FY14 Site Sustainability Plan

Brookhaven National Laboratory

U.S. DEPARTMENT OF ENERGY | Office of Science

BROOKHAVEN NATIONAL LABORATORY

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I. EXECUTIVE SUMMARY

Brookhaven National Laboratory (BNL) is operated and managed for the Department of Energy Office of Science (DOE-SC) by Brookhaven Science Associates (BSA), a partnership formed by Stony Brook University (SBU) and Battelle Memorial Institute. For more than 65 years, the Laboratory has played a lead role in the DOE Science and Technology mission and continues to contribute to the DOE missions in physical, energy, and life sciences, with additional expertise in environmental sciences, energy technologies, and national security. BNL is staffed by over 3,000 research and support employees, hosting an even greater number of facility users, guest researchers, and scientists annually.

To date, seven Nobel Prizes have been awarded for discoveries made at the Laboratory throughout its history. The Laboratory operates from an extensive campus located in Upton, New York, on 5,320 acres with approximately 4.2 million gross square feet (gsf) of space in over 300 buildings.

With a long-standing expertise in accelerator science and technology, BNL conceptualizes, designs, builds, and operates major scientific facilities and makes them available to university, industry, and government researchers in support of the SC mission. The sustainability vision for BNL leverages this unique combination of access to diverse research talent, stewardship for a significant national research infrastructure, and a location in the energy intensive northeastern United States. As a result, BNL is well established as a northeastern regional resource for sustainability expertise and is effectively utilizing its physical infrastructure to demonstrate sustainability technology. This approach to development and deployment of technology, combining the unique resources of both research and operations, is the vision of the BNL Site Sustainability Plan to help ensure a successful future for our nation.

In addition to efforts in science and technology, BNL continues to be strongly committed to supporting and achieving the targets in the DOE Strategic Sustainability Performance Plan (SSPP) and has made significant progress over the past year.

BNL continues to capitalize on efforts from a strong energy management program that has existed for decades at BNL to achieve substantial reductions in our greenhouse gas (GHG) footprint. Strong relationships with local utility providers has been a business strength of the Laboratory for many years to ensure cost effective power rates for operating the energy intensive user facilities and general infrastructure. BNL continues to collaborate with the local utilities to leverage purchasing power and assist in renewable energy production to jointly support the goals of BNL and the New York region. On March 1, 2011, BNL began purchasing and receiving 15 megawatts (MW) of hydropower from the New York Power Authority (NYPA). Annual consumption of the hydropower is approximately 115,000 megawatt hours (MWh) and reduces BNL's GHG emissions by approximately 78,000 metric tons of carbon dioxide equivalent ($MtCO_2e$) per year. This equates to about 54% of BNL's 2008 GHG baseline and is now included in the Consolidated Energy Data Report (CEDR) calculations.

The Long Island Solar Farm (LISF), a solar photovoltaic (PV) power plant, was developed through a collaboration that included BP Solar, the Long Island Power Authority (LIPA), and DOE. Construction of the LISF, located on the BNL site, was completed in late October 2011 and began delivering power to the LIPA grid in November 2011. The LISF is made up of 164,312 PV panels and can produce 32 MW of electricity, making it the largest solar PV power plant in the eastern United States. It provides clean solar energy equivalent to the power consumption of approximately 4,500 homes on Long Island. Through its

role in facilitating and hosting this highly successful project, BNL is helping to avoid production of 28,000 $MtCO_2e$ of GHG. In FY13, the LISF provided 54 million kilowatt hours per year (kWh/yr) of clean renewable energy to Long Island.

BNL's commitment to the advancement of solar technology does not end with the LISF. Since the LISF is privately owned and is a production facility, new technologies cannot be tested there. As part of the collaboration to site the LISF at BNL, arrangements have been made for construction of a second, smaller array on-site—the Northeast Solar Energy Research Center (NSERC). This 700 kilowatt (kW) research array, sitting on approximately 8 acres of the Laboratory, will be a proving ground for BNL and our industrial partners to test new solar technologies, including electrical inverters, storage devices, and solar modules. This effectively adds solar energy research to the user facility portfolio of BNL. This facility will become operational in early 2014. Completion of the NSERC will ultimately provide up to 1 MW of on-site solar PV generation and a further reduction approximately 700 $MtCO_2e$ of GHG.

These projects demonstrate how BNL is continuing to collaborate with many organizations both internally and externally to enhance research at the Laboratory with the sustainability goals in mind. BNL staff from Environment & Life Sciences (ELS), Facilities & Operations (F&O), Global and Regional Solutions (GARS), Information Technology Division (ITD), and the DOE Brookhaven Site Office (BHSO) have been instrumental in preparing our research agenda and developing a plan to bring it to fruition. External collaborators already engaged include American Superconductor, Blue Oak Energy, BP Solar, Electric Power Research Institute, General Electric, LIPA, National Renewable Energy Laboratory (NREL), New York State Energy Research and Development Authority (NYSERDA), SBU, and University of California at San Diego. The DOE Energy Efficiency and Renewable Energy's Solar Energy Technology Program has been instrumental in providing funding for this research as well.

In addition to the above projects and through the Governor's Regional Economic Development Initiative, conceptual development support has been provided for the Smarter Electric Grid Research, Development, Demonstration and Deployment Center (SGRID3). SGRID3 combines resources from SBU's Advanced Energy Research and Technology Center (AERTC) with BNL to create two leading edge facilities and establish New York as the undisputed leader in design and control of "smarter grid" systems and technology development and deployment. The Advanced Electric Grid Innovation and Support (AEGIS) Center (the BNL facility proposed in SGRID3) will provide a laboratory for proving existing technologies, developing needed technologies, and improving operational effectiveness, working with the BNL operational micro-grid. Conceptual design on this facility is expected to start in 2014.

BNL remains committed to complying with GHG specific targets as well as the other objectives and goals of the DOE SSPP. BHSO, with support from BNL staff, awarded a Utility Energy Service Contract (UESC) on October 22, 2013. The first Task Order focuses on improving efficiency in supplying chilled water, upgrading lighting throughout the Laboratory, and installing building controls with enhanced temperature setback. Phase I implementation of the UESC will start in early 2014. It is estimated to result in a nearly 11% reduction in energy intensity. Additional Task Orders are anticipated to be awarded in the near future to achieve even greater reductions.

A primary Laboratory focus is on building sustainable facilities. Construction of the Interdisciplinary Science Building I (ISB-I) was completed in FY 2013 and achieved Leadership in Energy & Environmental Design (LEED) Gold certification. Construction of the five National Synchrotron Light Source II (NSLS-II) Laboratory/Office Buildings (LOBs) was completed in FY13 and submitted for LEED Gold.

BNL's Modernization Project Office (MPO) continues to make progress toward ensuring that 15% of existing buildings greater than 5,000 gsf are compliant with the Guiding Principles (GPs) of High Performance Sustainable Buildings (HPSB) by 2015. As a measure of continued progress, BNL received an HPSB Recognition Letter from DOE Headquarter (HQ). At the end of FY13, BNL has achieved 72% HPSB compliance for the 9 buildings that will not achieve LEED certification. MPO has developed a schedule for the completion of the remaining HPSB projects in FY14 and early FY15.

BNL's construction and demolition recycling rate for concrete remains strong. The Laboratory recycles 95% of construction, demolition, and wood debris. BNL continues to store concrete rubble and utilize a subcontract concrete crusher on a batch basis to crush the material into usable product for road bases and parking lot material.

BNL continues to be committed to sustainable purchasing and has achieved 99% compliance on purchase of 30% recycled content paper. The only non-recycled paper purchased is used for photography and graphics work.

BNL has purchased 100% alternative fuel vehicles (AFV) and therefore, exceeded the requirement that mandates 75% of light duty vehicle purchases consist of AVFs. The Laboratory evaluated its government fleet, based upon the SC guidance for right-sizing the fleet. Against the 2005 baseline, BNL identified 45 vehicles as being non-mission critical. In total, non-mission critical vehicles were reduced by 39, representing an 86% reduction and exceeding the Secretary's goal of 35%.

Water reduction has been a major focus of the BNL sustainability effort. As noted last year, BNL has already achieved substantial reductions in water usage through the years (about 55% since 1999). When normalized by site growth (building area in gross square feet), BNL's annual water use intensity has decreased from 101 gallons per square foot to 85 gallons per square foot, a 15.5% water usage reduction since base-year 2007. Most cost-effective water reduction investments have been made. Laboratory growth will tend to increase water use in the future. Economically, implementing further water conservation measures will be a significant challenge for BNL, as water is plentiful and inexpensive and further water reduction is capital and labor intensive.

