NASA Sustainable Facilities and the Guiding Principles

Eugene Mszar, LEED AP
Facilities Engineering Division
NASA Headquarters
eugene.a.mszar@nasa.gov
202.358.2292

NASA SUSTAINABLE FACILITIES TIMELINE

1. Initial Facilities Policy Memo

1. Signed by Facilities Director September 2003
2. All new construction and major renovations (> $500K) beginning in 2004 meet LEED Silver and strive for Gold

2. Strategic Initiative Investment (SII) Account

1. Dedicated funding (Strategic Investment Initiative Account) for energy related projects showing a favorable return on investment
2. Project proposed to target existing buildings

3. Updated Policy Memo

1. Continues Policy for minimum of LEED Silver for NC and MR
2. Requires meeting the Guiding Principles, which are included in NASA NPR 8820 update
3. Identifies major differences between LEED and Guiding Principles
    1. LEED has no specific credits for integrated design, moisture control, and process water conservation
    2. LEED has no requirement for an EMS nor a benchmark model
    3. Earn at least 10 points under Energy and Atmosphere (EA-1, Optimize Energy Performance credit)
    4. All designs must be at least 30% more efficient than ASHRAE 90.1
4. Provides a crosswalk between the Guiding Principles and LEED 2009

NASA SUSTAINABLE FACILITIES TIMELINE (cont.)

4. Sustainable Facilities Training Offered to Centers

1. 3 day session provided for staff at each Center involved in facility construction and major renovation
2. Since February 2012, 4 Centers have hosted sustainable facilities training
3. Although focus is on LEED, corresponding Guiding Principles are identified

5. Post Occupancy Evaluations

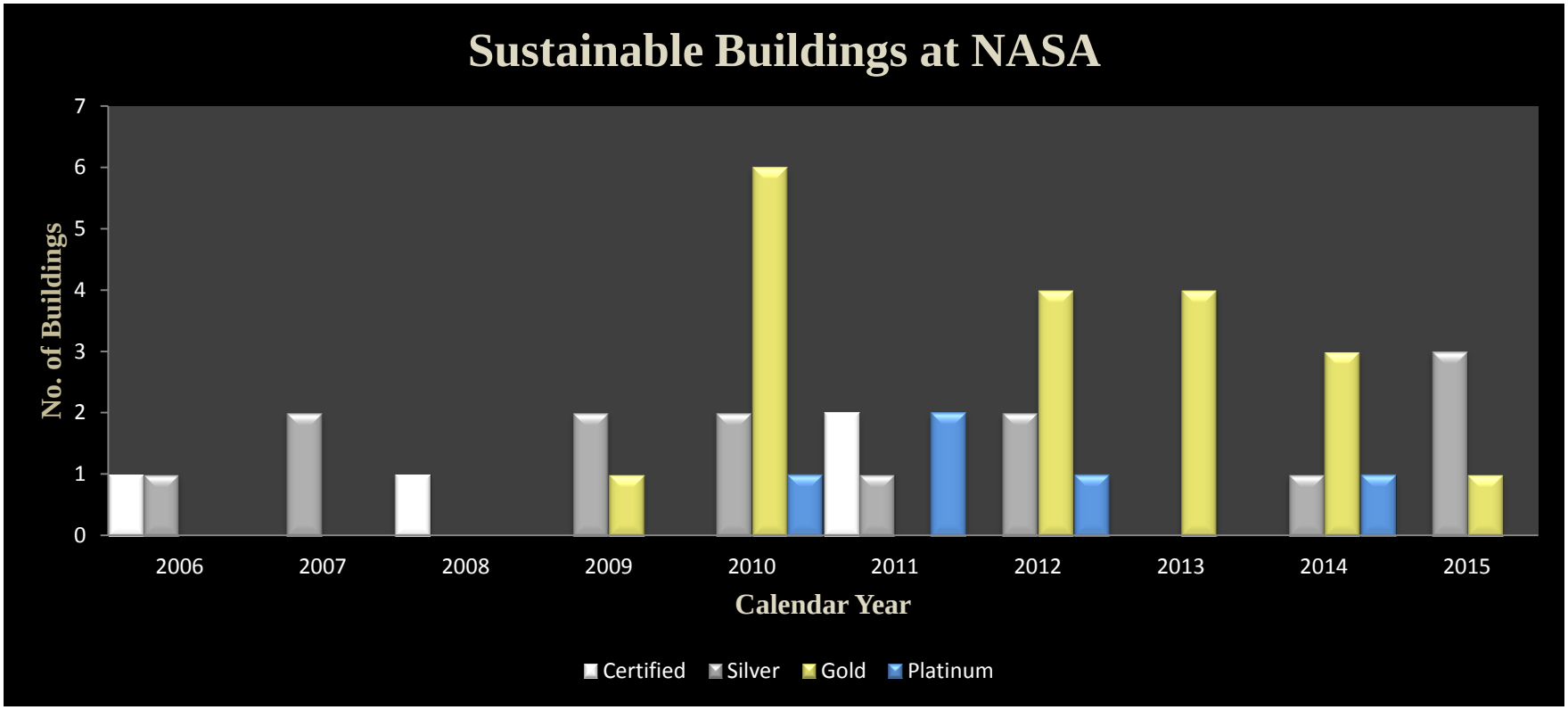
1. Surveys planners, engineering, construction, occupants and O&M personnel
2. Identifies and provides lessons learned for future projects

