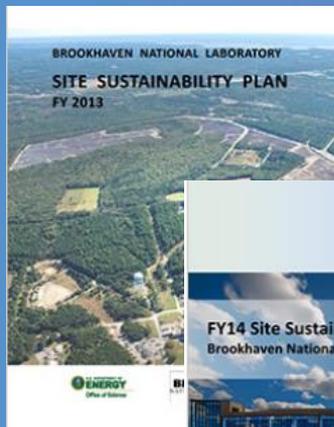


Brookhaven National Laboratory Site Sustainability Plan Update

*Community Advisory
Council*

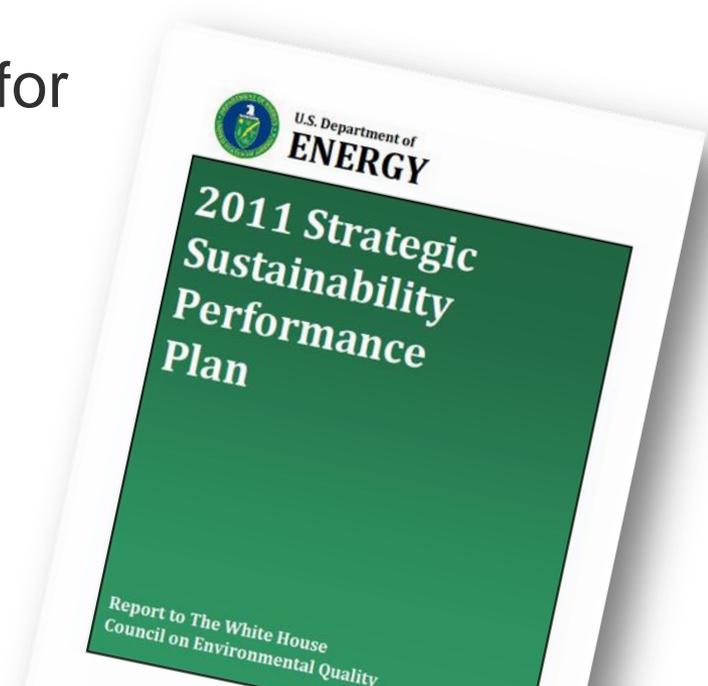
Amy Nunziata
Associate Laboratory Director,
Facilities & Operations
January 12, 2017