To mitigate this plateau in traditional water reduction techniques, BNL has been working for several years on a modification of the outfall of its sewage treatment facility. This modification converts from a surface water discharge to a groundwater injection process that meets evolving regulatory requirements and also provides significant system-level recycle. The Sewage Treatment Plant Modification contract was awarded and field work commenced in the fourth quarter of FY13. The contractor is scheduled to complete the Sewage Treatment Plant Modification in the second quarter of FY14. This project will result in the recycling of approximately 70% of the potable water used at BNL.

The Laboratory is committed to leadership in sustainability through its management practices, stewardship of the BNL campus, as well as its research and education programs. The Laboratory's efforts in sustainability focus on four broad principles:

1. Striving to be climate neutral through energy use and management;
2. Lowering the environmental impact of the campus through sustainable infrastructure;
3. Leveraging research in conjunction with our operations and in support of the northeastern region; and

4. Fostering a culture of sustainability with our employees and our community.

The efforts in sustainability are communicated widely across the Laboratory and the senior leadership team is engaged in status and decisions as the effort continues.

Sustainability is a major theme for Science, Technology, Engineering and Mathematics (STEM) education at BNL. BNL's Office of Educational Programs (OEP) continues to develop hands-on learning experiences in sustainable energy sciences and environmental sciences from elementary students to graduate students. One unique program is called the Open Space Stewardship Program (OSSP). The program fosters partnerships between schools and land stewards in their local communities. Students in grades K through 12 participate in environmental research on undeveloped land owned by either a public or private agency. In 2013, the program worked with students from over 35 schools in Suffolk County and fully expects to increase that number in 2014.

Table 1. Summary Table of Strategic Sustainability Performance Plan Goals, BNL's Performance Status, Planned Actions, and Risks

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
Quantitative Goals				
Goal 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory				
1.1	28% Scope 1 & 2 GHG reduction by FY 2020 from a FY 2008 baseline (2013 target: 17%)	The FY 2008 baseline was 205,542 $MtCO_2e$. In FY 2013, BNL's Scope 1 and 2 GHG emissions totaled 80,466 $MtCO_2e$—a decrease of 60.9% against the FY 2008 baseline.	Continuing efforts in FY14 include hydropower, LISF, on-site PV research and development, Renewable Energy Credit (REC) purchases, and energy intensity reduction through the UESC Phase I. Planned actions include the UESC Phase II and consideration of small Combined Heat and Power (CHP).	Low
1.2	13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline (2013 target: 4%)	Overall, Scope 3 GHG emissions have been reduced by 13% from the FY 2008 baseline of 20,003 $MtCO_2e$ to 17,397 $MtCO_2e$ in FY 2013. Emissions specifically from employee business travel have increased 12.8% from 8,667 $MtCO_2e$ in FY 2008 to 9,780 $MtCO_2e$ in FY 2013.	Planned efforts include the following: consideration of options to reduce GHGs from employee business travel; improving metrics for commuting GHGs; amending domestic and foreign travel procedures to encourage use of hybrid vehicles; expanding user teleconferencing capabilities through the deployment of enhanced communication technologies during site-wide telephone replacement; conducting a survey about expanding shuttle services and possible introduction of a bussing service and on-site communal bicycles;	Medium

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
			and working with MetroPool on a BNL Rideshare Portal.	
Goal 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning				
2.1	30% energy intensity (Btu per gross square foot) reduction by FY 2015 from a FY 2003 baseline (2013 target: 24%)	BNL's current level of energy intensity is 296,375 Btu/GSF. This level represents a cumulative reduction of 8.5% from the FY 2003 baseline of 323,780 Btu/GSF.	The UESC was awarded on October 22, 2013. Phase I implementation of the UESC will start in early 2014. It is estimated to result in a nearly 11% reduction in energy intensity. Energy conservation measures include improving the efficiency of supplying chilled water; lighting upgrades throughout the Laboratory, and installation of building controls with enhanced temperature setback. Further UESC Phases and other planned initiatives include providing free cooling, improving the steam system, and CHP and/or biomass.	Medium
2.2	EISA Section 432 energy and water evaluations	100% completed within last four years.	Green Energy Surveys will continue to be combined with Facility Condition Assessments to reduce audit costs.	Low
2.3	Individual buildings metering for 90% of electricity (by October 1, 2012); for 90% of steam, natural gas, and chilled water (by October 1, 2015)	The status of individual building metering is as follows: • Electric: 97% • Natural Gas: 100% • Steam: 85% • Chilled Water: 100%.	**Data Center 459:** An advanced dual channel ultrasonic Chilled Water (CHW) meter will be installed to separate data center and office load, and an electric meter will be installed on UPS to meter data center	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
	(2013 target: 90% and 50%, respectively)	Several Ethernet-based Power Quality meters were installed throughout the Laboratory. Several steam meters were upgraded to the advanced metering platform. Chilled water metering in the new NSLS-II includes segregated metering for the ring/process loads and the LOB cooling loads. Advanced potable water metering has been installed in the new ISB-I.	electric load. **Data Center 515:** The small CHW line serving perimeter offices will be meter-advanced, and two electric sub-meters will be installed to segregate office and data center electric load.	
2.4	Cool roofs, unless uneconomical, for roof replacements unless project already has CD-2 approval. New roofs must have thermal resistance of at least R-30.	In FY13, one Cool Roof was added to Building 734 (the new ISB-I).	In October 2013, a reminder was sent to all roofing project managers to review potential projects against the DOE Cool Roof requirements.	Low
2.5	15% of existing buildings greater than 5,000 gross square feet (GSF) are compliant with the Guiding Principles (GPs) of HPSB by FY 2015 (2013 target: 11%)	MPO continues to make progress towards the 15% requirement and received an HPSB Recognition Letter from DOE-HQ. At the end of FY13, BNL is 72% HPSB compliant for the 9 buildings that will not achieve LEED certification. Tasks completed in FY13 include replacement of the HVAC system at Building 438; installation of occupancy sensors in all HPSB buildings; installation of night setback controls in	MPO has put together a schedule for the completion of the remaining HPSB projects in FY14 and early FY15. For FY14 the work planned includes HVAC, fume hood, and lighting upgrades in Building 599; roof replacement for Building 438; miscellaneous metering; and bid/award of Building 459 indoor air quality improvements and HVAC upgrade.	Medium