NASA SUSTAINABLE FACILITIES

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*	TOTAL*
CERTIFIED No. Bldgs. Area (gsf)	1 12,266		1 15,821			2 237,664					4 265,751
SILVER No. Bldgs. Area (gsf)	1 139,074	2 21,666		2 27,857	2 14,778	1 126,973	2 88,702		1 21,901	3 206,104	14 647,055
GOLD No. Bldgs. Area (gsf)				1 194,602	6 599,536		4 30,794	4 186,868	3 158,631	1 133,000	19 1,303,431
PLATINUM No. Bldgs. Area (gsf)					1 83,205	2 89,725	1 49,022		1 35,652		5 257,604
TOTAL*	2 151,340	2 21,666	1 15,821	3 222,459	9 697,519	5 454,362	7 168,518	4 186,868	5 216,184	4 339,104	42 2,473,841

* Indicates value to date within Fiscal Year 2015

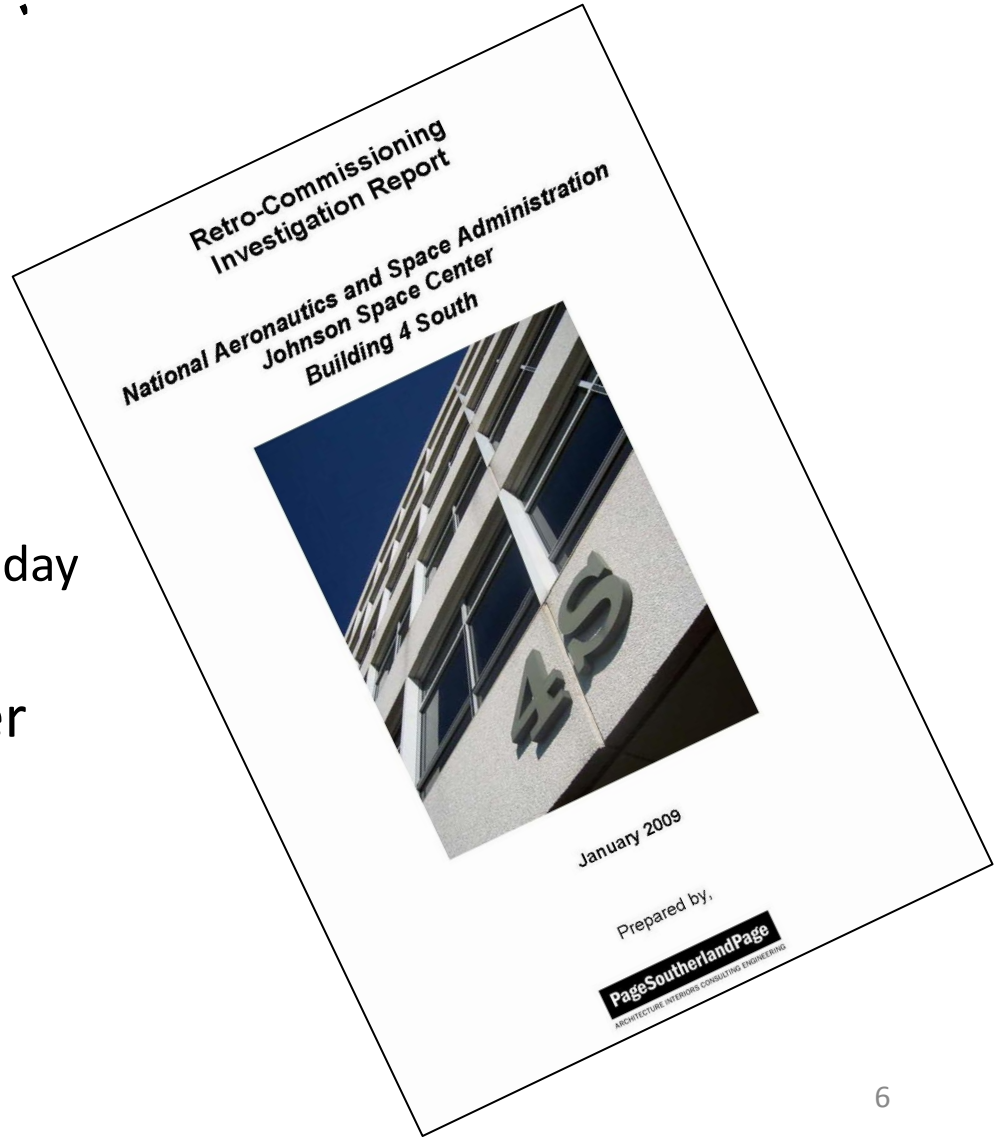
NASA LEED BUILDINGS



Retro-Commissioning Example

Johnson Space Center – Building 4 South

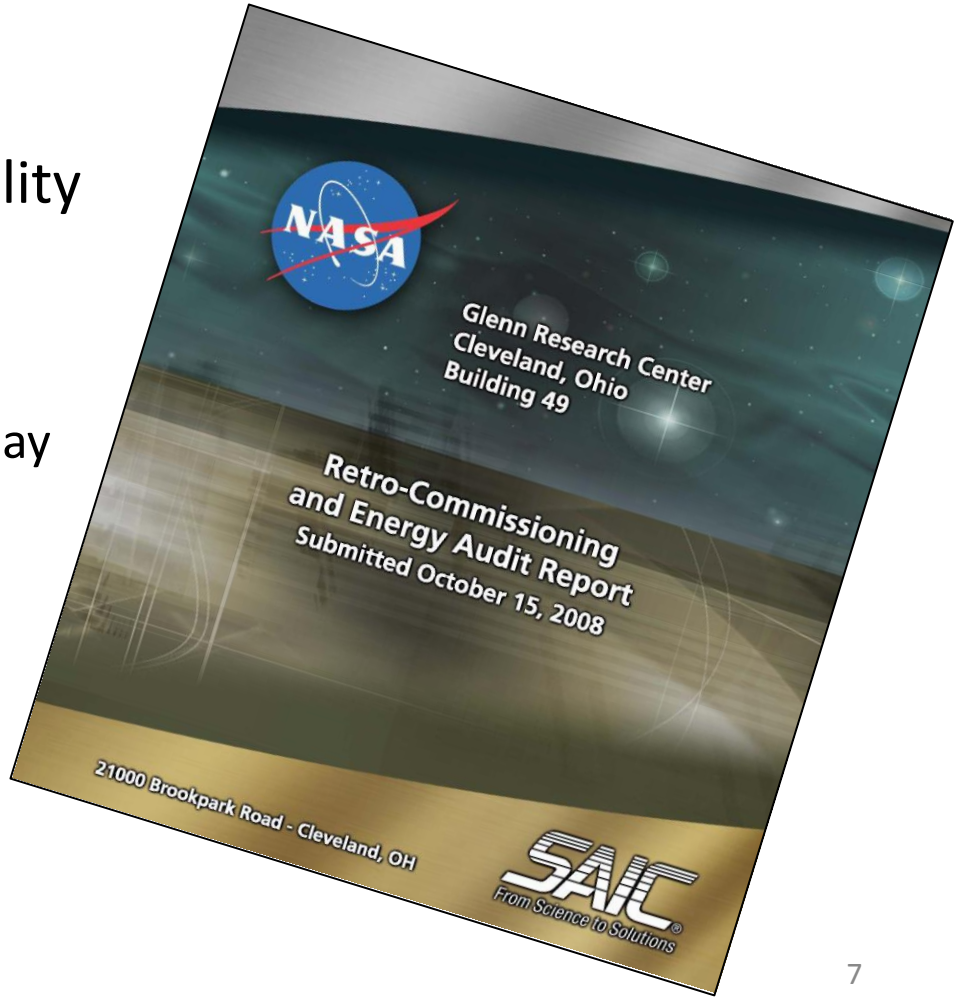
- **Summary**
  - Conducted in Fall 2008
  - 244,000 SF office facility
  - 6-story structure
  - Hours of operation
