

Sustainable Building Plan

For

NASA

Marshall Space Flight Center
Huntsville, Alabama

Overview

1. Marshall Space Flight Center began its first sustainable design for new construction in 2002
2. Incorporated with the ongoing energy and water management plan - Marshall's approach for improved operational efficiency and energy and water conservation is repairing inefficient buildings by replacement and upgrading existing buildings to the LEED standard
3. Each building in the sustainable plan will be certified to the LEED standard
4. Experiencing 32% energy reduction and 55% water reduction in LEED Certified office buildings

LEED – New Construction

- Marshall has 6-buildings already LEED certified - in design or construction
- Building 4600 (LEED Silver Certified) – 2006; NASA's first)
- Building 4346 (LEED Certified – 2008)
- Building 4601 (LEED Gold Certified – 2009)
- Building 4602 (being constructed as LEED Lab)
- Building 4494 (67-year old building being renovated – will probably receive LEED Silver Certification)
- Building 4220 (being designed for minimum LEED Silver Certification)

LEED NC



Building 4600
(LEED Silver Certified 2006)
Marshall Space Flight Center
Huntsville, Alabama
NASA's First LEED Building



**Building 4346
Child Development Center
(LEED Certified 2008)
Marshall Space Flight Center
Huntsville, Alabama**



**Building 4601
(LEED Gold Certified 2009)
Marshall Space Flight Center
Huntsville, Alabama**

**THE
LEED EBOM
CHALLENGE**

LEED – Existing Buildings O&M

- Marshall has 2-buildings in the LEED EBOM process and 2-buildings being audited for feasibility
- Building 4203 (230,000 sf office building) was registered with the USGBC in 2008
- Building 4707 (118,000 sf laboratory & process facility) was registered with the USGBC in 2010
- Building 4487 & 4708 (636,000 sf combined – laboratory & office facilities being audited)



Building 4203
Constructed 1992
Registered as LEED EBOM 2008
(Existing Building Operations and Maintenance)
Marshall Space Flight Center
Huntsville, Alabama

Pre-requisite Challenges

- Retro-Commissioning
- Smoking Policy
- Green Cleaning
- Green Purchasing
- Multi-Tenant Building Use
- Water Fixture Upgrades

Problems Found During Retro-Commissioning Assessment

- Insufficient return air
- Multiple VAV actuator failures (approximately 140)
- Area function changes (overage or deficient airflow in many areas)
- Collapsed ductwork
- Multiple AHU actuator failure
- Need to change air flow direction for comfort problems with air supply blocked
- Fan terminal unit's internal insulation deteriorating- clogging parts of air passage and reduced air flow
- Insufficient outside air
- Leaking plumbing causing odors in attempt to balance airflow in building
- Clogged restroom exhaust ducts
- Exhaust fans with broken belts - building automation status was good but fans were not turning
- Discharge of operating exhaust fans was directed toward outside air intake- thus re-circulating exhaust air rather than outside air
- Plumbing vent pipes terminate above roof but beneath parapet wall - the joint on the vent gas apparatus was broken - the vent gases were not being moved away from building but returning back into building
- Numerous ductwork leaks allowing conditioned air to leak into ceiling plenum
- Duct smoke detectors improperly installed
- Cleaning grease trap at cafeteria appears to be improper thus causing an odor to the interior of the building.

Obstacles & Problems

- Undefined major problems not found during audit
- Stop and start over (T&B)
- Operational obstacles due to building being occupied
- Unknown due to project being 1st LEED EBOM
- Unplanned investment during process (\$400K – \$500K)
- Establishing commissioning for non-commissioned building
- Capital Improvement needs (HVAC = \$600K & Lighting upgrades = \$1M)

Reflections

1. LEED EBOM or some whole building process is the right thing to do
2. A better understanding of major O&M problems encountered in the past
3. Tenants happier
4. Better prepared for future LEED EBOM projects
5. Building 4203 is scheduled to be submitted for certification by 9/30/2010

NASA MSFC Sustainable Building Plan

- Certify 52% (2,433,693 sf) by 2017
- Should reduce total utilities by 5% (+)

Q&A