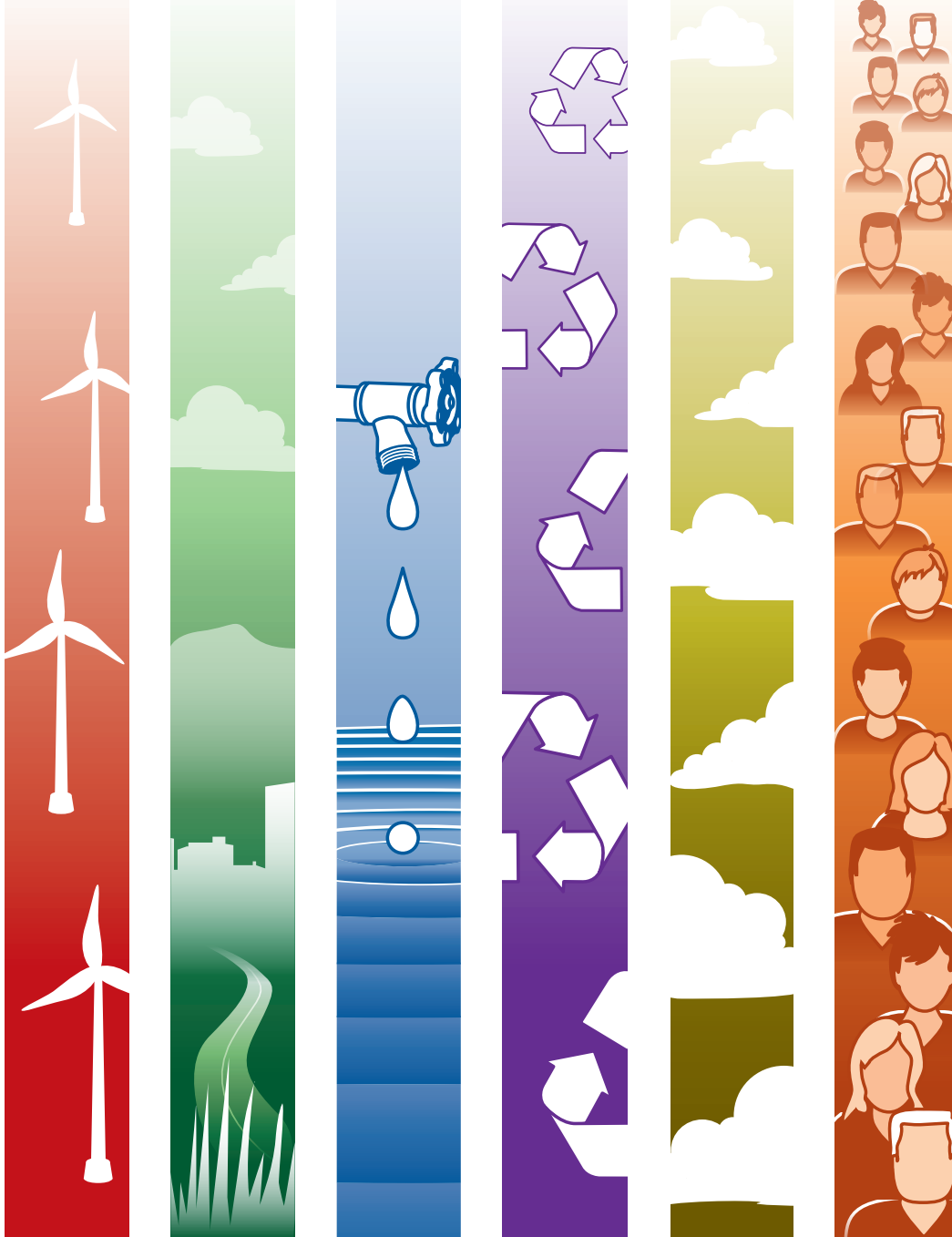


## FY 2015 Focus Areas

1. Introduce sustainability and environmental topics to interested employees through more Environmental Brown Bag Lunch presentations.
2. Increase the use of alternative transportation (i.e., cycling, carpooling, public transportation, and walking) to get to and through JSC.
3. Integrate sustainability goals and recognition opportunities for positive behavior into required inspections and walk-throughs.
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](mailto: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!***