

National Aeronautics and
Space Administration



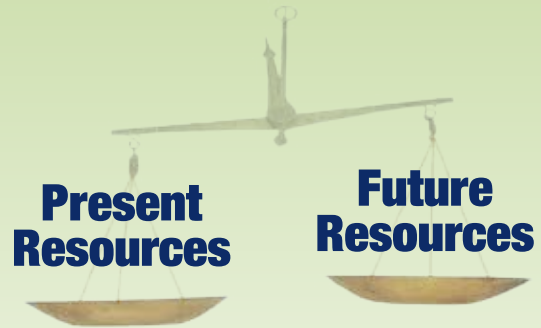
JSC Sustainability Engagement Strategy FY2016



What is Sustainability?

Sustainability is “development that meets the needs of the current generation without compromising the needs of future generations.” (<http://www.epa.gov/sustainability/basicinfo.htm>)

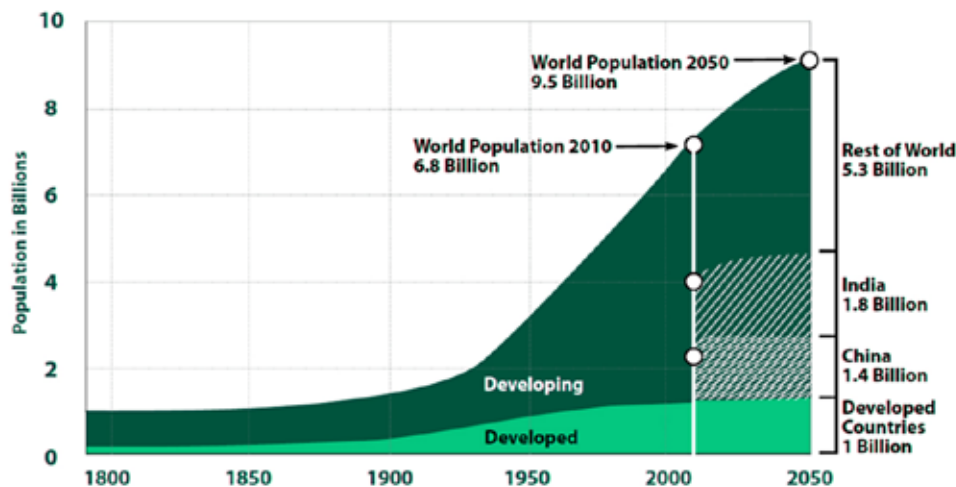
To achieve sustainability, we must balance present resource needs with future resource needs by considering the Triple Bottom Line (economic, environmental, and social considerations) in all of our decisions making.



At present, what type of an impact do you think you're having? Calculate your ecological footprint using the personal calculator at www.footprintnetwork.org. You may rationalize that you are just one of almost 7.5 billion people on this planet, so how can your efforts or lack thereof possibly make a difference? Consider the IPAT formula.

Environmental Impact = Population x Affluence x Technology

First proposed by Paul Ehrlich and John Holdren in the early 1970's through a dialogue with Barry Commoner, the IPAT formula relates environmental impact (I) to population (P), affluence (A) and technology (T)



<http://www.un.org/apps/news/story.asp?NewsID=45165>

The Great Challenge:
*“How do we provide enough energy and clean water for 9 to 10 billion people and their descendants to flourish?”**

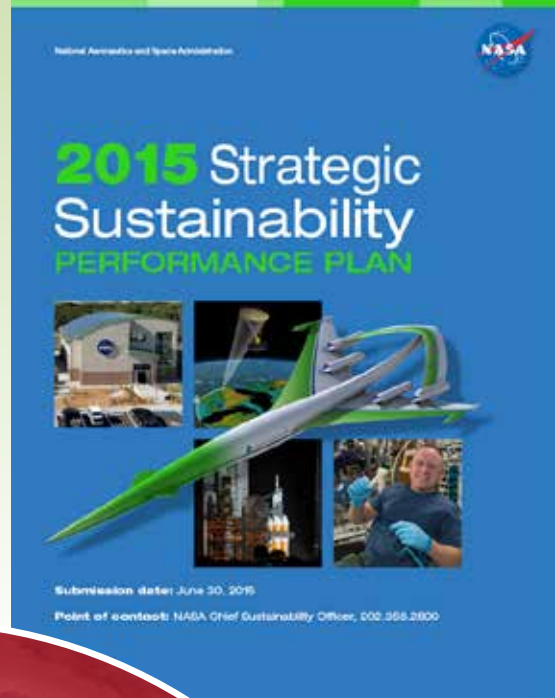
**Without destroying the planet, other species, or the stable climate system upon which we all depend.*

“The greatest shortcoming of the human race is our inability to understand the exponential function.”

