

Sustainability: A NASA Perspective and Strategy for Success



Rich Wickman

**Deputy Director, Environmental Management Division
NASA HQ**

May 2005



NASA's Vision

**To improve life here,
To extend life to there,
To find life beyond.**

The NASA Mission



To understand and protect our home planet

To explore the Universe and search for life

To inspire the next generation of explorers

...as only NASA can.





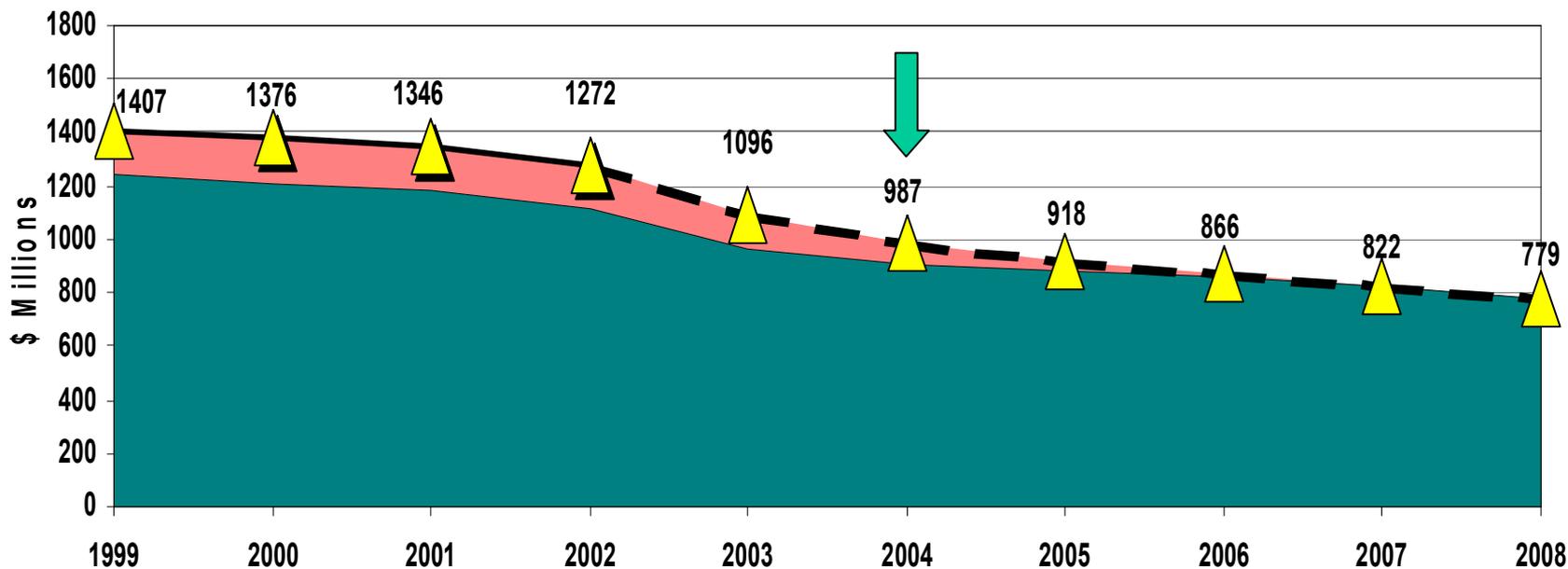
Environmental Compliance and Restoration Program Mission

- Environmental Cleanups
- Capital compliance (construction) projects
- Agency-wide environmental initiatives
 - Environmental Functional Reviews
 - Environmental Management Systems
 - Pollution Prevention & Sustainability



NASA's Environmental Liability – FY 2004

(\$ in Millions)



All Other Sites

Plum Brook Reactor

Total Environmental Liability

TARGET = A minimum of at least a dollar for dollar reduction in unfunded cleanup liability defined as Total Environmental Liability at the end of the previous fiscal year plus amounts estimated for newly discovered cleanups sites or changed site conditions encountered during the current fiscal year minus amounts budgeted toward closures and remediation in that fiscal year.