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
		Buildings 438 and 935; and HVAC, lighting, and hot water HPSB improvements in Building 817.	In FY15, the work will include the completion of Building 459, data center improvements if required, and retro-commissioning. This work is planned for the first quarter of FY15 to ensure completion well ahead of the milestone of September 30, 2015.	
2.6	All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs	ISB-I was completed in FY13 and achieved LEED Gold certification, indicating compliance with the GPs.	LEED Gold for NSLS-II LOBs is expected in early FY14. No new major construction or renovation projects are expected in FY14.	Low
Goal 3: Fleet Management				
3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline (2013 target: 114% cumulative since 2005)	FY13 performance compared to FY12 showed a 21% increase in alternative fuel consumption from 42,629 gallons (gal) in FY12 to 51,713 gal in FY13. Alternative fueling infrastructure exists for compressed natural gas (CNG), diesel, E-85, and biodiesel.	Continue to purchase as many AFVs as possible and remove petroleum vehicles as much as practical.	Low
3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline (2013 target: 16% cumulative since 2015)	FY13 performance compared to FY12 showed an 18% decrease in petroleum consumption from 84,449 gal in FY12 to 69,263 gal in FY13. BNL is reducing petroleum consumption by replacing gasoline and diesel vehicles with AFVs as budgets	Continue to purchase as many AFVs as possible and remove petroleum vehicles as much as practical.	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
		permit.		
3.3	100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2015 and thereafter (75% FY 2000 – 2015)	In the last several years, all light duty vehicles purchased were AFVs.	Continue to ensure that 100% of light duty vehicle purchases are AFVs.	Low
3.4	Reduce fleet inventory of non-mission critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline	Identified 253 mission critical vehicles, and reduced the fleet from 2005 baseline of 298 vehicles to current size of 259 vehicles.	This goal has been achieved.	Low
Goal 4: Water Use Efficiency and Management				
4.1	26% potable water intensity (Gal per gross square foot) reduction by FY 2020 from a FY 2007 baseline (2013 target: 12%)	Annual water use intensity has decreased from 101 gal per square foot to 85 gal per square foot, a 15.5% water usage reduction since base-year 2007. The Sewage Treatment Plant Modification contract was awarded and fieldwork commenced in the fourth quarter of FY13.	The contractor is scheduled to complete the Sewage Treatment Plant Modification in the second quarter of FY14. This project will result in the recycling of approximately 70% of the potable water used at BNL. In FY14, we will continue with the replacement of existing water-related fixtures with low flow fixtures.	Low
4.2	20% water consumption (Gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline (2013 target: 6%)	No permanent landscaping or agricultural water use.	n/a	n/a
Goal 5: Pollution Prevention and Waste Reduction				
5.1	Divert at least 50%	During FY13, the recycling	Planned actions include	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
	of non-hazardous solid waste, excluding construction and demolition debris, by FY 2015	rate was approximately 62%.	revising training to educate employees on recycling programs; conducting a study to test efficacy of remanufactured toner cartridges; and soliciting ideas for partial or full funding of projects that minimize waste/prevent pollution.	
5.2	Divert at least 50% of construction and demolition materials and debris by FY 2015	The Laboratory recycles 95% of construction, demolition, and woody debris.	Continue to send material to Construction & Demolition (C&D) transfer station for sorting and recycling. Continue to convert concrete, stone, and brick debris into recycled concrete aggregate (RCA) for reuse on-site.	Low
Goal 6: Sustainable Acquisition				
6.1	Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements / Biobased Procurements)	All contract actions for construction and custodial products met sustainable acquisition requirements in FY13.	Performance in sustainable acquisition will be documented in the FY 2014 Pollution Prevention Tracking and Reporting System (PPTRS) and the CEDR. The performance for the purchase of bio-based products will be documented in the System for Award Management (SAM) for FY14.	Low
Goal 7: Electronic Stewardship and Data Centers				
7.1	All data centers are metered to measure a monthly Power Utilization Effectiveness (PUE)	Initial PUE study indicated current PUE to be above 1.6.	BNL is working to install additional metering so that a more accurate PUE for each data center may be measured and monitored. The meter is	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
	of 100% by FY 2015 (2013 target: 80%)		expected to be completed in third quarter of FY 2014.	
7.2	Maximum annual weighted average PUE of 1.4 by FY 2015 (2013 target: 1.60)	Initial PUE study indicated current PUE to be above 1.6.	Once all meters are in place, PUE will be monitored to evaluate the course of action needed to meet the goal of 1.4.	Low
7.3	Electronic Stewardship - 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY 2012	All systems in the BNL domain that are capable of power management have the setting enabled.	BNL will continue to evaluate the feasibility of extending this desktop computer-power management policy to other operating systems	Low
Goal 8: Renewable Energy				
8.1	20% of annual electricity consumption from renewable sources by FY 2020 (2013 target: 7.5%)	BNL purchased 40 million kWh of RECs, which equals about 9% of BNL's total usage of electric and thermal energy. LISF began operations November 2011 and in FY13, provided 54 million kWh/yr of clean renewable energy to Long Island.	Construction of the Research and Development (R&D) solar array began in the fourth quarter FY 2013 and will continue in FY14. A CHP study was completed in August 2013 and evaluation of the potential benefits is ongoing. REC purchases will continue and the quantity will need to be significantly increased due to the 20% requirement.	Low
Qualitative Goals				
Goal 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning				
2.8	Local and Regional Planning	BNL continues to investigate public transportation and	Continue to support federal/local efforts to	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Non-attainment
		increased carpool ridership. Local renewable energy is supported through the LISF and the NSERC. Natural resource activities include measuring impact of large scale solar installations. Stakeholder involvement includes hosting numerous conferences and routine communications with regulatory and community groups.	reduce reliance on petroleum by establishing a working group to reduce single occupancy vehicles and examine alternate work schedules; and re-deploy tick management techniques (4-poster) in the spring.	
Goal 9: Climate Change Adaptation				
9.1	Climate Change Adaptation - Address DOE Climate Adaptation Plan goals	BNL continues to develop and maintain strong regional relationships in renewable energy and climate change adaptation.	Continue to be leader in regional climate change adaptation partnerships.	Low

II. PERFORMANCE REVIEW AND PLAN NARRATIVE

QUANTITATIVE GOALS

Goal 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory

28% Scope 1 & 2 GHG reduction by FY 2020 from a FY 2008 baseline

1.1 GREENHOUSE GAS REDUCTION, SCOPE 1 AND 2

Performance Status

BNL is committed and on target to reduce Scope 1 and 2 GHG emissions by at least 28% by FY 2020 when compared to the FY 2008 baseline. The FY 2008 baseline was 205,542 $MtCO_2e$, making the FY 2020 target 148,000 $MtCO_2e$. In FY 2013, BNL's Scope 1 and 2 GHG emissions totaled 80,466 $MtCO_2e$—a decrease of 60.9% against the FY 2008 baseline.

With existing initiatives and planned projects and activities, it is estimated that BNL will exceed the target by over 40%, despite the substantial programmatic growth that is expected by 2020. Without these efforts, BNL's projected GHG emissions in 2020 would be more than 90% above the goal at 287,000 $MtCO_2e$.

The table below summarizes the Laboratory's current and projected GHG status in light of existing and planned initiatives.

Table 2. Current and Projected GHG Status

	$MtCO_2e$	Change Compared to	
		2008	Target
2008 GHG Emissions	205,542		
28% GHG Reduction Target	148,000	-28%	
2020 Projected GHG Emissions	287,000	+40%	+94%
2020 Projected GHG Emissions with Initiatives	84,000		-43%

BNL is currently well below the FY 2020 target of 148,000 $MtCO_2e$ due to a combination of hydropower (obtained in March 2011), hosting and support for innovative projects, such as the LISF, and the purchase of RECs. However, in order to ensure achievement of the 28% reduction goal by 2020, BNL must be diligent in maintaining these valuable assets and be aggressive with energy conservation, renewable energy projects, operational improvements, and infrastructure modernization. This will involve seeking and obtaining funding from every possible source, along with cultural changes and increased emphasis on management practices.

