GSFC Energy and Sustainability Program

March 12, 2014

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Presented by:

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Sustainability: Energy Management Building Sustainability Integration

Federal Requirements (Laws and Regulations) for Sustainable Buildings
NPR 8820.2F & 8820.2G (pending approval)

- Executive Order (E.O.) 13514 (2009) – High-performance sustainable Federal building design, construction, operation and management, maintenance, and deconstruction: 2020 (entering design phase) and 2030 (net zero energy)
- Energy Independence and Security Act (EISA) of 2007
  - Designed to reduce fossil fuel-generated energy consumption – FY2003 baseline: 55% (2010), 65% (2015), 80%(2020), 90%(2025), and 100%(2030)
  - Energy intensity reductions per FY relative to a 2003 baseline (30% by FY15).
- E.O. 13423 - 15% of existing Federal building inventory incorporate the Guiding Principles for Sustainable Existing Buildings by end of the calendar year 2015 (buildings > 5,000 SF).
- Energy Policy Act (EPAct) of 2005
  - Life cycle cost-effective - Buildings design energy consumption at least 30% < ASHRAE Standard.
  - Renewable electricity consumption ≥ 3%(2007-2009), ≈ 5%(2010-2012) and 7.5%(2013→).
- E.O. 13327 (2004) - Federal Real Property Asset Management (Promote efficient and economical use of real property)

Benefits of Sustainable Building Design

- Lower energy costs (annual costs reduction 30%–50%; ROI 5-10 years)
- Reduction in operating and maintenance costs
  - Water savings; sustainable landscaping; building commissioning; and use of longer-lasting materials
- Increase in productivity and Improve health *and* psychological well-being of building occupants (Healthier more pleasant building)
  - Eliminate sick building syndrome: Good ventilation, personal controls, daylighting, low-emitting interior materials…
  - Could reduced liability associated with sick building syndrome
  - Reduce absenteeism and increase productivity
- Reduction in pollutants via lower energy use
  - Decreases SO_x, NO_x, and CO_2 emissions
  - Use natural materials w/o harmful and low VOCs – reduces pollution and prevents off-gassing in bldgs.
- Opportunity to foster a positive public image
  - Environmental stewardship fosters community acceptance, political support, better ability to attract and retain desirable employees, fewer complaints from surrounding communities, and easier siting of future facilities.

Defined in NASA Procedural Requirement 8570.1A

Recap: Sustainability Program Definition

The GSFC Sustainability Program manages long-term environmental concerns projected to affect center operations, and the natural environment, by acting in two ways:

1. Ensuring **conformance** with federal law, executive orders, agency initiatives and state regulations by
   a. Tracking new directives,
   b. Working with programs and projects to respond to directives,
   c. Monitoring and reporting on GSFC's response to directives.

2. Working with the Goddard community to **pursue new sustainability initiatives**.

NASA's Sustainability Policy Areas

1: GHG Reductions; operational and induced

2: Sustainable Buildings

3: Fleet Management

4: Water Use Efficiency & Management

5: Pollution Prevention & Waste Reduction

6: Sustainable Acquisition

7: Electronic Stewardship & Data Centers

8: Renewable Energy

9: Climate Change Resilience

Additional GSFC Sustainability Policy Areas

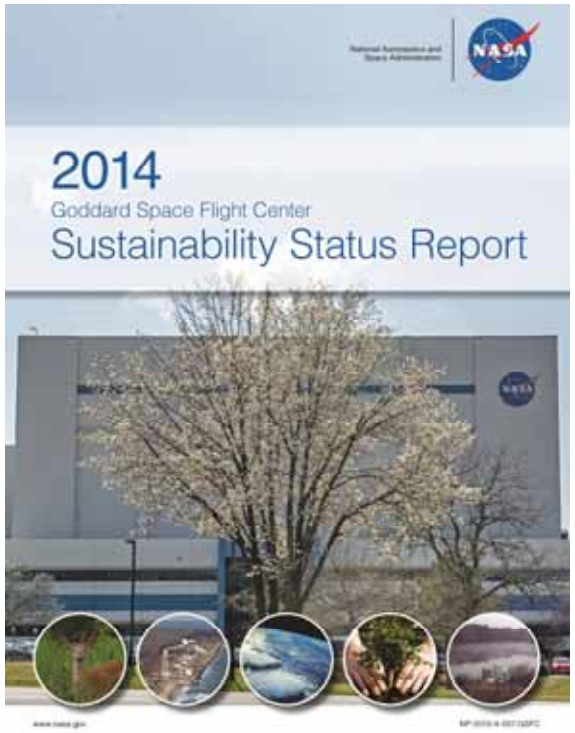
10: Local Environmental Stewardship

11: Leadership in Sustainability

Status of ongoing tasks (1 of 5)