Budget Projections by Center (FYs 2007 - 2011)

(\$ in Thousands)

CENTER	FY 07	FY 08	FY 09	FY 10	FY11
ARC	1,861	3,759	2,187	2,256	2,256
DFRC	605	500	500	500	500
GRC	1,761	1,394	1,462	946	946
GRC-PBR	600	0	0	0	0
LaRC	700	500	500	500	500
GSFC	1,253	1,166	1,049	1,157	1,157
WFF	2,363	3,300	2,605	3,405	3,405
JPL	5,565	6,000	5,500	6,000	6,000
JSC	3,709	4,613	4,152	4,037	4,037
WSTF	6,700	7,000	5,500	5,500	5,500
KSC	18,276	13,805	16,085	18,406	18,406
MSFC	7,913	7,586	12,759	8,408	8,408
MAF	2,000	2,000	1,050	1,050	1,050
SSC	1,659	2,767	2,774	2,649	2,649
HQ-EMD	5,000	5,536	3,972	5,381	5,380
TOTALS:	59,965	59,926	60,095	60,195	60,194

NOTE: Full Cost Values



FY07 Full Cost Loading

Procurement:	\$51.6M
Personnel:	\$2.7M
Travel:	\$0.1M
Center G&A:	\$3.1M
Service Pools:	<u>\$2.4M</u>
Total:	\$60.0M

**Note: NASA-wide workforce is 25 Civil Service FTE
and 50 contractor WYE**





Major Remediation Projects

Significant multiyear projects entering or continuing cleanup phase:

- JPL Groundwater Remediation - \$10.0M
- WSTF Groundwater Remediation - \$6.7M
- KARS Park Phase II @ KSC - \$4.3M
- SSFL Cleanup Implementation Phase - \$4.0M
- MSFC Cleanup Implementation Phase - \$2.4M

NOTE: Above are project estimates for the FY07 effort (procurement dollars only).





JPL Groundwater Cleanup Operable Unit 1 - Onsite





JPL Groundwater Cleanup Lincoln Avenue Water Company Ion Exchange System - Offsite





KARS Park Shooting Range Phase 1 Excavation





Issues and Concerns

- Plum Brook Reactor Decommissioning
 - Buried/embedded piping condition may require more costly alternative to abandon in place
 - Preliminary estimate of \$43 - \$103M above current \$152M project budget
 - Budget impact will occur in FY06 - FY07 timeframe
 - Tiger team evaluation and more reliable cost estimate and schedule due July 1, 2005
 - Current Nuclear Regulatory Commission (NRC) requirement is to complete decommissioning by 2007
 - Will likely require NRC approval of revised decommissioning plan and “Possess but not Operate” license extension





PBS Reactor Buried/Embedded Piping



Deteriorated 4- and 6-inch radioactive piping

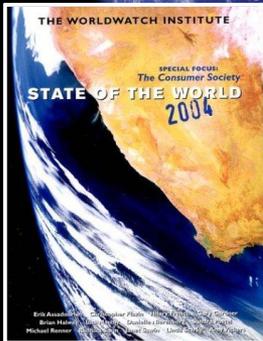
A Global Perspective

life supporting
resources

declining

consumption of
life supporting
resources

rising





Toxics in the Environment

The cover of the 2002 Toxics Release Inventory (TRI) Public Data Release Report. It features the EPA logo at the top left, the year "2002" in large white font, and the title "Toxics Release Inventory (TRI) Public Data Release Report" in white text. Below the title are four circular images: a brown textured surface, a blue sky with white clouds, a blue rippling water surface, and green grass with white dew drops. At the bottom left, it says "EPA 260-R-04-003" and "June 2004".