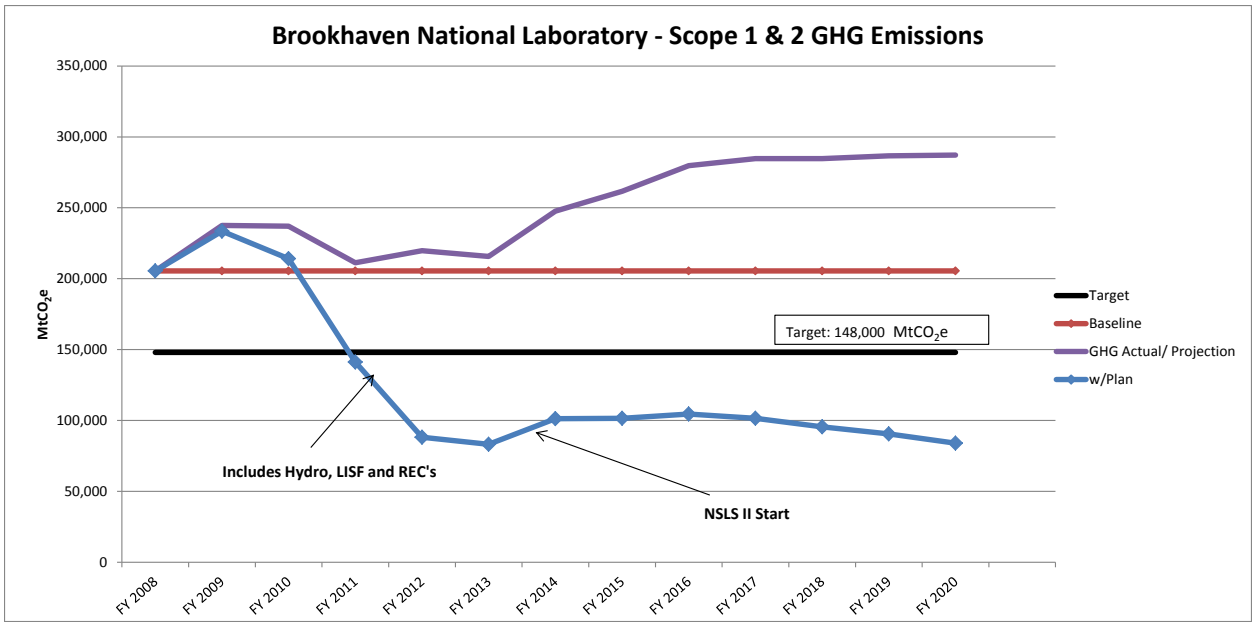


Figure 1a. Scope 1 and 2 Greenhouse Gas Emissions

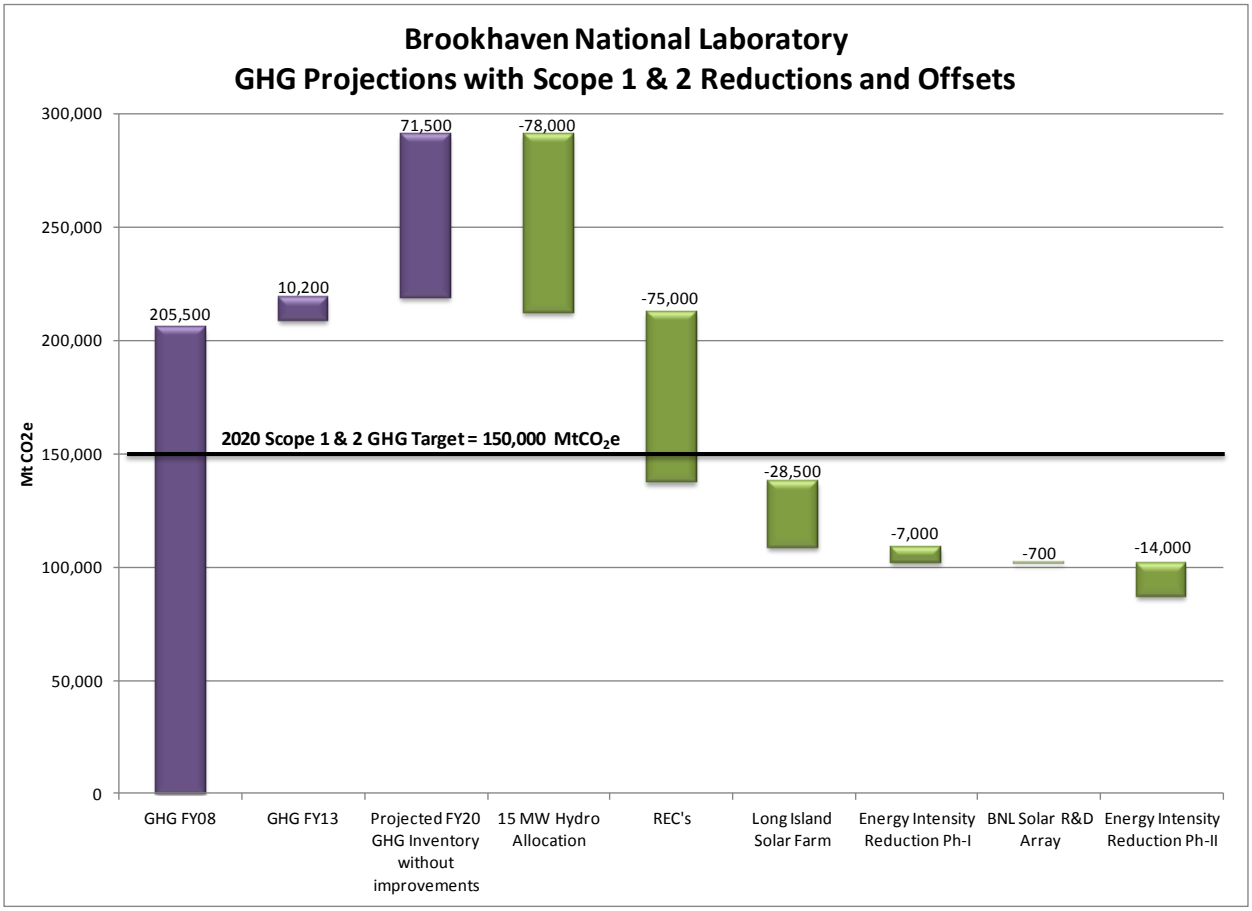


Figure 1b. Scope 1 and 2 GHG Projections with Reductions/Offsets

Plans and Projected Performance

BNL continually evaluates various options and has formulated a robust path forward. A Site Sustainability Steering Committee was formed in 2010 to better integrate actions across the Laboratory and achieve a comprehensive approach to attaining GHG targets. The Committee is comprised of senior leadership from Science and Operations, which enables the necessary visibility and management attention for this important issue. This Steering Committee has been instrumental in advising and coordinating the progress to date as well as the path forward.

The following summarizes ongoing and planned efforts.

Hydropower

Starting in March 2011, BNL began receiving 15 MW of hydropower from NYPA. Annual consumption of the hydropower is approximately 115,000 MWh and reduces BNL's GHG emissions by approximately 78,000 $MtCO_2e$ per year. This is now included in the CEDR calculation.

Long Island Solar Farm (LISF)

Starting in November 2011, the LISF began producing approximately 32 MW of alternating current electricity. This project will avoid GHG emissions of 28,000 $MtCO_2e$ or more per year.

Utility Energy Service Contract (UESC)

Implementation of the UESC will reduce GHG levels by approximately 7,000 $MtCO_2e$. The contract was awarded in October 2013 and will be completed by late 2015. Additional details regarding the UESC are provided under Goal 2.1, Energy Intensity Reduction.

Northeast Solar Energy Research Center (NSERC)

Completion of the NSERC will ultimately provide up to 1 MW of on-site solar PV generation and a further reduction approximately 700 $MtCO_2e$ of GHG. This facility will become operational in early 2014.

Renewable Energy Credits (RECs)

REC purchases will continue. It is important to note the new 20% Renewable Energy Goal will significantly lower GHG values but will require a substantial annual cost.

The table below lists the current and proposed components of BNL's GHG initiative to offset/reduce emissions and how each element will contribute to attaining the emissions goal.

Table 3. Elements of BNL GHG Emissions Offset/Reduction Initiative

Planned Action	MW	MWh/yr	$MtCO_2e$	%	Estimated Cost	Comments
Energy Intensity Reduction – UESC Phase I			-7,000	-5%	$12,200,000	The contract was awarded in October 2013 and will be completed by late 2015.

Energy Intensity Reduction – UESC Phase II			-14,000	-10%	$10,510,000	This initiative will be undertaken if we are able to identify additional projects that can be alternatively financed. If possible, the estimated cost will be approximately $10.5 million and would begin in 2015, after completion of Phase I.
Hydro Allocation (15 MW)	15	120,231	-78,000	-56%	N/A	15 MW of NYPA hydropower at an average LF of 0.91; credit per FEMP email
BNL Solar PV (R&D)	1	1,042	-700	-1%	N/A	R&D array of 700 kW at LF 0.85 and FLH of 0.14. Online 2014.
Renewable Energy Credits (RECs)		116,114	75,200	-54%	$1,509,487	RECs need to be purchased to meet 20% renewable energy goal. This is an annual cost.
Long Island Solar Farm Credit	31.5	44,000	-28,500	-21%	N/A	Credit for hosting the LISF is based on purchasing approximately the same amount of RECs as the LISF produced.
Total actions in progress or under consideration			**-203,400**		**$24,219487**	

There is a difference of 139,000 $MtCO_2e$ between the reduction target of 148,000 $MtCO_2e$ and the projected FY 2020 GHG emissions of 287,000 $MtCO_2e$ without initiatives. The % values in the table reflect each initiative's impact on the 139,000 $MtCO_2e$ value.

Fugitive GHG Emissions

Periodic purging of carrier gases, which are used during experimental runs at the Relativistic Heavy Ion Collider (RHIC), is responsible for the bulk of BNL's annual fugitive GHGs. In FY 2012, carrier gases were purged from various subsystems within the PHENIX and STAR detectors as summarized below. The table indicates the percentage of BNL's FY 2012 fugitive GHGs that can be attributed to the purging of carrier gases from these subsystems.

Table 4. Fugitive GHG Emissions

Gas	Subsystem	Detector	Percentage of Total BNL GHG Emissions
1,1,1,2-tetratfluourethane (HFC-134a)	resistive plate chamber (RPC) subsystem	PHENIX	36.1 % (8,992 $MtCO_2e$)
perfluoromethane (PFC-14)	muon tracking chamber north and south subsystems	PHENIX	44.6 % (11,351 $MtCO_2e$)
1,1,2-tetratfluourethane (HFC-134a)	multi-gap resistive plate time of flight (TOF) subsystem	STAR	5.4% (1,372 $MtCO_2e$)

In 2012, BNL's PHENIX Group began acquiring funds to upgrade the single pass circulation system used by the RPC to a recirculation system that will reduce purged 1,1,1,2-tetratfluourethane (HFC-134a) and sulfur hexafluoride (SF_6) emissions by 50% to 75%. Most of the materials to upgrade the system have been purchased and the recirculation system installation is about 80% complete. The recirculation system will be completed in time for the FY 2015 PHENIX experimental run.