1. FY 2014 Sustainability Status Report

- Serves as basis for setting sustainability priorities



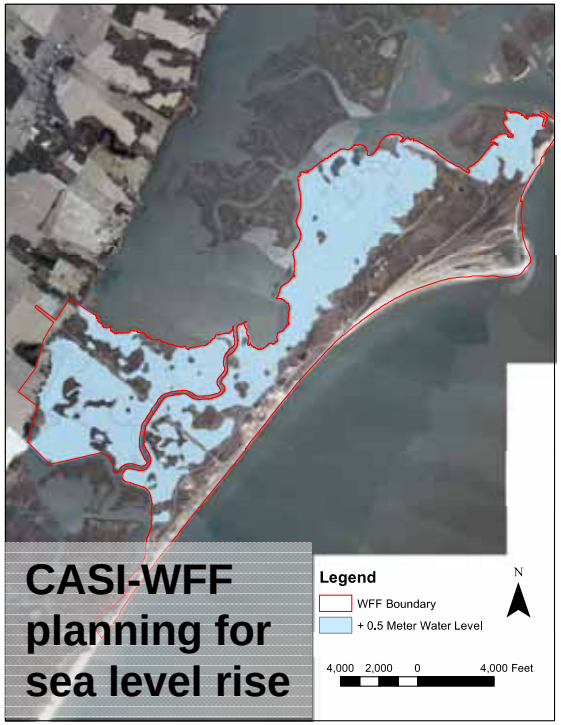
2. Voluntary sustainable work practices program

- Coordinating detailed recycling instructions
- Energy efficiency teams formed to address energy practices

Status of ongoing tasks (2 of 5)

3. Climate adaptation research (CASI, Code 618)

Collecting data and developing models:
- -WFF Sea Water Inundation
- -Emerald Ash Borer Study
- -Urban Heat Island
- -Stormwater
- -Building Energy



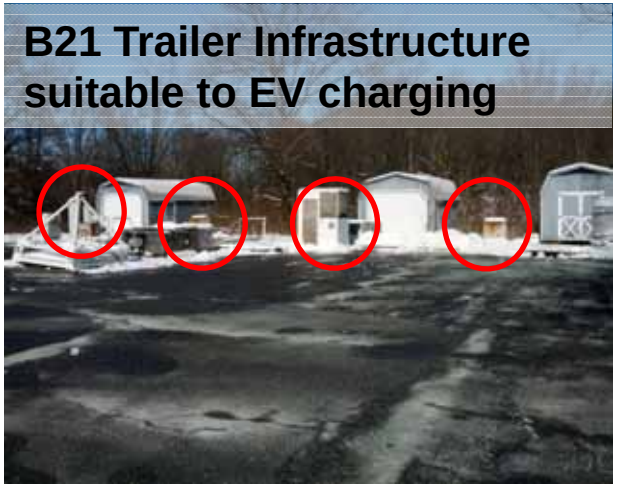
4. WFF beach and seawall restoration

Accepted bid to repair damage from hurricane Sandy

5. Employee electric vehicle charging research

-Identified unused infrastructure capable of supporting charging

-Still need to address how to address energy taxes owed to state



Status of ongoing tasks (3 of 5)

6. Sustainable Buildings Tracking

- **Goals Clarification:**

  NEW BUILDINGS AND MAJOR RENOVATIONS:

  Meet LEED Silver *and* Guiding Principles for New Construction

  EXISTING BUILDINGS (subject to EISA):

  15% of buildings and GSF meet *just* Guiding Principles for Existing buildings by 2015.

- **Status:**
  - Evaluating ENERGY STAR® Portfolio Manager software to track conformance with Guiding Principles.

Status of ongoing tasks (4 of 5)

7. Supercomputer Redesign Study:

- Meeting to explore the potential to pursue Code 200 goals with the benefits of new computer technology
- New deployment will likely be in 4-5 40’ x 10’ outdoor housings, vacating space in B28.
- New system uses no cooling energy.
- System can provide hot water that can be used to reduce demand for natural gas.
- Potential benefits:
  - Vacated indoor space (≈10,000 sq. ft.)
  - Reduced building energy demand (≈ 10,000 MWh/year…= $800,000/year)
  - Free heat (≈2.2 MBH)

Move B28 Supercomputer out of B28, and in to containers

Status of ongoing tasks: WFF (5 of 5)

A. Geothermal Retrofits

- Final install at B-Y015

B. Water Side Economizer

- Dry Cooler Application

C. Sustainable Buildings

- E-109 LEED for Existing Buildings: O +M
- N-161 ENERGY STAR® Portfolio Manager Evaluation

Sustainability - Energy

ACCOMPLISHMENTS

Completed Phase I Energy Savings Performance Contract (ESPC)

Propane Storage Tanks

Vertical Geothermal Ground Loops In Progress

IN PROGRESS

Phase II ESPC Modification

- Geothermal retrofits in 20 buildings
- Eliminate 8 fuel oil tanks
- Install 2 new chillers
  - E Complex
  - Range Control Center
- Refinance entire contract at lower interest rate

Building Tune-Up

- Evaluate building HVAC and control systems
- Determine true space requirements
- Optimize building performance for comfort and efficiency

BENEFITS

Reduced heating energy by 55% (decentralization)