    - 7am to 6pm Monday - Friday
    - Computer areas 24/7
  - Campus central hot water and chilled water system



Retro-Commissioning Example

Glenn Research Center – Building 49

- **Summary**
  - Conducted in Fall 2008
  - 100,000 SF laboratory facility
  - 3-story structure
  - Hours of operation
    - 7am to 6pm Monday - Friday
    - Laboratory areas 24/7
  - Campus central hot water and chilled water system



Retro-Commissioning Example

Wallops Flight Facility – Buildings F-4 & F-5

- **Summary**
  - Conducted in January 2009
  - 7,500 SF dormitory facilities
  - 2-story structures
  - Hours of operation
    - Hotel like dwelling 24/7
  - Hot water from campus central steam and chilled water from local air cooled chiller


FINAL REPORT

VT Griffin at Wallops Island
NASA
Wallops Island, VA

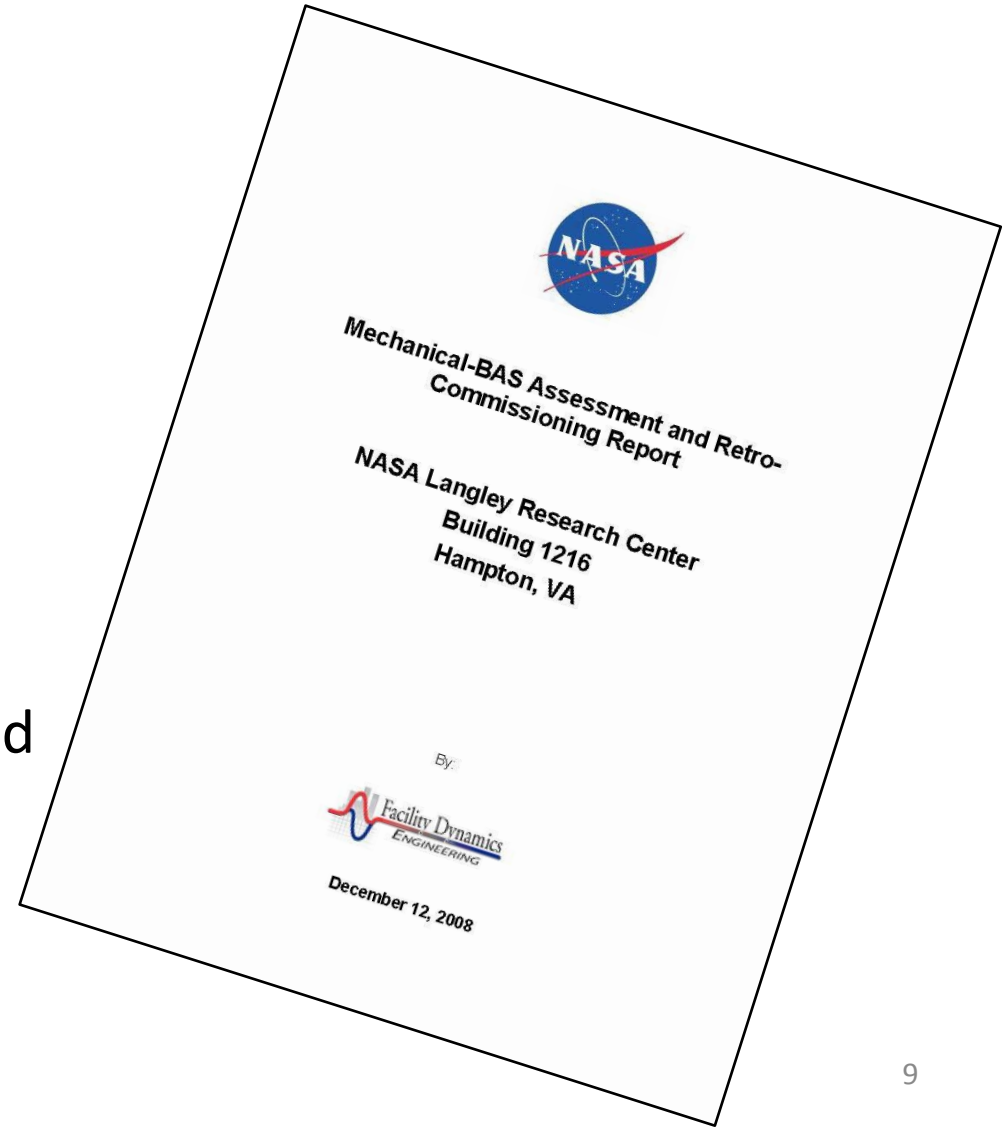
Investigative Phase of the Retro-Commissioning Project
Buildings F-4 and F-5