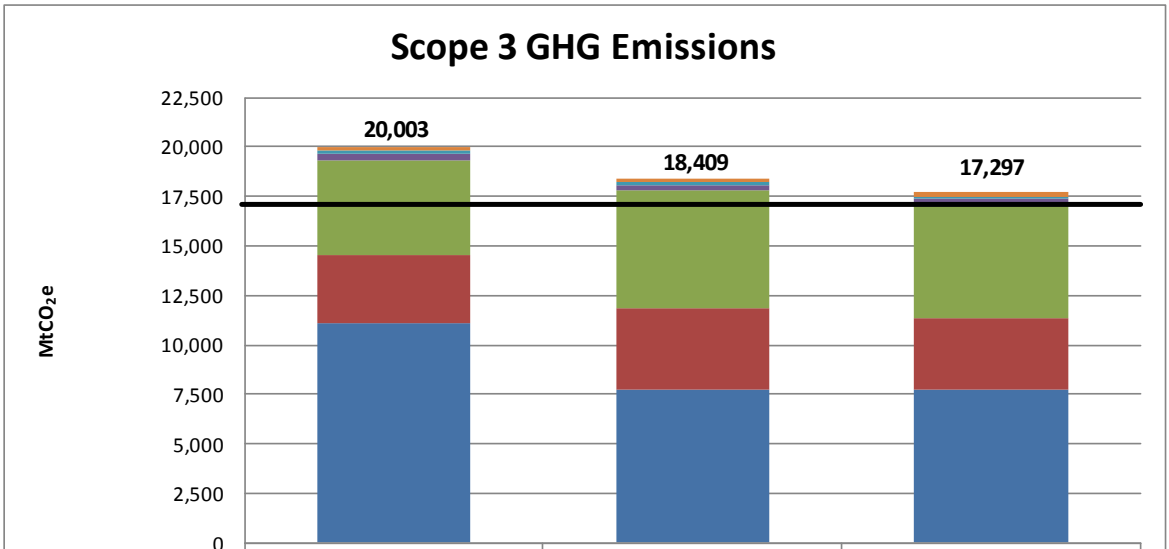
Meanwhile, BNL's STAR Group has completed plans to upgrade the single pass circulation system used by the TOF to a recirculation system equipped with a scrubber device to purify the gas before it is returned to the TOF. The new recirculation system will be operational for the FY 2014 STAR experimental run. If the gas scrubber device performs as expected, allowing STAR to run in the recirculation mode for the duration of the FY 2014 experimental run, TOF detector emissions of HFC-134a will be reduced by at least 50%.

1.2 GREENHOUSE GAS REDUCTION, SCOPE 3

13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline

Performance Status

The figures below illustrate that, overall, BNL reduced Scope 3 GHG emissions from all combined source categories. Scope 3 GHG emissions are down 5.5% from FY 2012 (1,012 $MtCO_2e$), and 13% lower than the FY 2008 baseline value.



	FY08	FY12	FY13
Waste	212	183	192
Personal Auto	126	183	138
Rental Car	347	217	222
Commuting	4,795	5,987	5,782
Air Travel	3,399	4,116	3,638
Trans & Dist Losses	11,124	7,723	7,725

Figure 2a. Scope 3 Greenhouse Gas Emissions

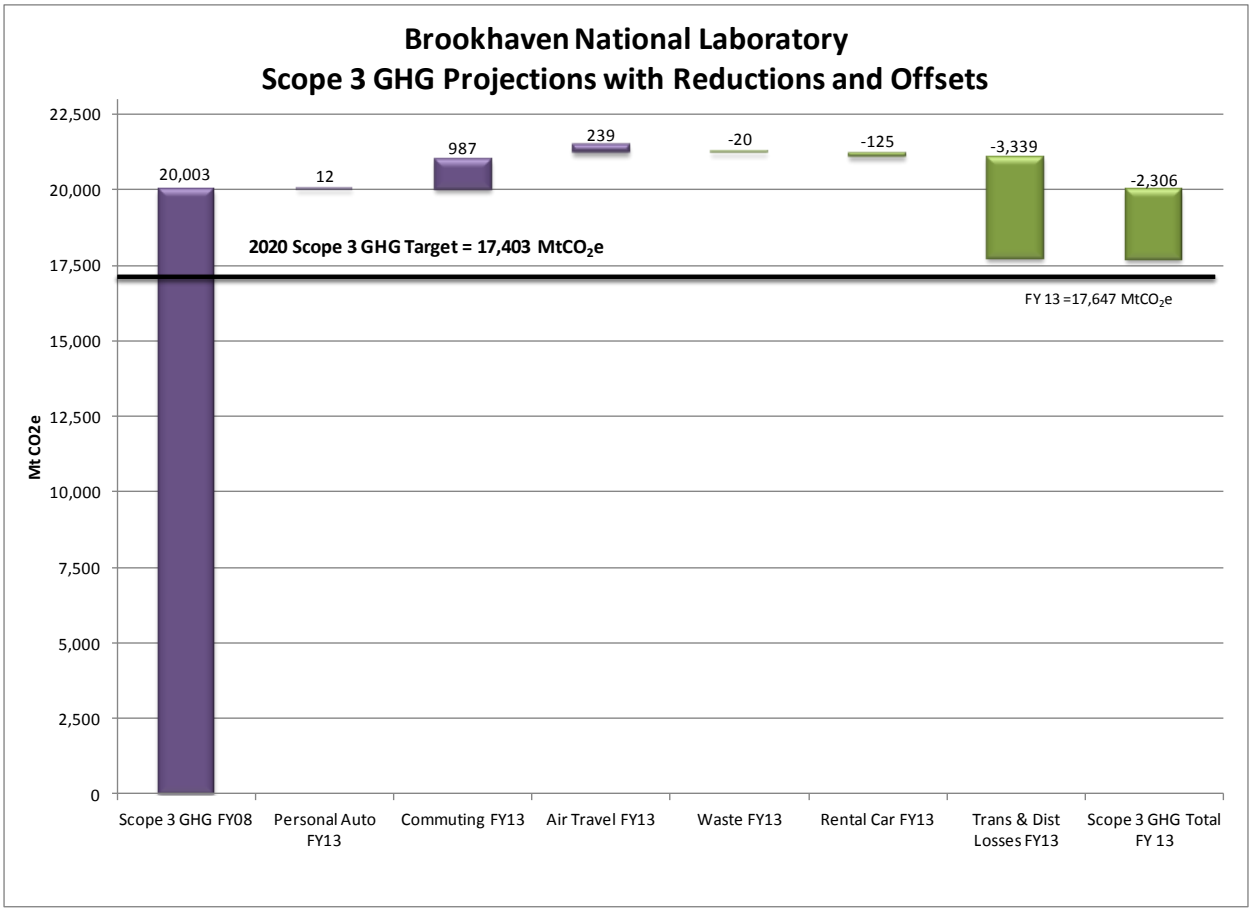


Figure 2b. Scope 3 GHG Projections with Reductions/Offsets

Transmission and Distribution Losses

From FY 2008 to FY 2013, GHGs from electrical transmission and distribution losses dropped 33.3%, or 3,699 $MtCO_2e$, despite a 16.7% increase in purchased electricity. Hydropower purchases of 118,856 MWh in 2013 from the NYPA accounted for 43.9% of all electrical power purchases. As a result, transmission and distribution loss GHGs dropped by 2,845 $MtCO_2e$. Lower e-Grid GHG emission factors for the Long Island sub-region in FY 2013 versus that of FY08, combined with a decrease in the transmission and distribution loss factor from 6.85% in FY 2008 to 6.18% in FY13, also helped to reduce transmission and distribution loss GHGs.

Commuting

Commuting GHGs dropped 3.5 %, or 205 $MtCO_2e$, from FY 2012. In September 2011, a survey was performed using traffic counters to aggregate and distinguish the types of vehicles entering the site from 7am to 9am over a five-day period. The survey results were combined with tallies of the number and types of multi-occupant vehicles each day to estimate the commuting GHGs. There was a modest decline in the average employee round trip commute, as the distance decreased from 28.84 miles in FY 2012 to 28.18 miles in FY 2013. This drop in the average commuting distance accounts for the

corresponding decreases in the commuting distance traveled by single occupancy passenger cars/light duty trucks and carpools noted in Section 8.3 of BNL's CEDR.

In 2013, BNL staff met with administrators of MetroPool Long Island, the New York State Department of Transportation (NYSDOT) regional commuting services contractor for Long Island, regarding their progress in creating a rideshare portal customized to meet the needs of BNL employees. Since the proposed enhancements to ride-matching services would require input of personally identifiable information into a rideshare database hosted on a NYSDOT server, several cyber security issues on how the information would be used and protected were raised. MetroPool or NYSDOT must address these issues before BNL can commit to providing employee information to be loaded into the database.

Also in FY 2013, a working group led by Human Resources developed two new procedures that will be added to the BNL Standards-Based Management System (SBMS) Flexible Work Arrangements Subject Area. These new procedures expand flexible workweek and compressed workweek schedules for non-bargaining nonexempt employees and non-bargaining employees, respectively. The new procedures are expected to be rolled out to employees after the revisions to the Flexible Work Arrangements Subject Area have been published.