Improved overall efficiency improvement by 27%

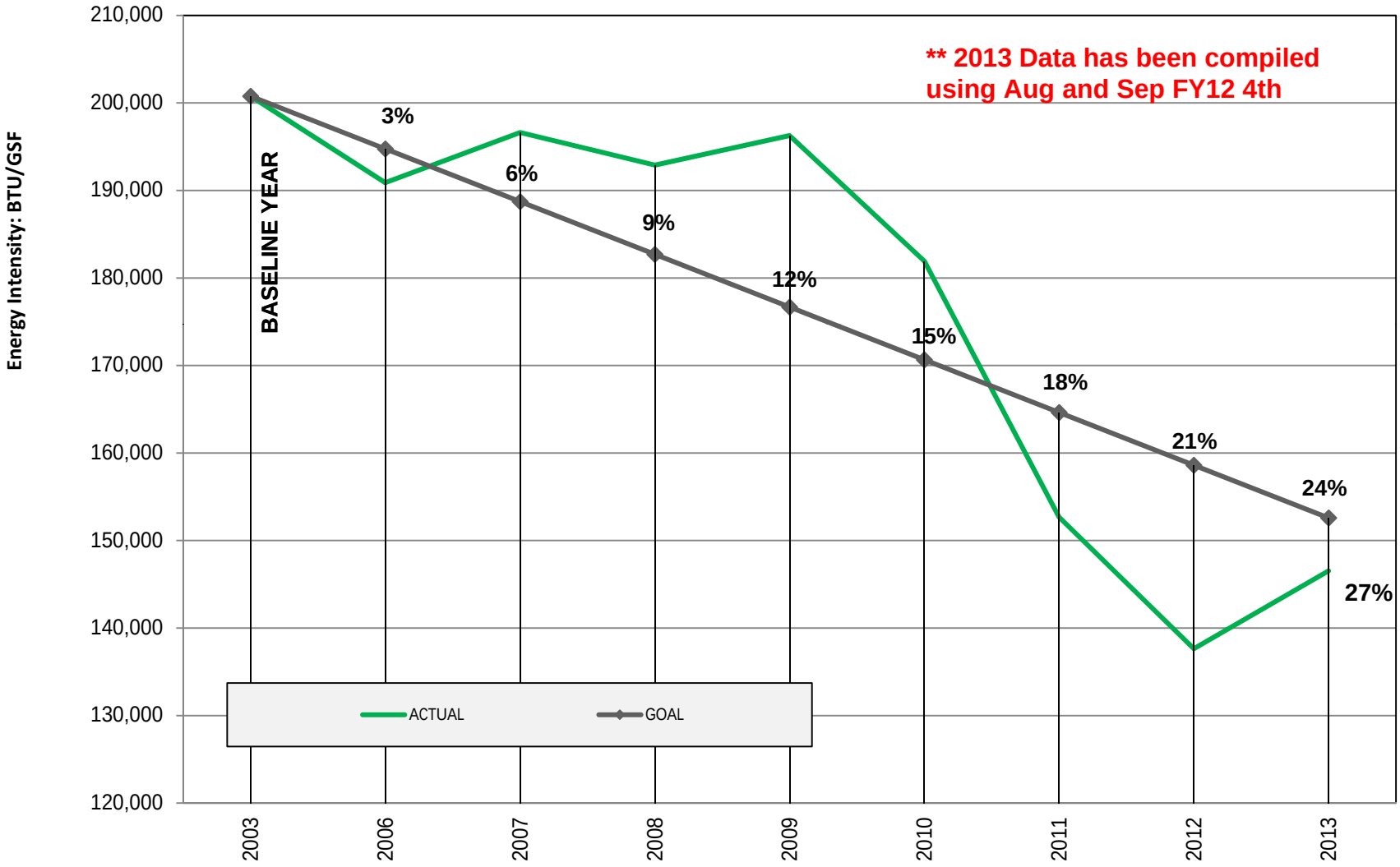
Annually saved 1M gallons of water

Reduced polluting air emissions

- Sulfur Dioxides-95%
- Nitrogen Oxides-86%
- Greenhouse Gases-50%

Invested $25M in WFF outside of normal budget channels

ENERGY EFFICIENCY



Draft Presidential Memorandum

Renewable Energy

- By fiscal year 2020, to the extent economically feasible and technically practicable, 20 percent of the total amount of electric energy consumed by each agency during any fiscal year shall be renewable energy
- Agencies shall seek to achieve the renewable energy consumption target by taking the following actions, which are listed in order of priority:
  - install agency-funded renewable energy on-site at Federal facilities and retain renewable energy certificates;
  - contract for energy that includes the installation of a renewable energy project on-site or off-site at Federal facilities and the retention of renewable energy certificates for the term of the contract;
  - purchase electricity bundled with renewable energy certificates; and
  - purchase renewable energy certificates

Draft Presidential Memorandum

- Agencies shall ensure that 100 percent of renewable energy identified are produced by new renewable sources
  - "New renewable sources" means sources of renewable energy placed into service within ten years of the start of the fiscal year

<u>New RE targets</u>

- not less than 10 percent in fiscal year 2015
- not less than 15 percent in fiscal years 2016 and 2017
- not less than 17.5 percent in fiscal years 2018 and 2019
- not less than 20 percent in fiscal year 2020 and each fiscal year thereafter