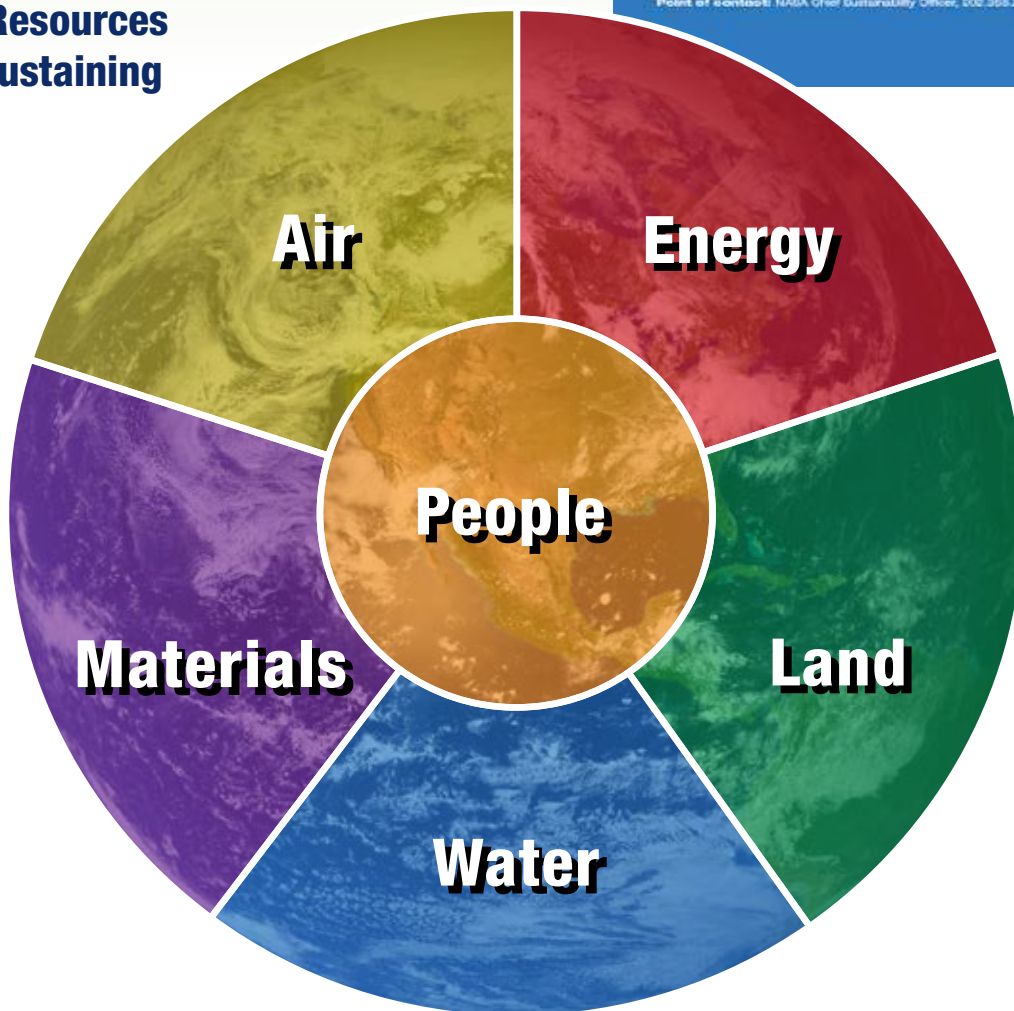
Albert A. Bartlett (1923-2013)

JSC Sustainability Model

Executive Order 13693 requires all U.S. Federal Agencies create a Strategic Sustainability Performance Plan (SSPP). NASA's SSPP can be found electronically on the NASA Sustainability Portal: <http://www.nasa.gov/agency/sustainability/>.