Engineering Economics Inc

Retro-Commissioning Example

Langley Research Center – Building 1216

- **Summary**
  - Conducted in late 2008
  - 2-story office building
  - Hours of operation
    - 7am to 6pm Monday - Friday
    - Computer areas 24/7
  - Hot water from campus central steam and chilled water from local air cooled chiller



Retro-Commissioning Example

Goddard Space Flight Center – Buildings 28, 3 & 14

- **Summary**
  - Conducted in 2009
  - 100,000 SF office facilities
  - 2-story structures
  - Hours of operation
    - 7am to 6pm Monday – Friday
  - Campus central hot water and chilled water system

NASA
Goddard Space Flight Center
Bldg. 28, 3 & 14
Commissioning Exceptions Notebook
November 6, 2009

PMA Consulting, Inc.

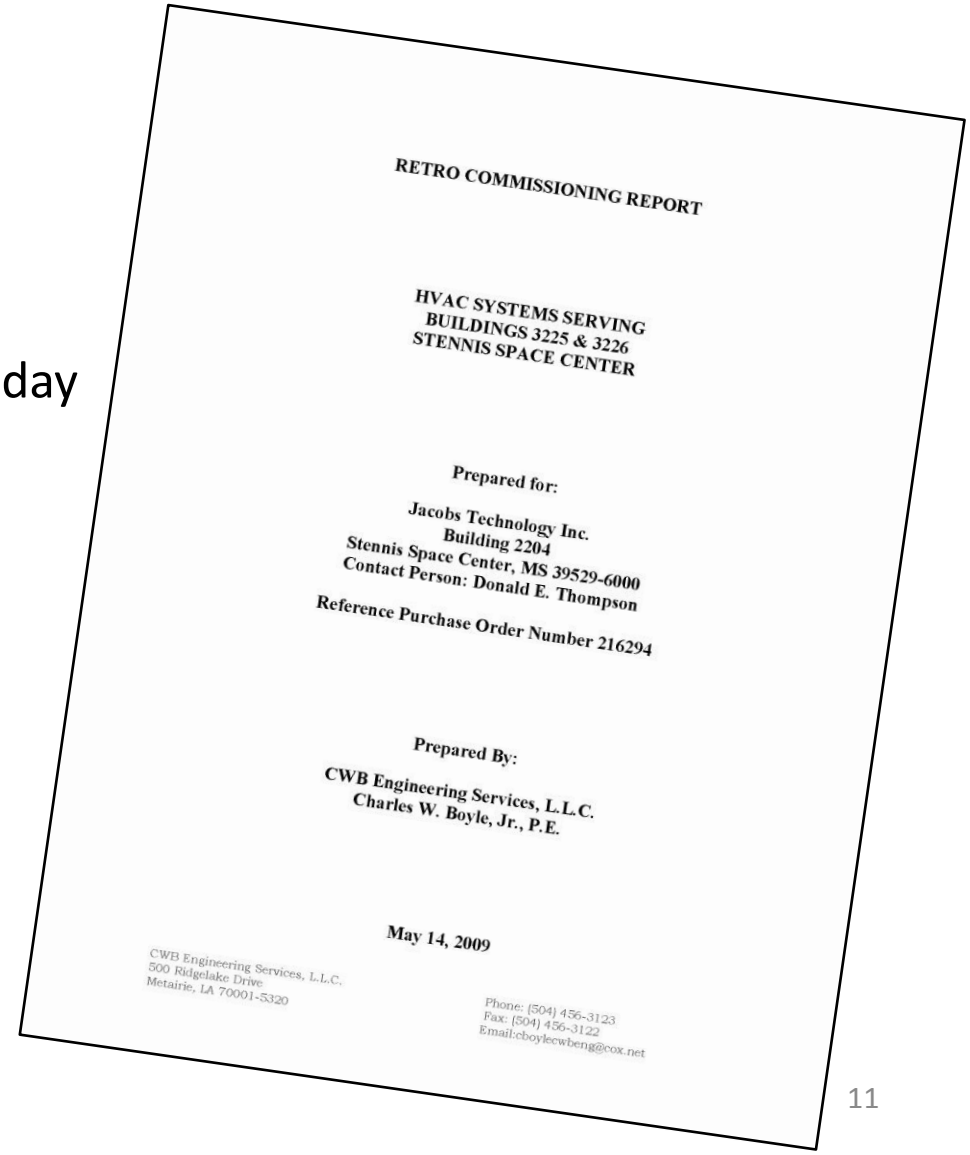
Exception	Definition
Security (Sec)	Failure to resolve the exception could pose a security threat to Base. Notify Security if not resolved.
Safety (Saf)	Failure to resolve the exception could pose a safety threat to Base occupants or the environment. Notify OSHO if not resolved.
Health (H)	Failure to resolve the exception could pose a health threat to Base occupants. Notify Base OSHO Officer if not resolved.
Mission (M)	Failure to resolve the exception could pose a threat to Base mission.
Reliability ®	Failure to resolve the exception could increase operations and maintenance cost. Notify Facility Manager if not resolved.