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

2002

Toxics Release Inventory (TRI)
Public Data Release Report

EPA 260-R-04-003
June 2004

US facilities reported 4.79 billion pounds of toxic chemical releases to air, land, and water in 2002

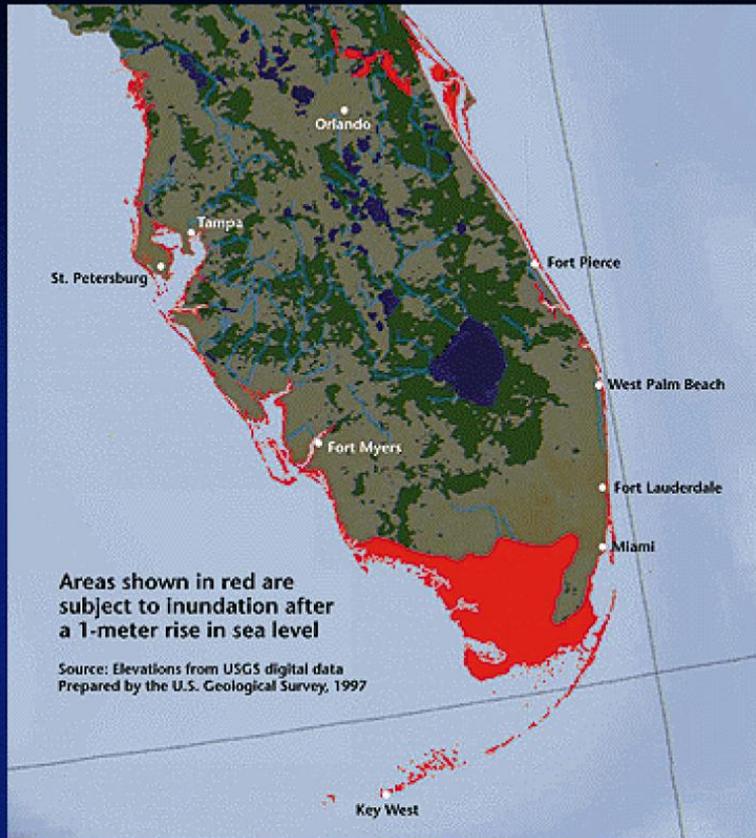
Persistent bioaccumulative toxic (PBT) chemicals accounted for almost half a billion pounds (e.g., lead, mercury, and dioxin)

315 federal facilities reported 85.2 million pounds of toxic chemical releases

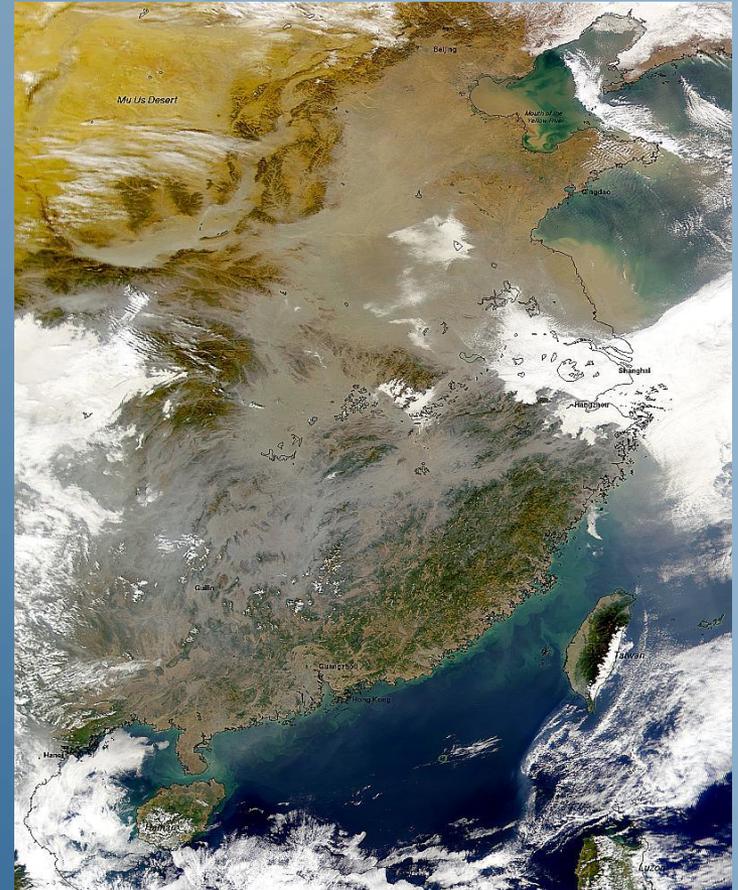


Pollution and Climate Change

South Florida Shoreline Change after a 1-Meter Rise in Sea Level



From : seawifs.gsfs.nasa.gov/.../chinapollution.html



From : John P. Holdren (Harvard University) 2003 "Risks from Global Climate Change: What do we know? What should we know?" at Institutional Investors' Summit on Climate Risk United Nations.