BROOKHAVEN
NATIONAL LABORATORY
a passion for discovery

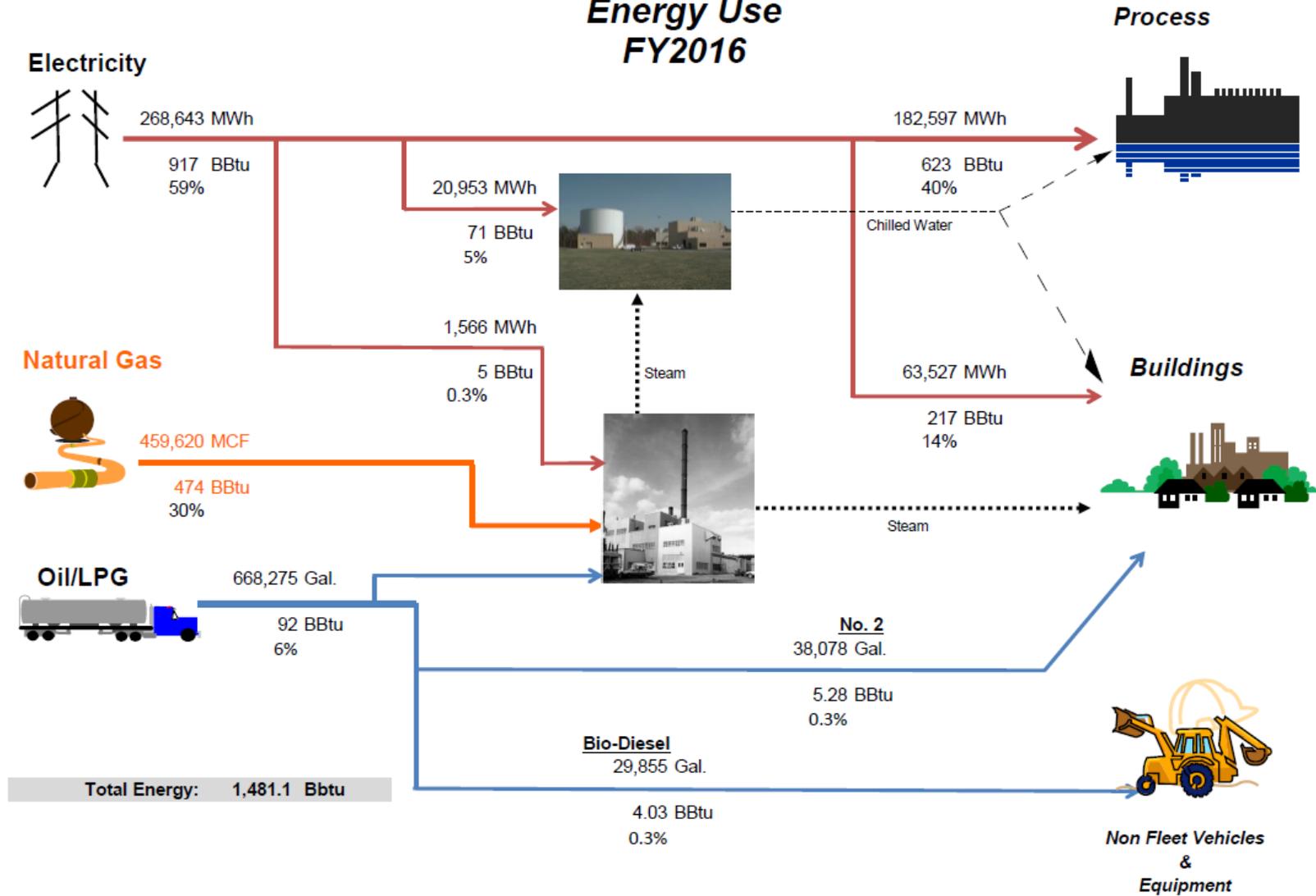


Background

- DOE Strategic Sustainability Performance Plan establishes Department goals
- Annual Site Sustainability Plan requirement
- BNL uses a cross Laboratory Team approach
- Executive Order 13693, Planning for Federal Sustainability in the Next Decade, was signed March 2015.
 - Adds and extends many goals
- The BNL Plan has been updated as of Dec 2016