NOTE: Exception list includes previously discussed items relating to steam, condensate return, chilled water and chilled water condensate meters. These items impact reliability of energy calculations required for LEED O&M

Retro-Commissioning Example

Stennis Space Center – Buildings 3225 & 3226

- **Summary**
  - Conducted in 2009
  - Hours of operation
    - 7am to 6pm Monday – Friday
  - (4) VAV air handling units
  - Air cooled chiller
  - Hot water boiler



RETRO COMMISSIONING REPORT

HVAC SYSTEMS SERVING
BUILDINGS 3225 & 3226
STENNIS SPACE CENTER

Prepared for:

Jacobs Technology Inc.
Building 2204
Stennis Space Center, MS 39529-6000
Contact Person: Donald E. Thompson

Reference Purchase Order Number 216294

Prepared By:

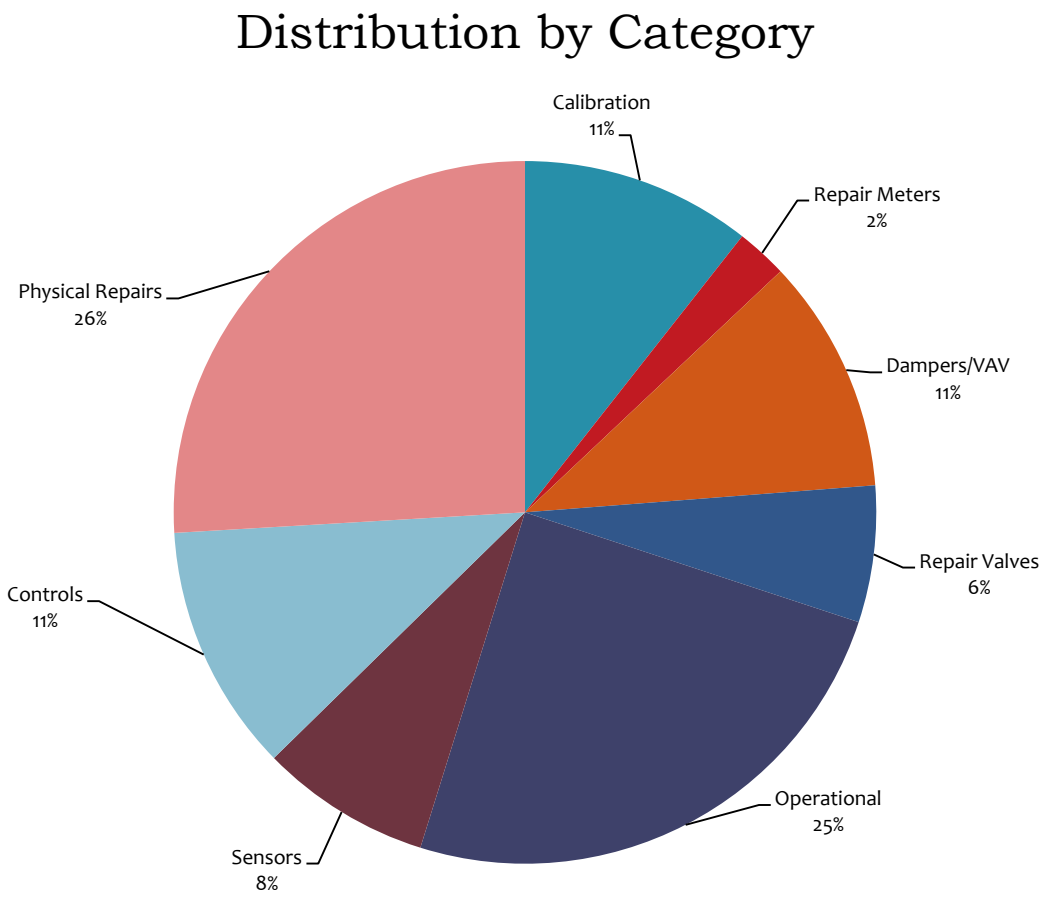
CWB Engineering Services, L.L.C.
Charles W. Boyle, Jr., P.E.

May 14, 2009

CWB Engineering Services, L.L.C.
500 Ridgelake Drive
Metairie, LA 70001-5320

Phone: (504) 456-3123
Fax: (504) 456-3122
Email:cboyleecwbeng@cox.net

RETRO-COMMISSIONING SUMMARY



INTRODUCTION TO SUSTAINABLE FACILITIES

What are we going to do?

Glenn Research Center

September 17-19, 2013

Objectives

- **Upon completion, participants will be able to:**
  - identify the major green building rating systems
  - discuss the International Green Construction Code and ASHRAE standard 189.1
  - discuss the relationship between the guiding principles and green building rating systems, codes and standards
  - define the roles of the organizations involved with the LEED® green building rating systems
  - describe how the rating systems are structured
  - identify the appropriate LEED rating system for a project
  - describe the LEED certification process and options

Green Building Rating Systems

Major Systems in the United States

USGBC:

- LEED Green Building Rating Program

ANSI/ASHRAE/USGBC/IES:

- ASHRAE Standard 189.1, The Standard for the Design of High Performance Green Buildings

Green Building Initiative:

- Green Globes

International Code Council:

- International Green Construction Code
- National Green Building Council

Living Building Challenge

NASA currently uses LEED Green Building Rating Program

TRAINING AGENDA for SUSTAINABLE FACILITIES

Introduction to Sustainable Facilities

AGENDA
NASA Glenn Research Center
Building 8, The Briefing Center
September 17-19, 2013

Tuesday, September 17, 2013 (8:30 – 4:15)