In March 2013, BNL's Badging Office amended the forms used to register employee vehicles and provide stickers for site entrance purposes. The form now includes the vehicle model, in addition to the model year and make that was previously recorded. The inclusion of the vehicle model is important as it indicates the type of fuel and mileage efficiency. Since March, more than 16% of employee vehicle records have been updated during renewal of employee identification badges. Approximately 37% of the updated vehicle records are for model years 2009 and later. This is of significance to calculations of employee commuting GHG emissions, since 2009 model year and later passenger cars and light duty trucks manufactured and sold in the US must meet stricter Environmental Protection Agency (EPA) emission standards.

Meetings were held in March to encourage the formation of carpool co-ops in eight targeted areas where large numbers of employees reside. However, they failed to generate sufficient interest in all but three areas. Work will continue in FY 2014 to expand participation in carpool co-ops in these areas.

To increase employee awareness and appreciation of the environmental, health, and economic benefits of more sustainable means of transportation, BNL participated in the 1st Annual Car Free Day LI celebration on September 20, 2013. To participate, employees completed an online pledge on the Car Free Day LI website to be car-free or car-lite on September 20, 2013 and commit to drive less by carpooling, biking, walking, or telecommuting. To encourage participation, all individuals that made pledges were automatically entered in a random drawing for multiple donated prizes.

Airline Travel

Airline travel GHGs dropped by 478 $MtCO_2e$, a decrease of 13.1% from the FY 2012 total. However, FY 2013 airline travel GHGs are 7.0% above the FY 2008 baseline.

Rental Cars

GHG emissions resulting from rental vehicles used for employee business travel rose 2.3%, but are still 36% below the 2008 baseline value.

Personal Auto (Business)

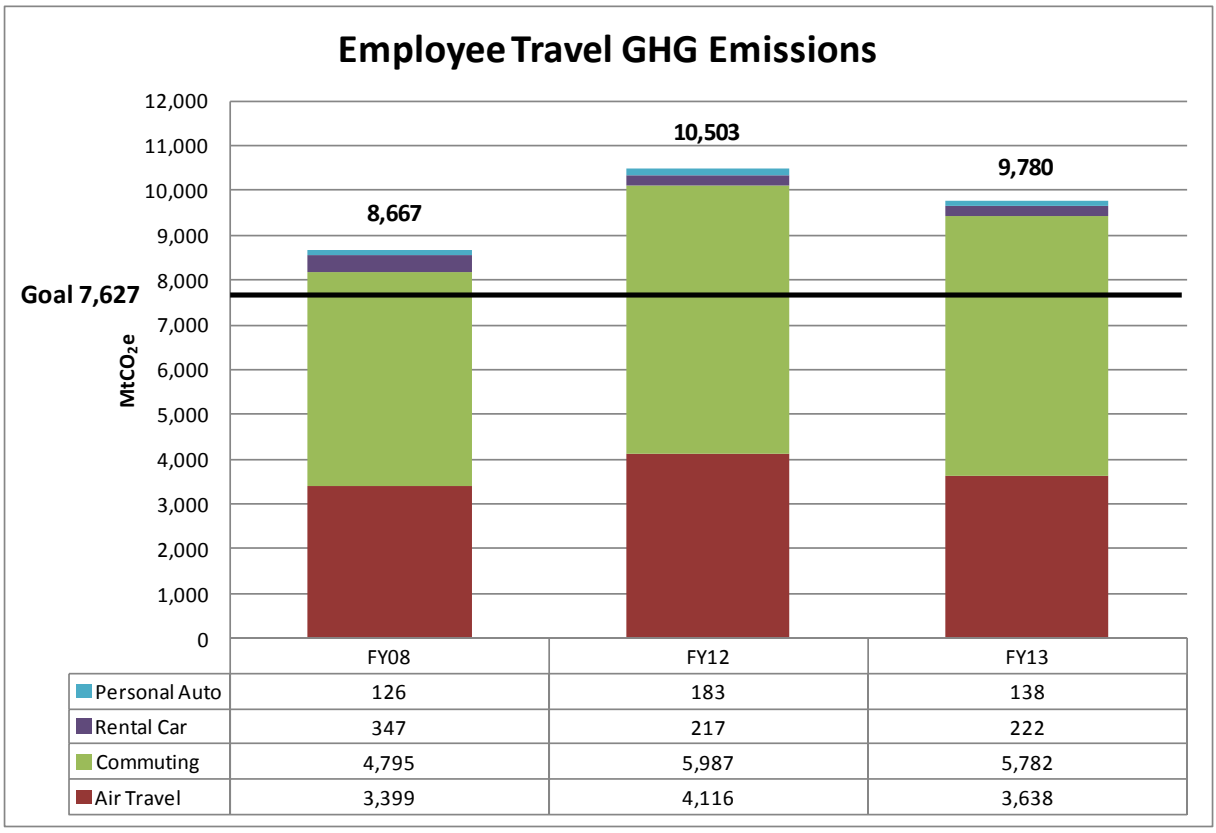
GHGs from employees using their personal vehicles for business use have increased just 9.5% since FY 2008, which is far below comparable emissions when considering the growth in the number of full-time employees since 2008.

Waste

Since 2008, GHGs from contracted waste are down 10.45% due to a corresponding reduction in the volume of waste transferred to the Hempstead Resource Recovery Facility. Diverting cafeteria food preparation wastes from the waste stream have also helped to reduce waste levels. These food preparation wastes are used at the Sewage Treatment Plant to raise plant biochemical oxygen levels, which, in turn, aid in the de-nitrification process and supplement the biomass at the Sewage Treatment Plant.

Plans and Projected Performance

To achieve the 13% Scope 3 GHG emission reduction goal and the 12% employee business travel GHG emission reduction goal, BNL must lower overall Scope 3 GHGs and employee travel GHGs by 2,600 $MtCO_2e$ and 1,040 $MtCO_2e$, respectively. Figure 3 illustrates the challenges that BNL must face in order to achieve the employee business travel GHG reduction goal.



	FY08	FY12	FY13
Personal Auto	126	183	138
Rental Car	347	217	222
Commuting	4,795	5,987	5,782
Air Travel	3,399	4,116	3,638

Figure 3. Employee Travel GHG Emissions

In the second quarter of FY 2014, BNL's Badging Office expects to complete updates to employee vehicle records as employee identification badges are renewed. Data from the revised employee vehicle records will be analyzed to determine the relative distribution of vehicles that meet older GHG emission standards and those that meet increasingly stringent EPA GHG emission standards for passenger cars and light duty trucks. The results of this analysis will be combined with results from either a new weeklong survey of vehicles entering the site during the morning commute period or an employee commuting survey. This will provide improved metrics to estimate commuting GHGs that capture the impact of new vehicle emission standards.

To affect reductions in rental car GHGs, efforts will be made to amend the rental car criteria in BNL's Domestic Travel and Foreign Travel standard procedures to select hybrid vehicles when available and practical. Upon approval of these changes, BNL Travel Office personnel who coordinate auto rental arrangements will be advised of the changes and encouraged to select hybrid vehicles when making rental arrangements for travelers whenever possible.

BNL will be deploying greatly enhanced Unified Communications technologies in FY 2014 to FY 2015 as its site-wide telephone replacement project is completed. In addition to providing users with the ability to rapidly schedule and conduct ad-hoc audio teleconferences, the new technologies will enable users to integrate desktop video teleconferencing capabilities with larger room-based sessions and mobile devices. This allows teleconferencing sessions to be scheduled by any individual user and spans the use of previously disparate technologies. As such, the need to travel for traditional face-to-face meetings is expected to decrease.

During the first quarter of FY 2014, a survey will be conducted among users, guests, and employees regarding their use of on-site shuttle van services and once-a-day morning and evening service to the Ronkonkoma railroad station. The survey will gauge the level of interest in expanding the hours of shuttle service as well as the level of interest in public bus service and communal bicycles for on-site use.

The working group, formed upon the recommendation of the Policy Council, to examine and expand possible options for reducing GHGs from each of the four employee business travel categories will meet on a quarterly basis in FY 2014.

Additional plans and objectives for FY 2014 include:

- A working committee to evaluate and make recommendations regarding design options, future locations, and vendor selection for electric vehicle charging stations that are slated for installation near the NSLS-II LOBs; and
- Continued work with MetroPool and BNL Cyber Security staff to complete and roll out the new BNL Rideshare Portal.

Goal 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning

30% energy intensity (Btu per gross square foot) reduction by FY 2015 from a FY 2003 baseline

2.1 ENERGY INTENSITY REDUCTION

Performance Status

BNL's current level of energy intensity is 296,375 Btu/gsf, based on CEDR FY 2013 data. This level represents a cumulative reduction of 8.5% from the FY 2003 baseline of 323,780 Btu/gsf. BNL continues to strive to meet the 30% reduction goal by 2015.