What is Sustainability?

Sustainability is:

Performing our mission today in ways that preserve our ability to perform our mission tomorrow.

A small, circular icon of a globe showing the Earth, located in the bottom left corner of the slide.

Sustainability is not a new way of doing business. It is refocusing, fine-tuning, and realigning existing practices, policies, and efforts.

Vision for Space Exploration

“ To Advance U.S. Scientific, Security, and Economic Interests Through a Robust Space Exploration Program”

From The Earth

To the Moon

To Mars

And Beyond





What is Sustainability?

Another Definition:

Securing the mission for
multigenerational
deployment while
enhancing our community
and the environment.

*This definition ties in the triple bottom line of
equity, economics and the environment.*





What is Sustainability?

Another Perspective:
Sustainability is the capacity
of a system to engage in
the complexities of
continuous improvement
consistent with deep values
of human purpose.



Factors of Sustainability

- Mission
- Economics
- Community
- Security
- Environment



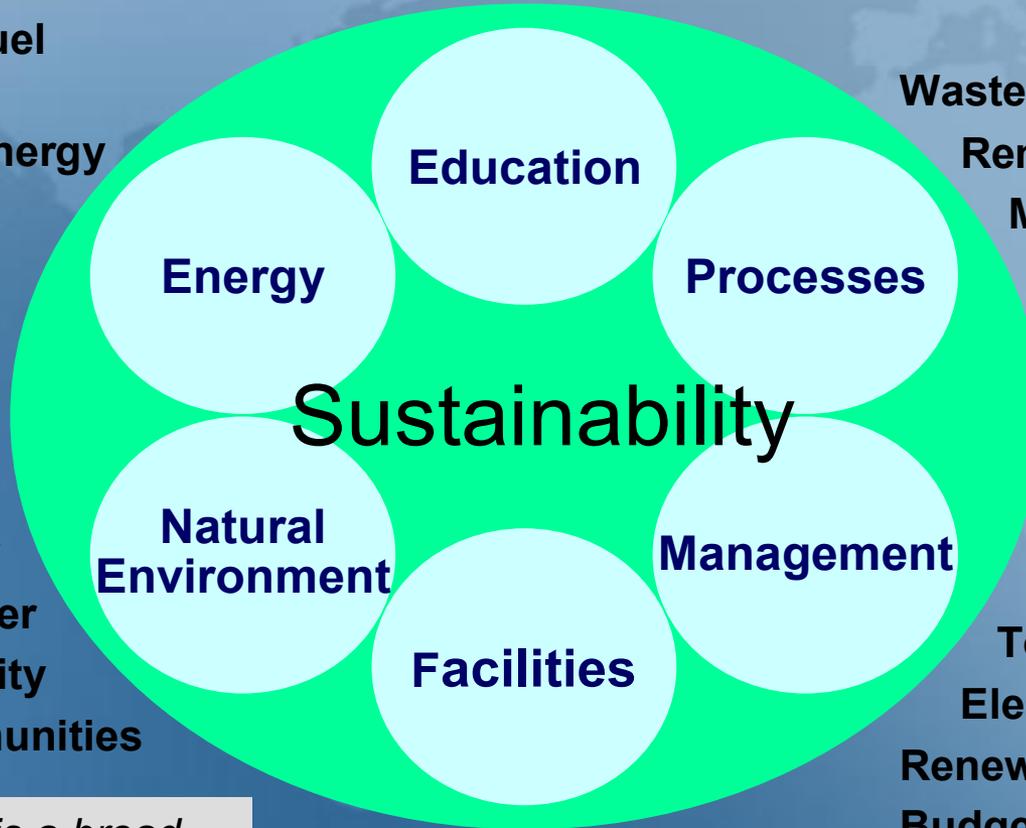


Sustainability on the Ground: Key Elements and Enabling Capabilities

Training & Development
Collaboration & Outreach

Alternative Fuel
Vehicles
Renewable Energy
Conservation

Waste Source Reduction
Renewable Materials
Material Substitution
Recycling/Reuse
Information Tech.