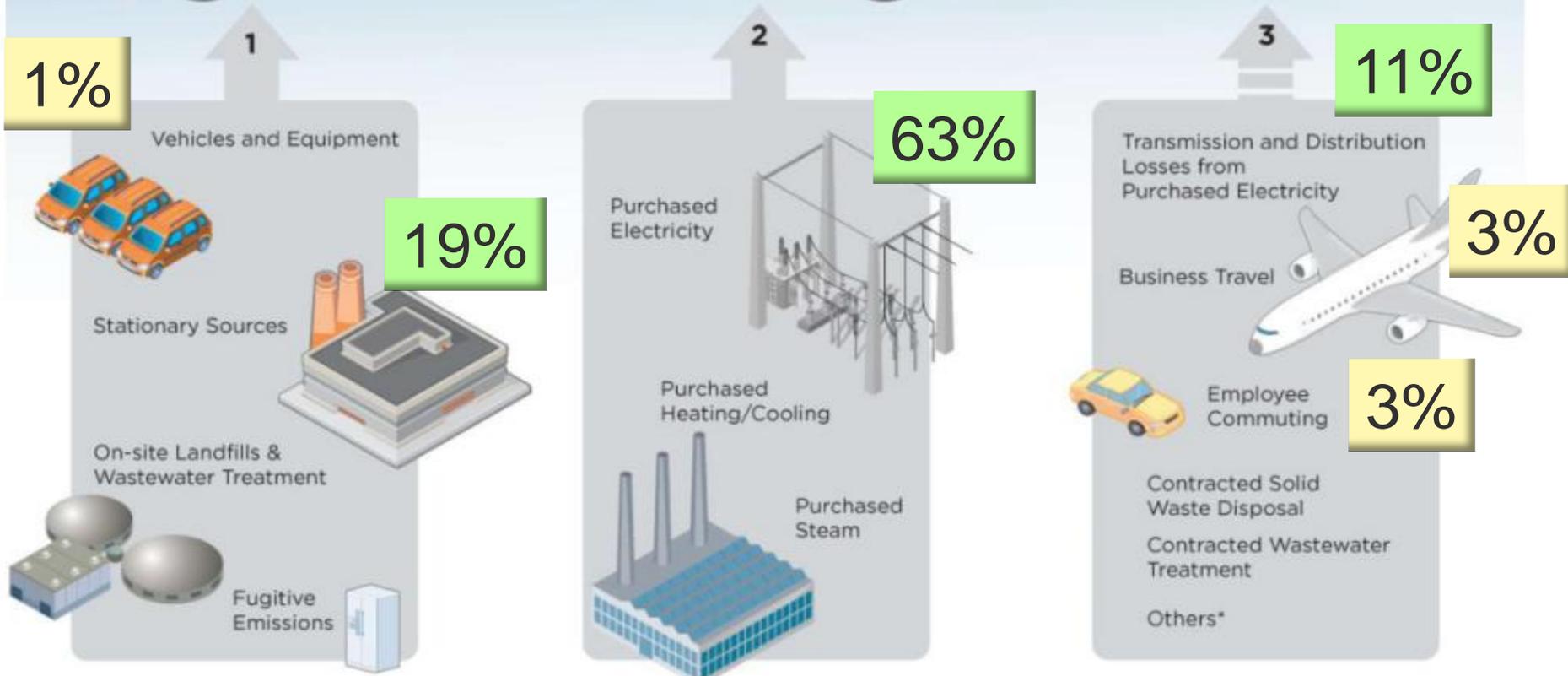


Brookhaven National Laboratory Energy Use FY2016



Common Sources of Federal Greenhouse Gas Emissions

Energy Use represents 93% of BNL GHG Production



SCOPE 1:

Greenhouse gas emissions from sources that are owned or controlled by a Federal agency.

SCOPE 2:

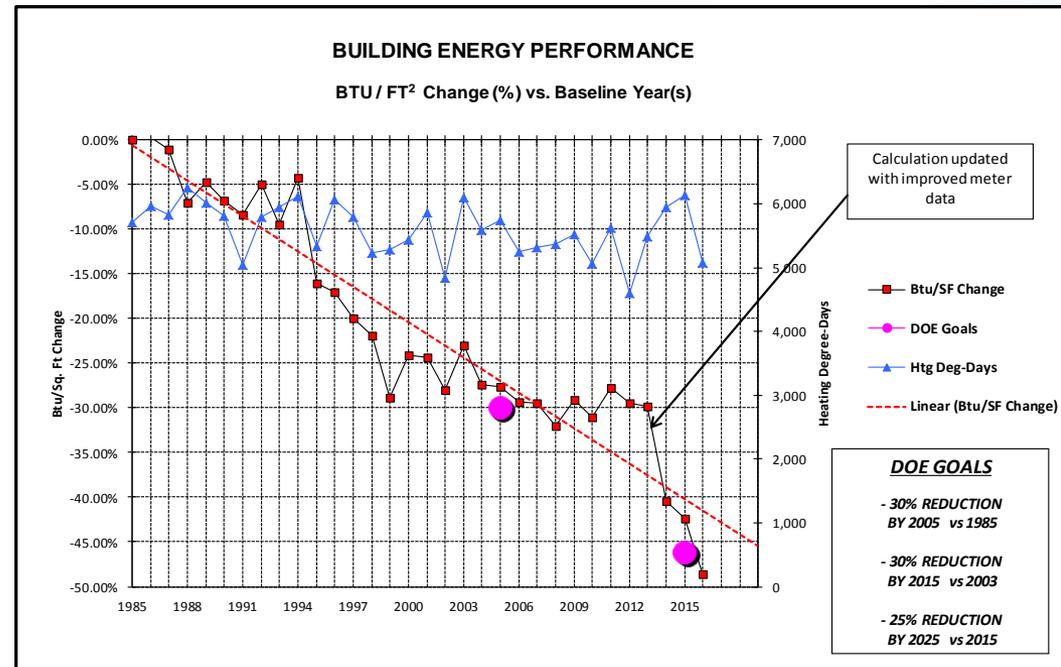
Greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by a Federal agency.

SCOPE 3:

Greenhouse gas emissions from sources not owned or directly controlled by a Federal agency but related to agency activities.