Natural Resources we are Sustaining



What are our Sustainability Goals?

Executive Order 13514 Federal Leadership in Environmental, Energy, and Economic Performance

GOALS		STATUS
	<p>Goal 1: Greenhouse Gases GOAL: Reduce direct GHG emissions (onsite or offsite) by 18.3% and indirect emissions (e.g., commuting, travel) by 12.3% by FY2020, compared to 2008</p>	
	<p>Goal 2: Sustainable Buildings GOAL: Facility Energy Intensity: Reduce energy consumption/GSF of building area by 3% annually from FY2003 baseline for FY2006 - FY2015 (30% Total) GOAL: Sustainable Buildings: At least 15% of Agency's existing buildings meet Guiding Principles by FY 2015</p>	 
	<p>Goal 3: Fleet Management GOAL: Reduce petroleum use by 2% annually, compared to 2005; increase use of alternative fuels by 10% annually through FY2015</p>	
	<p>Goal 4: Water Use GOAL: Reduce potable intensity (gallons/sq ft) by 2% each year, compared to 2007; reduce use for industrial, landscaping, and agricultural by 2% each year, compared to 2010</p>	
	<p>Goal 5: Waste Reduction GOAL: Divert 50% of solid waste (excluding construction and demolition debris); divert 50% of construction and demolition debris</p>	
	<p>Goal 6: Sustainable Acquisition GOAL: >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</p>	
	<p>Goal 7: Electronic Stewardship GOAL: Procure energy-efficient equipment rated per Electronic Product Environmental Assessment Tool (EPEAT); use best practices for computer operation and disposal</p>	
	<p>Goal 8: Renewable Energy GOAL: For FY13 and beyond, 7.5% of agency's total electricity consumption is from renewable energy sources</p>	
	<p>Goal 9: Climate Change Resilience GOAL: Evaluate climate change risks to identify and manage the effects of climate change on the agency's operations and mission in both the short and long term</p>	
	<p>Goal 10: Energy Performance Contracts GOAL: Award \$73.9M investment value in Energy Savings Performance Contracts and Utility Energy Services Contracts by the end of 2016</p>	

How do I get more involved?

My Sustainability Checklist

- Participate in one of our monthly sustainability opportunities (Google: NASA JSC Sustainability)
- Spread the word about your own interests and efforts at work and home
- Brainstorm additional opportunities and share your success stories with JSC-Sustainability@mail.nasa.gov
- Join the JSC Sustainability List Serve by entering your e-mail address at <https://lists.nasa.gov/mailman/listinfo/jsc-sustainability>
- Join one of our JSC Sustainability Teams

- **The Green Team** is a group of JSC employees and contractors that seek to motivate and educate the JSC community to be more sustainable at work and at home. The Green Team arranges educational lectures and tours regarding recycling, energy conservation, green living and more.

Learn more at the internal [JSC Green Team website](#).

- Since 2004, the **JSC Sustainability Partnership Team (SPT)** combines space technology and technical ideas with solutions to terrestrial problems. The SPT strives to improve environmental sustainability at JSC and increase JSC's exposure to 'dual use' technologies, while engaging the technical workforce in solving JSC's institutional (a.k.a. terrestrial) sustainability problems.

Please contact [Mr. Mike Ewert](#) to be part of the JSC Sustainability Partnership.

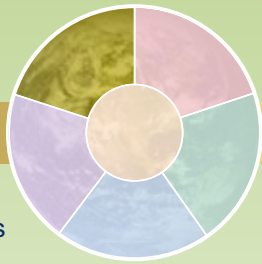
- The **Contractor Environmental Partnership (CEP)** includes onsite and offsite contractor volunteers that work together to find solutions to common sustainability and environmental problems. The CEP pilots programs and projects at a contractor level and collaborates on how to implement successful solutions onsite. The CEP also coordinates community outreach events, such as the electronic recycling events at Space Center Houston.

To find out more about our ongoing efforts, such as the Coffee to Compost Program, please contact [Ms. Jeni Morrison](#).

- The **Environmental Stewardship Subcommittee (ESS)** provides bi-directional communication between the JSC Environmental Office and JSC organizations on environmental issues that affect the Center and cross organizational lines.