Clean Air
Clean Water
Biodiversity
Healthy Communities

Benchmarking
Metrics
Total Life Cycle Costs
Electronic Government
Renewable Procurement
Budget and Performance

Sustainability is a broad group of practices. Many elements are already in place.

Master Planning
Design and Construction
Transportation



“One NASA” AFV Strategy Results

Fiscal Year	2002	2003	2004
• AFV acquisitions	49.0%*	93.0%*	198.0%*
• Petroleum reduction	10.6%	13.6%	15.3%
• Alternative fuel consumption	15.3%	9.4%	27.5%
• Average MPG increase	1.0	3.1	2.6

* Includes credits for dedicated compressed natural gas vehicles and use of biodiesel (B20)





Facility Energy Efficiency

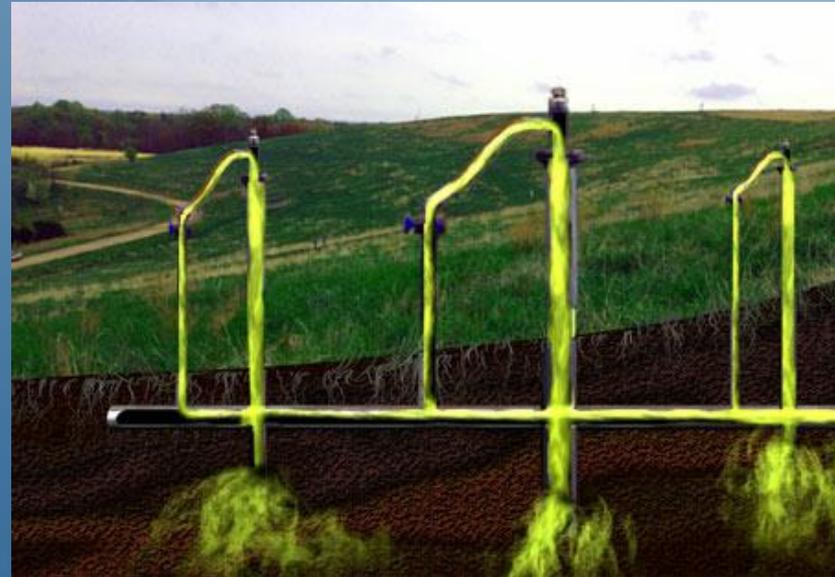
- FY 2005 is Executive Order milestone year
- Currently on track to meet 2005 goals and working towards 2010 goals

Facility Type	Percent Below Baseline		
	2004 Actual	2005 Goal	2010 Goal
Non-Mission Variable	31.5%	30%	35%
Energy Intensive	17.6%	20%	25%



Renewable Energy Purchases

- JSC began buying renewable energy credits in March
 - 40 million KWh electricity annually from biomass
 - 20% of site's electricity use
 - Cost premium \$16K/yr (0.0004 \$/KWh)
- GSFC buys landfill methane
 - 227 million Btu, FY 2004
 - 60% of site's gas use
 - \$1.4 million annual cost savings





On-site Renewable Energy

- Applications
 - MSFC new Building 4600
 - 34.7KW rooftop solar photovoltaic system
 - Photovoltaic powered parking lot lighting
 - KSC Film Storage Building
 - Solar thermal system regenerates desiccant
 - Evacuated tube heat pipe collectors