Energy surveys are completed annually to ensure 100% of BNL's buildings are evaluated within a four-year period. The information is compiled in a Green Energy Survey database. Projects that provide viable economics will be included in funding requests and alternatively financed initiatives.

Plans and Projected Performance

BNL continues to implement energy efficiency projects in order to significantly reduce energy intensity when compared with the FY 2003 baseline. Projects are selected primarily based on an evaluation of their lifecycle costs (less than or equal to 25-year simple payback). Worksheet 3.3 of the *CEDR FY 2013* includes projects that, if implemented, are estimated to reduce energy intensity by approximately 30%.

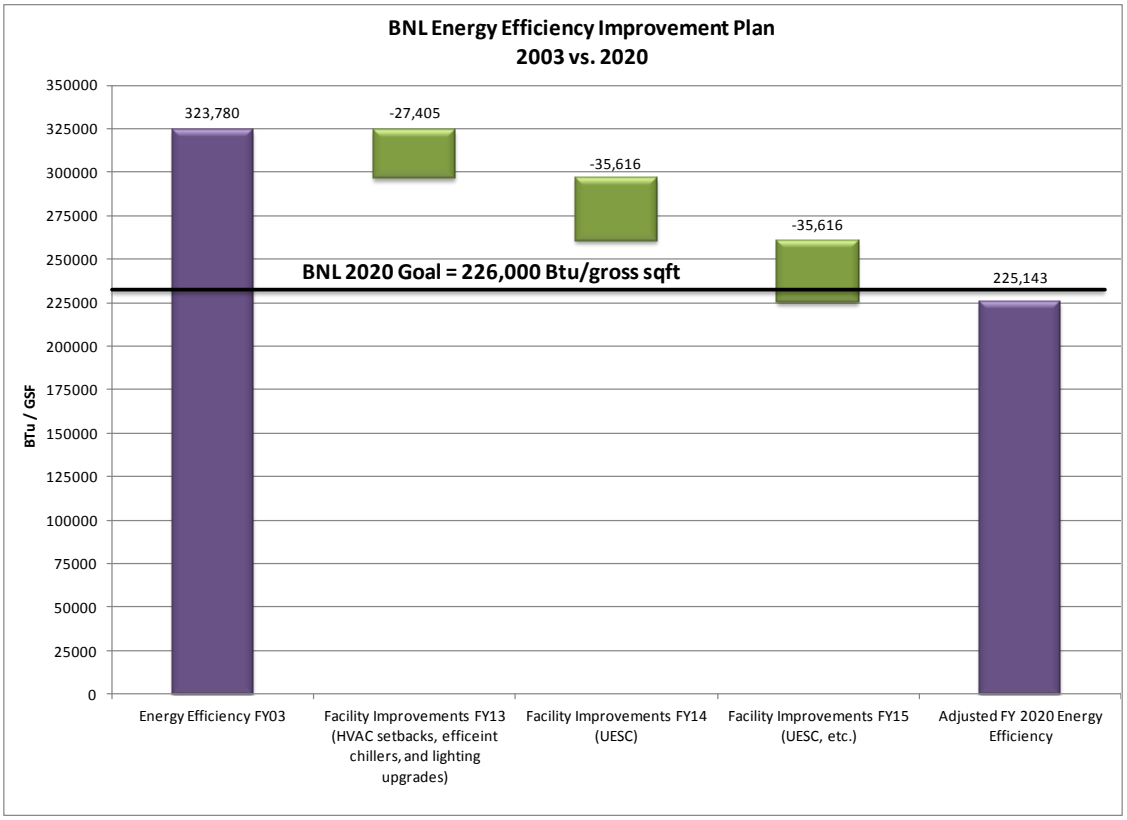


Figure 4. BNL Energy Efficiency Improvement Plan

BNL/DOE awarded a UESC on October 22, 2013, the first Task Order of which includes the following energy conservation measures:

- Improving the efficiency of supplying chilled water
- Upgrading lighting throughout the Laboratory
- Installing building controls with enhanced temperature setback.

Phase I implementation of the UESC will start in early 2014. It is estimated to result in a nearly 11% reduction in energy intensity. Additional Task Orders are anticipated to be awarded in the near future to obtain even greater reductions. Further UESC Phases and other planned initiatives include providing free cooling, improving the steam system, and CHP and/or biomass.

BNL had direct appropriations for energy conservation efforts of over $2.6 million in 2013 and expects to spend approximately $3 million/year in 2014 and beyond.

It is important to note that the anticipated growth in both staff and facilities will offset total energy savings. BNL will continue to seek out and implement additional projects in an effort to meet the goal of reducing energy use intensity by 30% by FY 2015. BNL has identified the following projects to further reduce energy intensity.

HVAC Setback

A setback capability for heating, ventilation, and air-conditioning systems (HVAC) will be installed. The Facility Complex Managers and their staff will continually evaluate systems to ensure that this function is operating as intended. Setback will be captured by using the new Building Automation Program. Facility Complex Managers will communicate with building occupants about energy usage and the benefits of HVAC setback and energy conservation. Lease agreements will be modified to incorporate setback clauses. In addition, the existing preventative maintenance (PM) program will be enhanced for all HVAC systems.

Steam Charge-back

A steam cost charge-back program will be implemented to encourage energy conservation. BNL uses direct charges to bill occupants for electricity and chilled water, and finds it to be one of the most effective methods to increase energy conservation. In FY 2010, a steam charge-back program was piloted; it will be phased in to full cost recovery program over several years to accommodate the varying financial impacts to each building's occupants. It is estimated that this should provide an energy savings of approximately 62,000 mmBtu/year.

Lighting Upgrades

Planning will continue for BNL's ongoing program of upgrading current lighting with high efficiency replacements. Where applicable, automated controls will be installed. It is estimated that this will provide an annual savings of approximately 4,000 mmBtu/year.

Energy Audits

Energy audits of HVAC systems, lighting, and office equipment will continue to be used to identify opportunities for energy conservation. The findings will help to develop policies on operation and equipment needs. These audits are being performed in conjunction with ongoing condition assessment surveys in order to reduce additional costs and administrative oversight needs.

2.2 ENERGY AND WATER EVALUATIONS

EISA Section 432 Energy and Water Evaluations

Performance Status

Energy Independence and Security Act (EISA), Section 432 energy and water evaluations were completed for 100% of the applicable buildings within last four years.

Plans and Projected Performance

BNL has combined the Green Energy Surveys with the required Facility Condition Assessments (FCAs). Due to the synergies of the relatively similar work, BNL achieves savings of approximately $45,000/year, when compared to completing them independently. Further, the database on facility information is more robust and helps BNL to plan building modifications more efficiently.

The energy survey information includes rough energy project cost estimates, along with Simple Payback calculations. This information is maintained in the database and used to identify viable energy projects.

2.3 INDIVIDUAL BUILDINGS METERING

Individual buildings metering for 90% of electricity (by 10/1/12); for 90% of steam, natural gas, and chilled water (by 10/1/15) (2013 Target: 90% and 50%, respectively)

Performance Status

The status of individual building metering is as follows:

- Electric: 97%
- Natural Gas: 100%
- Steam: 85%
- Chilled Water: 100%.

In FY13, BNL continued with its long, successful history in advanced metering and currently meets the goal for electricity, natural gas, and chilled water. Advanced electric meters are installed in 274 buildings, advanced chilled water meters are installed in 38 buildings or loads with chilled water, and all of BNL's natural gas-supplied facilities have advanced meters installed.

Advanced steam/condensate metering is installed in 21 buildings. However, 45 buildings still have conventional steam meters that will be upgraded to advanced meters as appropriate. BNL will install new steam metering in large use buildings where steam metering is insufficient with a goal of upgrading three or more meters per year. This will assist in our steam charge-back effort described in Section 2.1.

Due to the low cost of water, the installation of water meters is not economically justifiable. However, BNL's major facilities with cooling towers, as well as new buildings and major renovations, will include water metering. In FY13, the new LEED Gold ISB-I was commissioned and included advanced potable water metering.

Electric

Progress for FY13 includes:

- 7 Advanced Ethernet-based Power Quality meters in substation 616
- Ethernet-based recording for electric vehicle charging station metering in Building 400
- Ethernet-based Power Quality metering for Buildings 599, 860, and 740
- 8 Power Quality meters for individual labs and supporting offices for Building 740
- 2 Power Quality meters for ISB-I.

Steam

Three meters were upgraded to the advanced metering platform, and two new meters on the previously estimated steam load were also upgraded to advanced meters.

Chilled Water

Chilled water metering in the new NSLS-II includes segregated metering for the ring/process loads and the LOB cooling loads.

Plans and Projected Performance

Data Center 459

An advanced dual channel ultrasonic chilled water meter will be installed to separate data center and office load, and an electric meter will be installed on UPS to meter data center electric load.