Please contact the [JSC Environmental Office](#) to get added to the distribution list.

Questions, Ideas, Suggestions, or Success Stories?
E-mail JSC-Sustainability@mail.nasa.gov



Air

The Air Resource at JSC includes several types of emission activities. Stationary Sources includes both fixed stack sources and fugitive sources. Mobile Sources include Government and personal vehicles, government aircraft, and non-road equipment. Indoor Air Quality includes tracking Hazardous Material Usage and Air Conditions and Exposure Assessments for such parameters as lead, mold, dust, and asbestos.



2050 Vision for JSC: In 2050, JSC will have reduced the use of hazardous chemicals by at least 50% through aggressive product substitution. Through the process of renovating our buildings, asbestos will have been eliminated. The Combined Heat and Power (CHP) project at Building 24 continues to provide clean, low cost reliable electricity and byproduct steam at high level of efficiency, also reducing Greenhouse Gases (GHGs). The JSC Government vehicle fleet will be 100% electric.

The JSC Air Program

The JSC Air Program endeavors to maintain site compliance with applicable Federal and State Air regulations as measured by zero Notices of Violation or Enforcement Actions.

The JSC Air Program strives to assess new projects and programs that may have environmental air compliance requirements, and provide novel recommendations that reduce emissions and satisfy requirements at the lowest cost while meeting JSC schedules.

Sustainability Goal #1

Reduce direct GHG emissions (onsite or offsite) by 18.3% and indirect emissions (e.g., commuting, travel) by 12.6% by FY 2020, compared to FY 2008. (Related to ENERGY)

- a. The Energy Manager is implementing several energy savings programs that result in reduced GHG emissions.
- b. The Environmental Office has a JSC-specific FEMP GHG emission report to track the emission metric results.

Here's what you can do: Consider teleworking to reduce your vehicle emissions from commuting to work.



Sustainability Goal #6

Sustainable Acquisition to ensure contracts use of products and services that are non-ozone depleting or are non-toxic or less toxic alternatives. (Related to MATERIALS)

What this resource is doing at JSC to meet that goal: JSC Procurement is including FAR sustainability clauses in all applicable construction and other relevant service contracts.

The Environmental Office works with several other organizations to track and manage the use of toxic and hazardous chemicals and materials, including ozone-depleting substances (ODSs). For example, JSC eliminated the last of the Class I ODS (most damaging) materials from use in 2011, and is gradually phasing out use of the Class II ODS.

Here's what you can do:

For your home or auto A/C, select a reliable service contractor. Make sure they use refrigerant recovery equipment during service. And request that service technicians locate and repair leaks instead of "topping off" leaking systems.



And that's not all. Contact the Air Resource POC (Kirk Hummel) to learn more and get involved.



Energy

Includes:

Conservation and reducing use of Electricity and Natural Gas, as well as promotion of Renewable Energy.



2050 Vision for JSC: By 2050 JSC will exceed federal energy goals, with an efficient Combined Heat and Power (CHP) central plant serving energy efficient facilities for a conservation minded workforce. JSC will feature cutting edge renewable and alternate energy technologies in partnership with Engineering to put into practice “Energy Innovation in Space, Energy Conservation on Earth”.

Sustainability Goal #2

Sustainable Buildings

What this resource is doing at JSC to meet that goal: The energy intensity (energy used per square foot) is being reduced by implementing energy conservation projects and eliminating waste identified in energy audits. Energy intensity is also sensitive to the efforts of everyone at JSC to reduce power usage.

Here’s what you can do: Follow Energy Saving Tips like reducing energy using equipment in your work areas (especially refrigerators) and participating in Superflex. Report any energy wasting issues to your Facility Manager or directly to the Work Control Center.

Sustainability Goal #3

Renewable Energy

What this resource is doing at JSC to meet that goal: Because of low conventional energy costs and relatively low potential, Renewable Energy projects at JSC have a poor payback. However, limited installations allow JSC to stay current with the technology. In addition, partnering with Engineering to find space based technologies with terrestrial applications has the potential to provide breakthroughs in renewable energy production.

Here’s what you can do: Keep alert for renewable energy opportunities, and discuss any ideas with the JSC Energy Manager for partnerships and technology demonstrators.