BNL's Energy Reduction Efforts

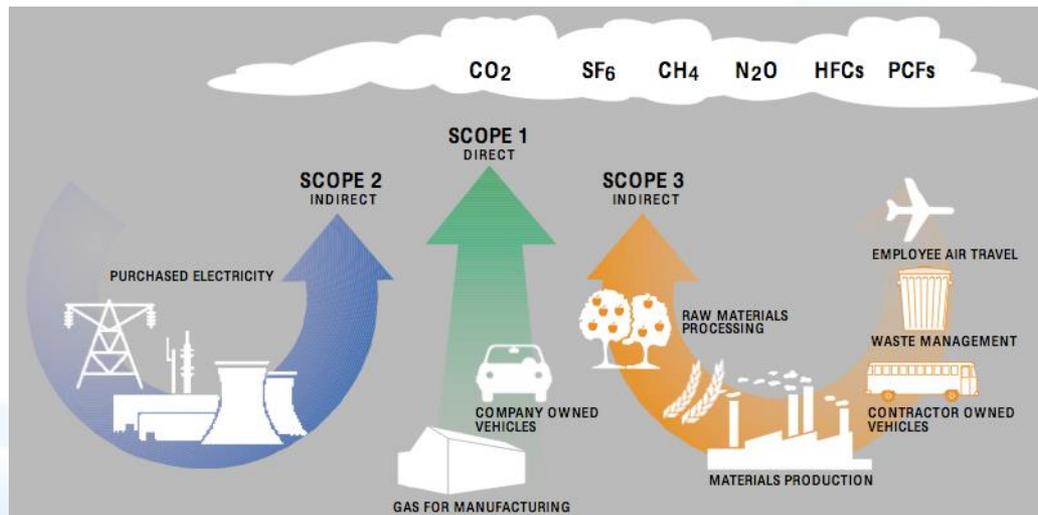
- BNL has a long and successful history of identifying and implementing energy conservation projects
- Began an energy conservation program in 1973 to combat high energy costs (first oil crisis)
- Over \$60 million has been invested in a wide range of efforts that has curbed BNL's energy consumption dramatically
- Energy intensity (Btu/GSF) has been reduced by over 67% comparing FY2016 to FY1973
 - Saves about \$12.6 million/year
 - in energy costs
 - Over 157,300 MTCO₂e per year avoided



Goal 1: Greenhouse Gas (GHG) Reduction

#	DOE Goal
1.1	50% Scope 1 & 2 GHG reduction by FY 2025 from a FY 2008 baseline
1.2	25% Scope 3 GHG reduction by FY 2025 from a FY 2008 baseline

- In FY16, Scope 1 & 2 GHG decreased 36% from baseline
 - Continuing to improve building efficiency
- In FY16, Scope 3 GHG are up 14.5% from FY15 and up 17.7% from baseline
 - Continuing to promote BlueJean teleconferencing and increased carpooling



Goal 2: Sustainable Buildings and Regional & Local Planning

#	DOE Goal
2.1	25% energy intensity (Btu per gross square foot) reduction in goal subject buildings, achieving 2.5% reductions annually, by FY25 from FY15 baseline
2.2	EISA Section 432 energy & water evaluations
2.3	Meter all individual buildings for electricity, natural gas, steam and water, where cost effective
2.4	At least 17% (by building count) of existing buildings >5,000 gross square feet to be compliant with revised Guiding Principles for HPSB by FY25, with progress to 100% thereafter
2.5	Efforts to increase regional and local planning coordination and involvement

- The Utility Energy Service Contract (UESC) Phase I was a success
- Continuing emphasis on building temperature setback
- Green Energy surveys
- Continuing metering of utilities
- Achieved Goal 2.4 in FY16; currently 27% of square footage classified as HPSB
- Discovery Park continues to have extensive involvement in state, regional, and local planning initiatives
- Meetings with the Community Advisory Council and the Brookhaven Executive Roundtable



Goal 2: Sustainable Buildings and Regional & Local Planning

#	DOE Goal
2.6a	Identify existing buildings above 5,000 gross square feet intended to be energy, waste or water net-zero buildings by FY25
2.6b	Identify new buildings >5,000 gross square feet entering planning process designed to achieve energy net-zero beginning in FY20

- MPO hosted “Net-zero” design training
- Benchmarking with other labs about Net-zero buildings
- Will incorporate Net-zero designs when economically feasible
- Identified three potential buildings to be furthered evaluated for Net-Zero designation