NASA's 1st LEED Certified Building



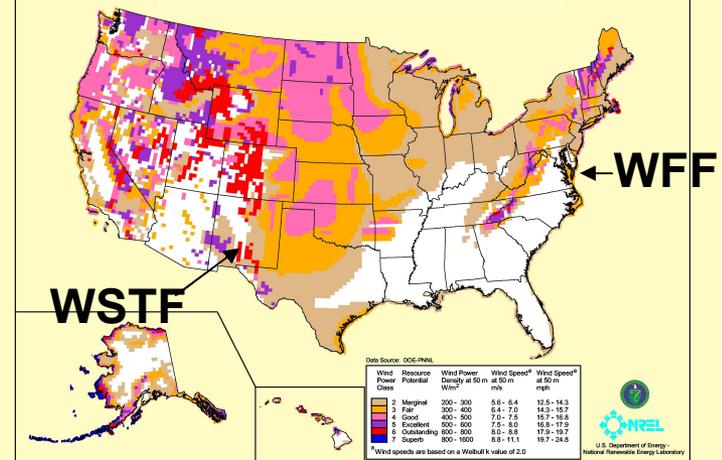
MARSHALL SPACE FLIGHT CENTER
OFFICE BUILDING 4600
SOLAR PARKING LOT LIGHTS



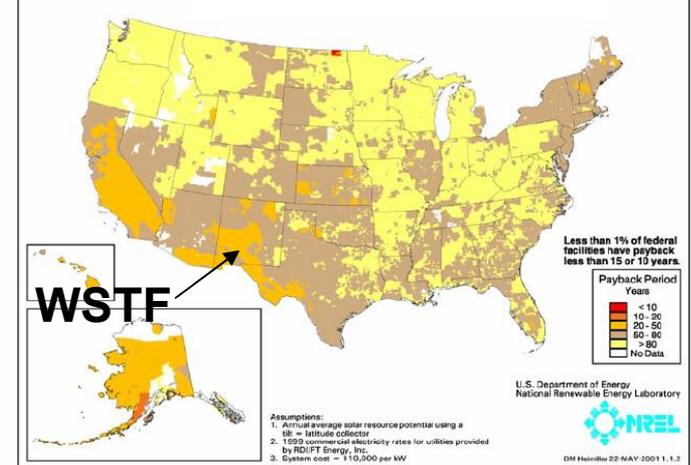
On-site Renewable Energy

- Studies
 - WSTF studying integrated technologies to power ground water remediation
 - Solar photovoltaic
 - Wind turbines
 - Fuel cell with storage
 - WFF studying wind energy potential under Department of Energy grant

Wind Resource



Solar Resource





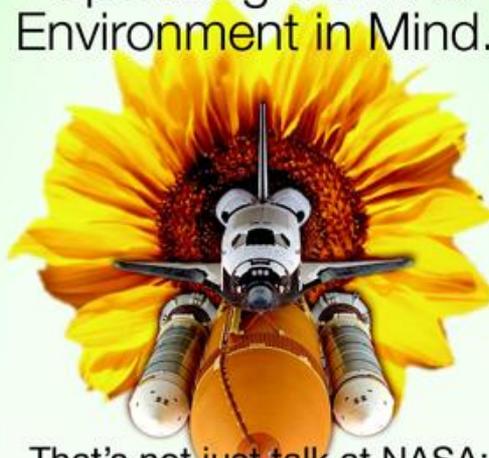
The Way Forward

- Elevate sustainability to the strategic level & identify goals and objectives.
- Integrate Sustainability into Environmental Assessments.
- Develop less material-intensive means of creating scientific value and place greater emphasis on using technology, know how, and information systems to create mission value more sustainably





Operating with the Environment in Mind.



That's not just talk at NASA;
it's the NASA way.

NASA Environmental Policy

- Prevention of pollution
- Conservation and sustainability of resources
- Restoration and remediation
- Compliance with laws and regulations

Key Environmental Aspects

- Sustainability
- Environmental impact reviews
- Historic and cultural resources
- Restoration and remediation of NASA facilities

http://www.hq.nasa.gov/office/codej/codeje/je_site/ems/about_ems.html

Questions?