Sustainability Goal #8

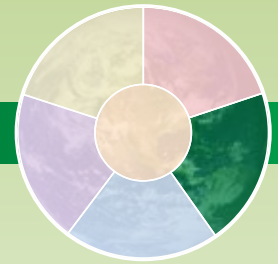
Energy Performance Contracting

What this resource is doing at JSC to meet that goal: Energy Saving Performance Contracting allows federal facilities to obtain energy savings immediately and, when the financed amount is paid off, gain the financial savings too. The Combined Heat and Power (CHP) central plant, a \$142M revenue neutral project which will be paid off over 23 years, will provide electricity and steam to JSC much more efficiently than the local utility while providing a high degree of energy security.

Here’s what you can do: Enjoy the benefits of more efficient and reliable power, heating and cooling knowing that in the event of a severe storm or blackout much of JSC will still be running.



And that’s not all. Contact [Kevin McCue](#), JSC Energy Manager, for more information.



Includes:

**Facilities • Utilities • Grounds • Wildlife (Flora & Fauna)
Master Planning • Cultural Resources**



2050 Vision for JSC: Site completely Net Zero, all grounds covered with native species, new construction adapted to projected climate change.

Sustainability Goal #2

LEED Construction – Building 21 – Health and Human Performance Laboratory

1. Benefits - Consolidates multiple buildings into a single, highly functional and efficient 117,878 sf facility resulting in a 10% reduction in footprint
2. LEED Silver design promotes sustainability and energy efficiency
3. New facility will be at an elevation of 21 ft greatly reducing risk of storm surge floods

Here's what you can do: Look for sustainable practices around your home. Select energy and water efficient appliances when replacing, schedule an energy audit with your power provider, or research rainwater harvesting techniques. Find many more tips at <http://www.sustainablebabysteps.com>

Sustainability Goal #10

In 2015, an estimated 200 breeding pairs of colonial nesting waterbirds nested and hatched their young on JSC. The heronry located around a now defunct cooling canal supports huge population of birds including anhingas, little blue herons, cattle egrets, black-crowned night herons, snowy egrets, and green herons. This breeding colony is monitored and protected as part of the JSC Wildlife Management Program.

Here's what you can do: Experts estimate as many as a 100 million birds are killed each year when they collide with very clear or very reflective windows. Home owners can mitigate this impact to bird populations by drawing blinds or curtains across transparent windows and covering reflective windows from the outside to make them more visible to passing birds. Bird window collisions are very common in the Houston area during fall (September-October) and spring (April- May) migration.

And that's not all. Contact [Lynn Lefebvre](#) or [Matt Strausser](#) to learn more and get involved.





Water

Includes:

**Potable Water • Fire Suppression Water • Re-use Water
Storm Sewer • Sanitary Sewer**



2050 Vision for JSC: Water conservation will be a routine mindset. Daily water habits of personnel will include conservation of this essential valuable resource. Re-use water systems will be commonly seen across the site for turf irrigation and the supply for sanitary sewer fixtures. Rainwater collection ponds will be abundant and used for non-potable water needs on site.

Sustainability Goal # 4

Improve water use efficiency and management by reducing potable water consumption intensity (gal/gsf) by 36% in FY 2025 through reduction of 2% annually from 2007 baseline.

What this resource is doing at JSC to meet that goal: Construction is nearing completion to split the potable and fire suppression water services. JSC's water usage can be reduced as a result of less flushing of the water system, needed to maintain required disinfection residuals throughout the system.