Goal 3: Clean & Renewable Energy

#	DOE Goal
3.1	Clean Energy percentage of total electrical and thermal energy accounted for by renewable and alternative energy shall be not <10% in F16-17, working toward 25% by FY25
3.2	Renewable Electric Energy account for not <10% of total electric consumption in FY16-17 working toward 30% by FY25



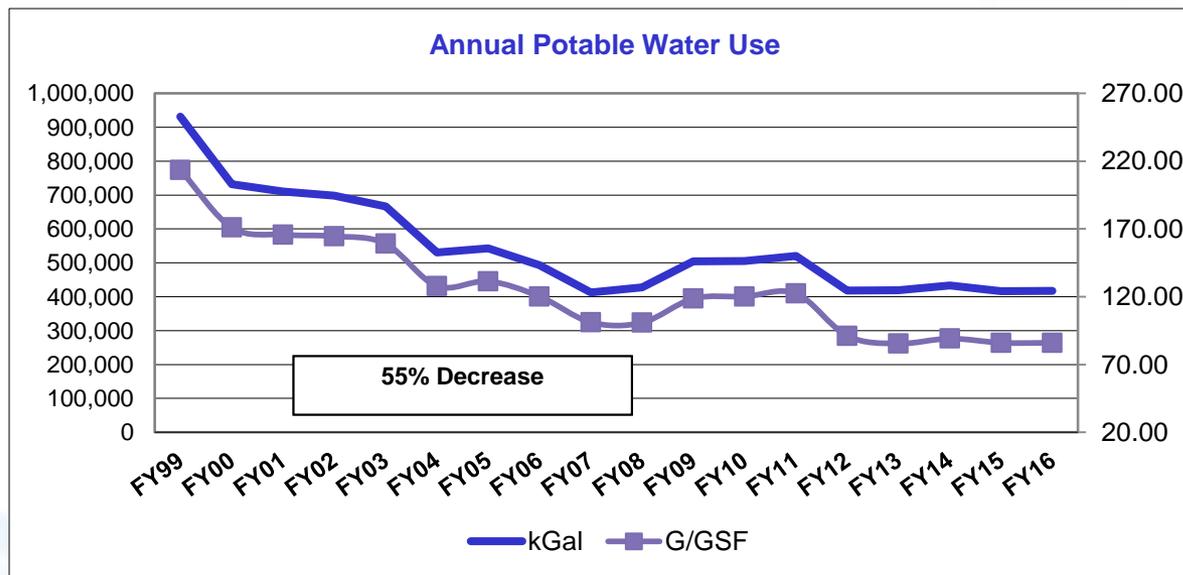
- Expansion of the Northeast Solar Energy Research Center (NSERC) facility by 324kWkW
 - In FY16, NSERC produced ~49.4 million kWh
- Purchase of 48.9 Renewable Energy Credits (RECs)
- In FY16, a combination of RECs and NSERC and the peak output is now 781 kW



Goal 4: Water Use Efficiency & Management

#	DOE Goal
4.1	36% potable water intensity (Gal per gross square foot) reduction by FY25 from FY07 baseline

- Long history of reducing water consumption
- Over 80% of water used is recharged back to groundwater
- Some concerns with new programmatic growth



Goal 5: Fleet Management



#	DOE Goal
5.1	30% reduction in fleet-wide per mile GHG emissions by FY25 from a FY14 baseline
5.2	20% reduction in annual petroleum consumption by FY15 relative to a FY05 baseline
5.3	10% annual increase in alternative fuel consumption by FY15 relative to a FY05 baseline
5.4	75% of light duty vehicle acquisitions must consist of alternative fuel vehicles
5.5	50% of passenger vehicle acquisitions must consist of zero emission or plug-in hybrid electric vehicles by FY25

- In FY16, 63% reduction in petroleum consumption
- 168% alternate fuel consumption in FY16
- 41% reduction from the FY14 baseline in fleet-wide per mile GHG emissions in FY16
- Only 2 light duty vehicles ordered in FY16 – both E-85
- No passenger vehicles ordered for FY16
 - GSA has not yet offered plug-in hybrid electric passenger vehicles

Goal 6: Sustainable Acquisition

#	DOE Goal
6.1	Promote sustainable acquisition and procurement, ensuring BioPreferred and biobased provisions and clauses are included in 95% of applicable contracts

- Included in BNL's Terms and Conditions
- Blanket orders include "Sustainable Acquisition" items
- Currently converting online purchasing system
- Developing "kits" to promote the most Environmentally Preferred Products for office supplies