8:30 – 9:15	Welcome & Introductions (0) Course Overview (1) Sustainability at Agency Level	Christina Hudson, *Department Manager, Sustainability & Strategic Risk Mgmt, SAIC*
9:15 – 10:00	(2) Sustainability at Glenn Research Center	Rickey J. Shyne, Ph.D., P.E., *Director, Facilities & Test, Glenn Research Center*
10:00 – 10:15	*BREAK*	
10:15 – 11:00	(3) NASA Facility Sustainability Requirements & Integrated Project Delivery	Eugene Mszar, *LEED AP, Construction of Facilities Program Manager, Facilities Engineering Division, Office of Strategic Infrastructure, NASA Headquarters*
11:00 – 12:00	(4) Green Building Rating System Overview	Molly Jones, *AIA, LEED AP (BD+C, O+M), Director of Sustainable Facilities, Facilities & DesignBuild, SAIC Energy, Environment & Infrastructure, LLC (SEE&I)*
12:00 – 1:00	*LUNCH*	
1:00 – 2:00	(5) Commissioning & the Role of the CxA	Eugene Mszar and Sam Strackeljahn, *PE, LEED AP, Mechanical Engineer, Facilities & DesignBuild, SEE&I*
2:00 – 3:00	(6) Retro-commissioning: Lessons Learned	Sam Strackeljahn
3:00 – 3:15	*BREAK*	
3:15 – 4:15	(7) Site Considerations	Molly Jones

Wednesday, September 18, 2013 (8:30 – 4:30)

8:30 – 10:00	(8) Building Technology in New Construction and Major Renovation	Sam Strackeljahn
10:00 – 10:15	*BREAK*	
10:15 – 12:00	(9) LEED-NC 2009 Review	Molly Jones
12:00 – 1:00	*LUNCH*	
1:00 – 1:30	(9) LEED-NC 2009 Review continued	Molly Jones
1:30 – 4:30	(10) Building 60 Facility Tour and Exercise #1	All

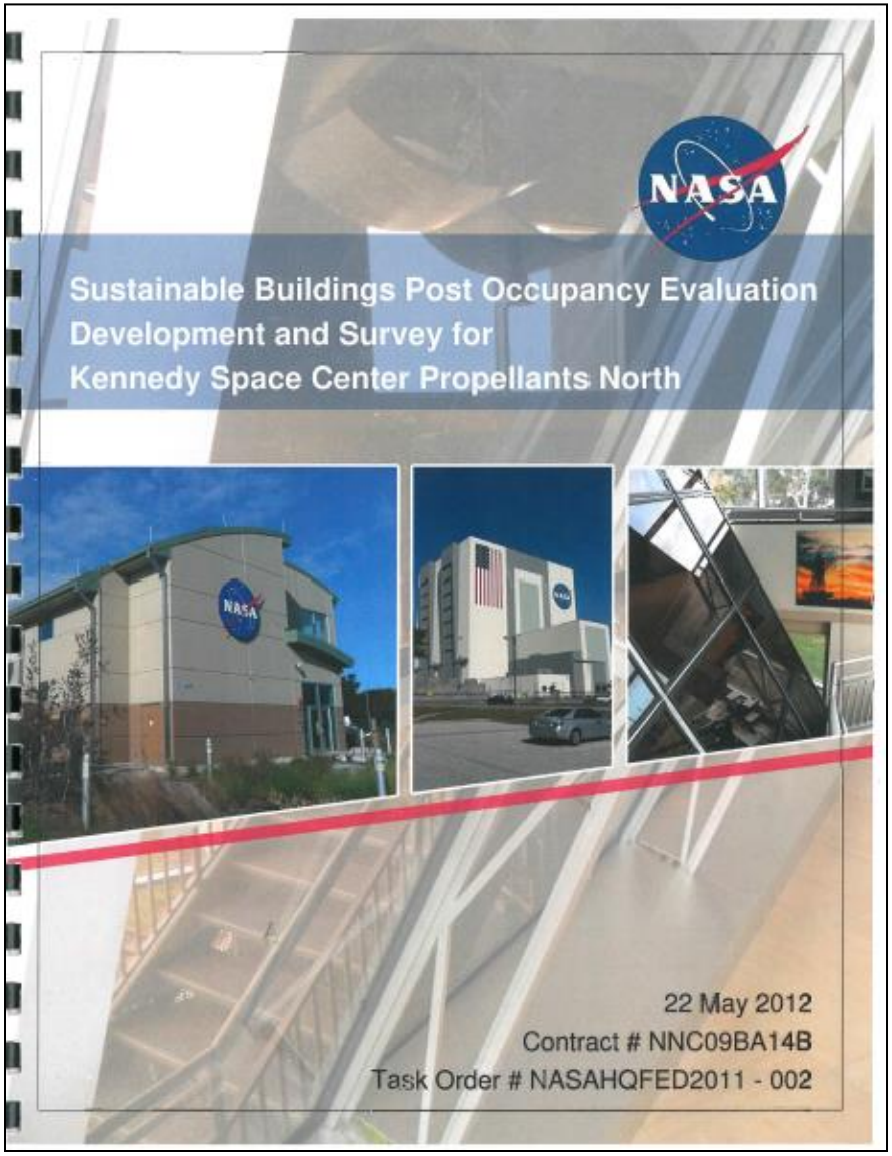
Thursday, September 19, 2013 (8:30 – 4:30)

8:30 – 10:30	(11) LEED-EB: O&M Review	Molly Jones & Sam Strackeljahn
10:30 – 10:45	*BREAK*	
10:45 – 12:00	(12) Exercise #2	All
12:00 – 1:00	*LUNCH*	
1:00 – 2:00	(12) Exercise #2	All
2:00 – 3:00	(13) Life Cycle Cost Analysis	Sam Strackeljahn
3:00 – 3:15	Closing Remarks	Eugene Mszar

Scope Requirements Team Technology/Process Tools Future

(#) – correlates to module number on the training CD.