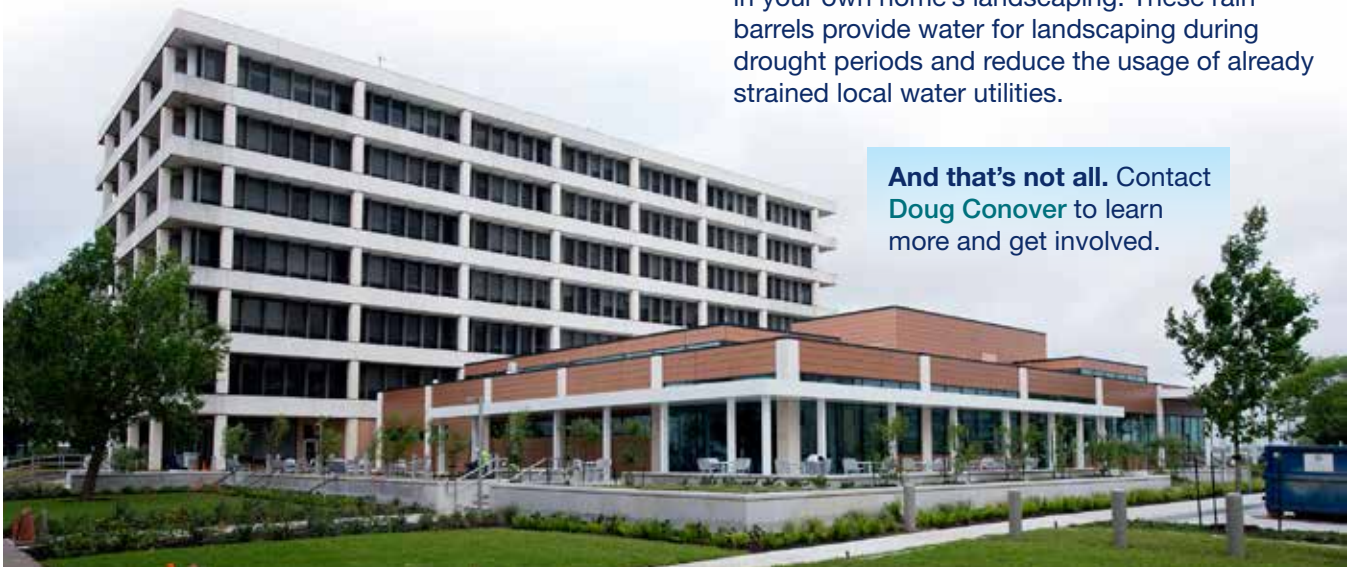
Here's what you can do: Be vigilant and initiate corrective water conservation actions for any wasteful practices of water use either during personal use or equipment which uses potable water for cooling at work. Install a system which recirculates cooling water or has other cooling means.

Sustainability Goal # 4

Improve water use efficiency and management by reducing industrial, landscaping, and agricultural (ILA) water by 2% annually through FY 2025 from the FY 2010 baseline.

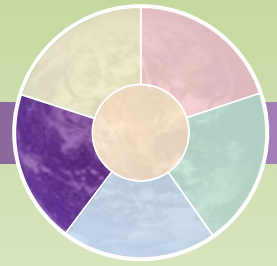
What this resource is doing at JSC to meet that goal: New sustainable buildings at JSC include rain water catchment basins to collect and reuse rain water. The water is used for irrigation of landscaping. Building 20 utilizes this feature. The Green Roof at building 12 absorbs rain water as it falls rather than allowing it to run off into the storm water system. Both of these use the collected rain water for irrigation and thus reduces the use of potable water and enhances the JSC campus. The new JSC clinic collects rain water in a catchment system to allow gradual percolation into the soil and controlled discharge. This reduces storm water discharge into local estuaries.

Here's what you can do: Install rain barrels at your home to collect rainfall for reuse as irrigation in your own home's landscaping. These rain barrels provide water for landscaping during drought periods and reduce the usage of already strained local water utilities.



And that's not all. Contact [Doug Conover](#) to learn more and get involved.

Materials



Includes:

Purchasing • Use • Disposal



2050 Vision: Recycling is a natural part of managing office and construction waste, and each facility has an easily accessible recycling center. Purchasing catalogs automatically offer “green” choices such as recycled or biobased content, lower energy use, and less toxic products. Sharing economies are common for items such as hazardous materials and office supplies; and employees utilize technology and electronic media to the maximum extent possible to reduce the need for single use or temporary products.

Sustainability Goal #1

95% of contracts have sustainable acquisition requirements

- Conduct organizational audits on the contracts that are required to purchase the largest quantities of recycled and biobased content items but have problems meeting the goals.
- Compile a list of compliant products to make it easier for purchasers to find products that are both technically and sustainably compliant.
- Provide product demonstrations to provide additional resources to purchasers to assist with compliant product selection.
- Create a Procurement and Environmental working group to help both organizations identify barriers to compliance with SA requirements and improve compliance.