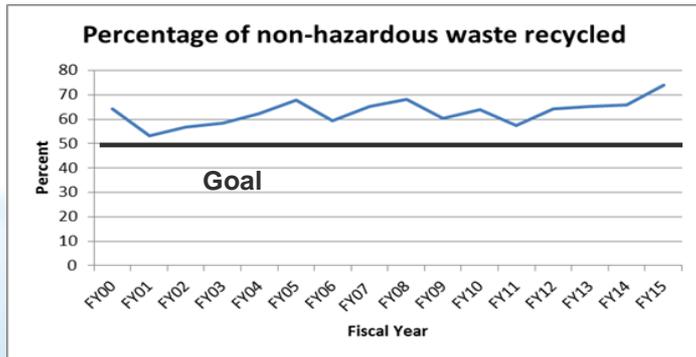


Goal 7: Pollution Prevention & Waste Reduction

#	DOE Goal
7.1	Divert at least 50% of non-hazardous solid waste excluding construction and demolition debris
7.2	Divert at least 50% of construction and demolition materials and debris

- In FY16 BNL achieved its highest recycling/diversion rate at 79%
 - Exploring diverting food waste to an off-site contractor
- The Lab typically recycles over 95% C&D materials and debris

BNL Concrete Crushing and Recycling
Savings average \$350,000 per event



After

Before

Goal 8: Energy Performance Contracts

#	DOE Goal
8.1	Annual targets for performance contracting to be implemented in FY 2017 and annually thereafter as part of the planning of section 14 of E.O. 13693.

- UESC Phase I, completed in May 2015, was a success
 - 1st year performance within 2% of original estimates
- We are planning a Phase II



Goal 9: Electronic Stewardship

#	DOE Goal
9.1	Purchases - 95% of eligible acquisitions are EPEAT-registered products
9.2	Power management - 100% of eligible computers and monitors have power management enabled
9.3	Automatic duplexing - 100% of eligible computers and imaging equipment have automatic duplexing enabled
9.4	End of Life - 100% of used electronics are reused or recycled using environmentally sound disposition options each year

- BNL procures Electronic Product Environmental Assessment Tool (EPEAT) certified systems
- All systems in BNL domain capable of power management have the setting enabled
- The Managed Print initiative promotes network printers and automatic duplex printing
- BNL recycles used and obsolete electronic equipment



Goal 9: Electronic Stewardship

#	DOE Goal
9.5	Data Center Efficiency: Establish a power usage effectiveness target in the range of 1.2-1.4 for new data centers and less than 1.5 for existing data centers

- New data center to be designed to meet optimization initiative - Power Usage Effectiveness (PUE) of 1.4. Striving for PUE design of 1.2
- Establish $PUE < 1.5$ for existing data centers - efforts in progress



Goal 10: Climate Change Resilience

#	DOE Goal
10.1	Update policies to incentivize planning for and addressing the impacts of climate change
10.2	Update emergency response procedures to account for projected climate change, including extreme weather events
10.3	Ensure workforce protocols and policies reflect projected human health and safety impacts of climate change



- The Lab has many workforce policies and programs that reflect projected human health and safety impacts of climate change, particularly severe weather events

- Long-range planning at BNL addresses climate change related to extreme weather events
- The BNL Office of Emergency Management (OEM) maintains the
 - Site Emergency Plan
 - Severe Weather Planning Guide
 - Hurricane Plan
 - Site Loss of Power Plan

Goal 10: Climate Change Resilience

#	DOE Goal
10.4	Ensure site/lab management shows commitment to adaptation efforts through internal communications and policies
10.5	Ensure site/lab climate adaptation and resilience policies/programs reflect best available current climate change science, updated as necessary

- BNL Internal Communications group publishes a biweekly web-based Memo from Senior Lab management



- Strengthened collaboration with NWS on-site
- Initiated a project to determine how use of real-time weather data can shorten recovery time for utility system impacted by severe weather
- Developed a team to improve modeling regional climate
- Engaged with NYC Mayor's office:
 - Collaborations on solar forecasting
 - City-wide meteorological sensor network

Challenges Going Forward

- Scope 3 GHG reductions in commuting and air line travel
- 25% reduction in energy intensity by FY25
- Meeting goals for Net Zero Buildings
- Meeting design requirements for existing data centers
- Monitoring of water usage



Questions?