POST OCCUPANCY EVALUATION REPORT



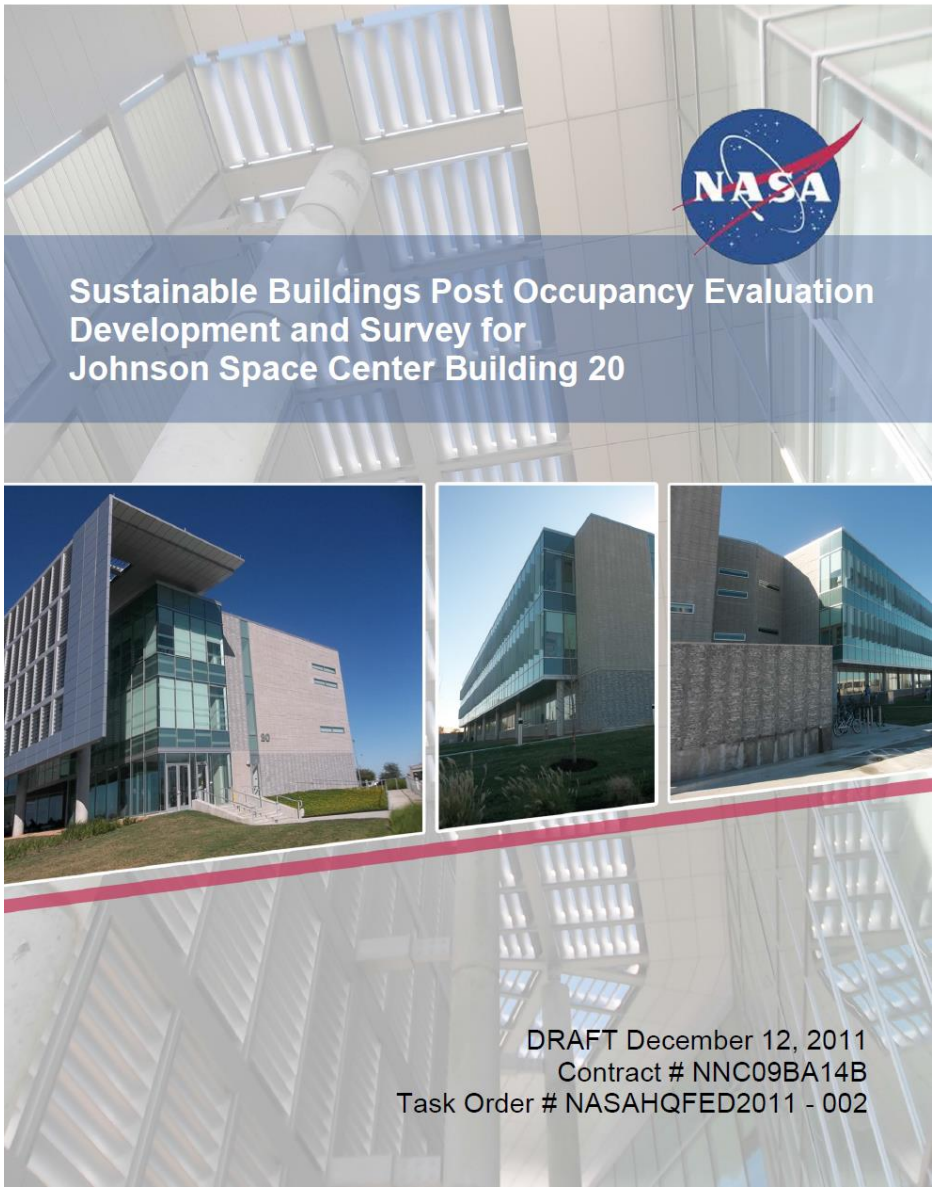
POST OCCUPANCY EVALUATION REPORT

NASA Langley Headquarters Building

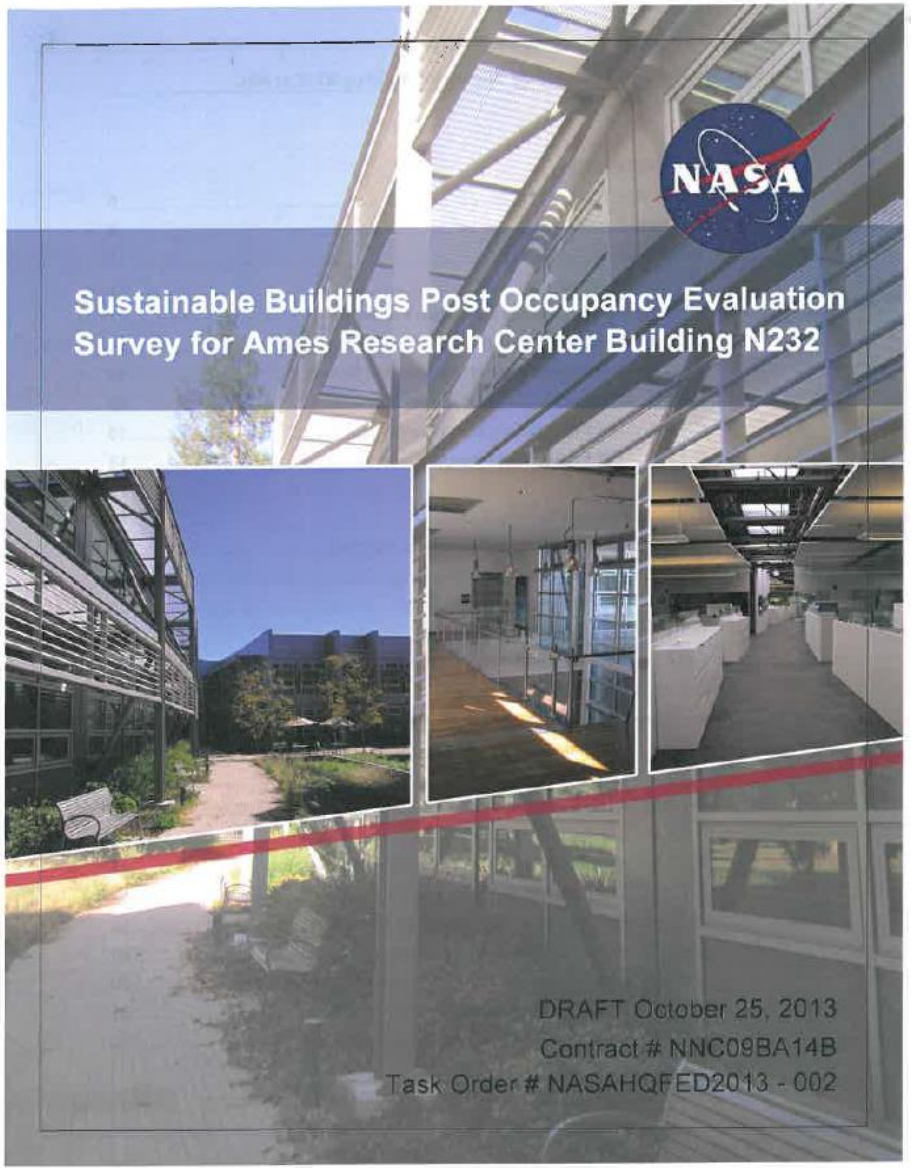
BUILDING SURVEY REPORT AUGUST 2012

1

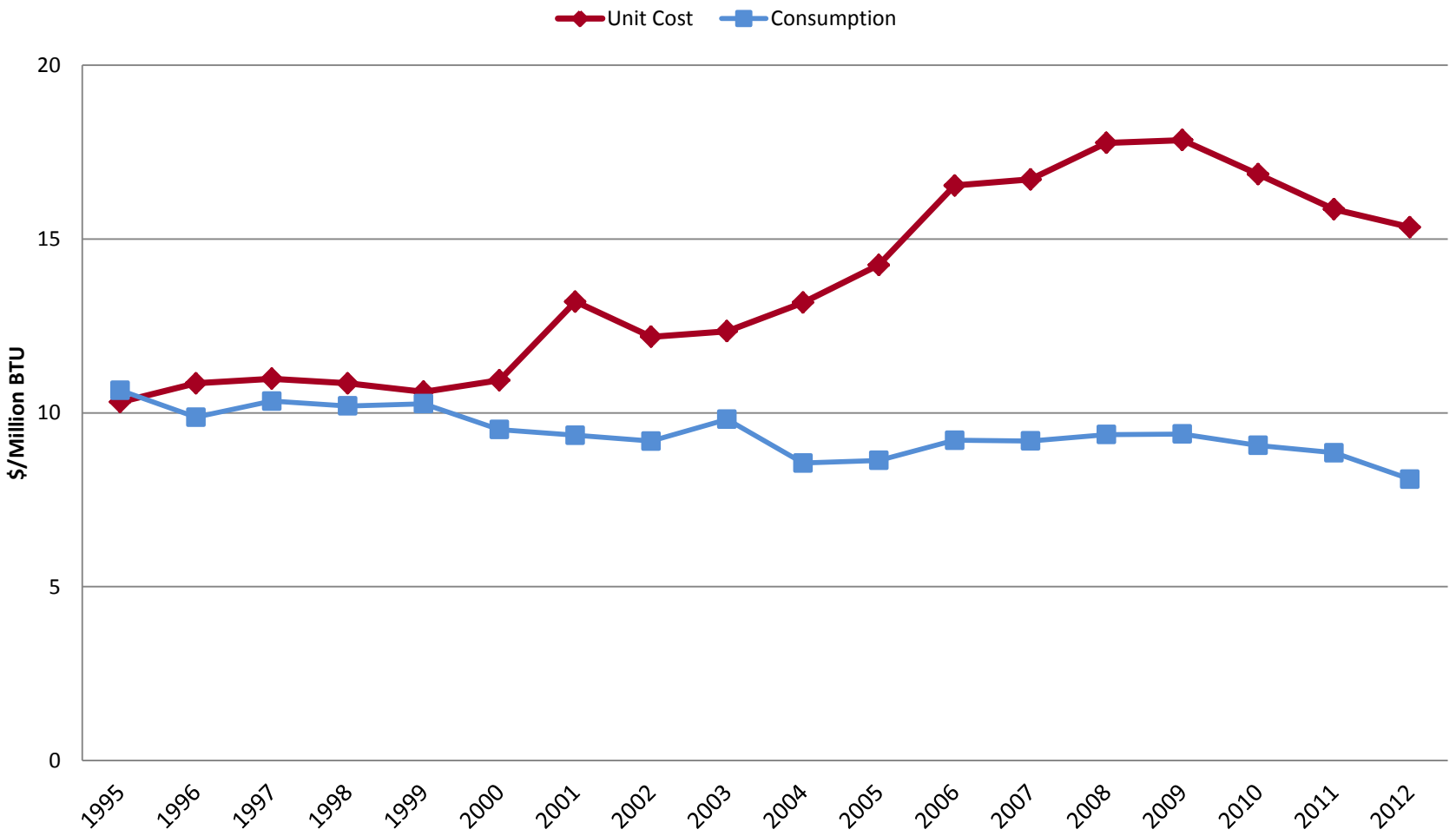
POST OCCUPANCY EVALUATION REPORT



POST OCCUPANCY EVALUATION REPORT



NASA Energy Unit Cost and Consumption



NASA Sustainable Facilities and the Guiding Principles

Questions?

Eugene Mszar, LEED AP
Facilities Engineering Division
NASA Headquarters
eugene.a.mszar@nasa.gov
202.358.2292