How you can help: If you purchase materials or specify material or process requirements, familiarize yourself with the sustainable acquisition requirements. Report compliant purchases to the Environmental Office.

Significant links and resources:

Centerops.jsc.nasa.gov/je – center resources

Earth911.com – where to recycle anything

Sftool.gov – sustainable acquisition catalogue of products

Sustainability Goal #2

Divert 50% or greater each of Municipal and Construction waste from landfills

- Implement a wood recycling pilot project to divert broken pallets and clean wood from the landfill.
- Increase our composting program by taking shredded paper and increase the number of volunteers who contribute used coffee grounds and tea bags from their work places.
- Provide information and outreach about waste diversion opportunities at work and at home for all employees.



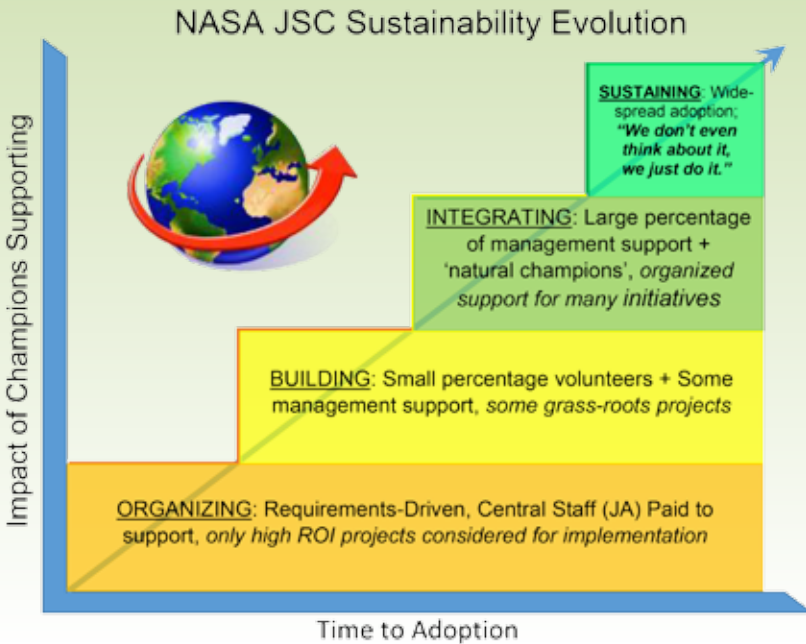
How you can help: Recycle, and keep trash out of the recycling. Find alternative uses for things that you would normally throw away, both at work and at home.

And that's not all. Contact [Michelle Fraser-Page](#) to learn more and get involved.



People

Our JSC Sustainability initiatives have been maturing very quickly. You are to thank for that. We're no longer in the ORGANIZING phase, just supporting a few projects here and there with only paid support personnel. Our center is swimming between BUILDING and INTEGRATING. People all across JSC have volunteered their time to promote sustainability both at work and home. This fluctuates with our overall mission to promote human spaceflight at JSC. Please help us continue to make significant differences sustaining our natural resources. Let's ultimately get to a point where sustainability is something "We don't even think about; we just do it" as our Center Operations Director, Mr. Joel Walker, suggests. How will you make a difference now and by 2050?



Awareness: JSCs Sustainability Operating Rhythm

This strategy is aimed at inspiring awareness and motivation change in the areas that are still low to moderate impact and cost to mitigate. It's published every first quarter of the FY. Additional references that support this are the JSC Energy Dashboard, the JSC Monthly Sustainability Opportunities, and our JSC Annual Sustainability Report (published every 3rd quarter).



This information is always available to you by Googling: [NASA JSC Sustainability](#). Or e-mail JSC-Sustainability@mail.nasa.gov with specific questions.

What do you think JSC will look like in 2050?

What should we be doing? Do you have a sustainability success story you'd like to share (at home or at work)? Draw it, write it, and share it to JSC-Sustainability@mail.nasa.gov.

Desalination Plant
and Bioregenerative
Wastewater treatment



Sustainability Exhibit at
Rocket Park and Space
Center Houston

Employee Electric Car
Charging and more no
energy options

No more
fence line

Net Zero Energy,
Water, and Waste

Green Roofs
all over JSC

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