Data Center 515

The small chilled water line serving perimeter offices will be meter-advanced, and two electric sub-meters will be installed to segregate office and data center electric load.

2.4 COOL ROOFS / THERMAL RESISTANCE

Cool roofs, unless uneconomical, for roof replacements unless project already has CD-2 approval. New roofs must have thermal resistance of at least R-30.

Performance Status

Construction of ISB-I was completed this FY. The building has a cool roof and meets the thermal resistance requirement of at least R-30. The associated information was entered into the Federal Information Management System (FIMS).

Plans and Projected Performance

An annual reminder was sent to all roofing project managers to review projects against the Cool Roof standards. If lifecycle analysis demonstrates that it is economically feasible, the roof will be designed to meet the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Cool Roof criteria, as well as insulation value of R-30.

There are no barriers to meeting the DOE Cool Roof requirements for new construction. For re-roofing projects, while there are no barriers to meeting the ASHRAE reflectivity standards for cool roofs, there are significant economic barriers to achieve R-30 insulation values. The economics are driven by several factors, including the current "R" value, quantity of equipment and penetrations on the roof, and other construction aspects, such as curbing. In all cases, BNL maximizes the "R" value based on the roof condition up to and including R-30.

15% of existing buildings greater than 5,000 gross square feet (GSF) are compliant with the Guiding Principles of HPSB by FY 2015, with progress to 100% thereafter

2.5 HIGH PERFORMANCE SUSTAINABLE BUILDINGS (HPSB) – EXISTING BUILDINGS

Performance Status

The MPO continues to make progress toward ensuring that 15% of existing buildings greater than 5,000 gsf are compliant with the GPs of HPSB by 2015. As a measure of continued progress, BNL received an HPSB Recognition Letter from DOE-HQ.

At the end of FY13, BNL has achieved 72% HPSB compliance for the 9 buildings that will not achieve LEED Certification. The following tasks were completed in FY13:

- Replacement of the HVAC system at Building 438
- Installation of occupancy sensors in all HPSB buildings
- Installation of night setback controls in Buildings 438 and 935
- HVAC, lighting, and hot water HPSB improvements in Building 817.

Plans and Projected Performance

MPO has developed a schedule for the completion of the remaining HPSB projects in FY14 and early FY15. For FY14, the planned work includes:

- HVAC, fume hood, and lighting upgrades in Building 599
- Building 438 roof replacement
- Miscellaneous metering
- Bid and award of Building 459 indoor air quality improvements and HVAC upgrade.

In FY15, the work will include the completion of Building 459 improvements, data center improvements if required, and retro-commissioning. This work is planned for the first quarter of FY15 to ensure completion well ahead of the milestone of September 30, 2015.

2.6 HPSB – NEW CONSTRUCTION AND MAJOR RENOVATIONS

All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs

Performance Status

All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs. DOE considers any new building that achieves LEED Gold or higher buildings to be compliant.

To define "major renovations," BNL uses the HPSB Working Group FAQ listed in the DOE Assessment Guidance Tool, June 27, 2008, as well as the supplement to the Secretarial Memorandum on DOE Federal Leadership in High Performance and Sustainable Buildings, February 27, 2008.

ISB-I was completed in FY 2013 and achieved a LEED Gold certification (Figure 4). Construction of the five NSLS-II LOBs was completed in FY13 and submitted for LEED Gold (Figure 5).

Interdisciplinary Science Building I

The first of five LOBs around the NSLS-II ring

Plans and Projected Performance

The following requirements will be added to BNL's Design Guide to ensure sustainability goals are addressed:

- Achieve net-zero energy by FY 2030 beginning in FY 2020 for new buildings
- Ensure all new construction is designed to be 30% more energy efficient than the baseline established by ANSI/ASHRAE/IESNA Standard 90.1, dated 2010.

LEED Gold for the LOBs of NSLS-II is expected to be received in early FY14. While there are no new major construction projects or renovation project starts expected in FY14, BNL will continue to move forward with the Renovate Science Laboratory II (RSL-II) project.

Goal 3: Fleet Management

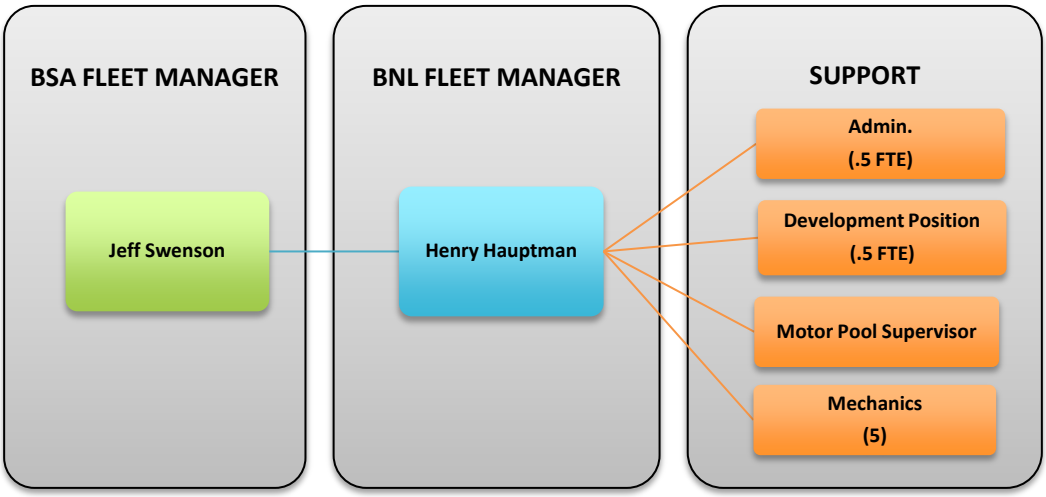


Figure 5. Fleet Management Organizational Structure

3.1 ALTERNATIVE FUEL CONSUMPTION

10% annual increase in fleet alternative fuel consumption by FY 2015 relative to FY 2005 baseline

Performance Status

Alternative Fuel

BNL currently has alternative fuel infrastructure with on-site facilities for E-85, CNG, and bio-diesel, in addition to gasoline. Alternative fuel use is driven through fuel card controls. The fuel cards are vehicle-specific and will only allow the operator to fuel with the designated fuel type. The table below shows quarterly fuel usage in FY12 and FY13 for petroleum (gasoline, diesel) and alternative fuel (E-85, CNG). Electric low-speed vehicles are also used on-site; however, electricity use is not monitored.

Table 5. Quarterly Fuel Usage in FY12 and FY13

FUEL	FY2012					FY2013				
	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	Q3	Q4	TOTAL
Gasoline	16,724	15,885	15,583	14,787	62,979	13,350	13,735	12,565	11,909	51,559
Diesel	6,063	5,580	5,181	4,646	21,470	3,058	5,978	5,324	3,344	17,704
E-85	5,542	6,203	5,686	5,904	23,335	6,870	9,149	8,829	10,658	35,506
CNG	4,960	4,869	4,783	4,682	19,294	4,207	4,000	4,000	4,000	16,207
Alternative Fuel (AF) Total	**10,502**	**11,072**	**10,469**	**10,586**	**42,629**	**11,077**	**13,149**	**12,829**	**14,658**	**51,713**
Petroleum (PET) Total	**22,787**	**21,465**	**20,764**	**19,433**	**84,449**	**16,408**	**19,713**	**17,889**	**15,253**	**69,263**
AF/PET	**0.46**	**0.52**	**0.50**	**0.54**	**0.50**	**0.68**	**0.67**	**0.72**	**0.96**	**0.75**
Note: CNG values ("4000") are estimated										

Employee Policies and Education

Off-Site Trip Tickets for using a government vehicle off-site must be approved by an Associate/Assistant Laboratory Director (ALD), Department Chair/Division Manager, or one of the senior assistants or administrators during normal working hours. Outside of normal working hours, a senior supervisor may approve Off-Site Trip Tickets. ALDs and Department Chairs/Division Managers may approve such tickets for their own use. Departments and divisions maintain a list of names on file in the BNL Transportation Office of those persons authorized to approve the use of a government vehicle for off-site transportation. Off-Site Trip Tickets are presented to the security officer at the gate upon return to the site. Completed Off-Site Trip Tickets are sent to the Transportation Office and maintained for one year from the date of issue.

There is an anti-idling policy in place, which is documented in the SBMS Government Vehicles Subject Area. The policy states, "Do not leave a parked vehicle with the engine running (except where specified for police or emergency vehicles), or with the ignition key in it." Internally, all replacement vehicles (since 2010) have idle limiters installed by the motor pool before the vehicle is placed in use.

There are multiple avenues of education on driving behavior available to all staff. It is a requirement to have a valid driver's license to operate a government vehicle and this is the overall training basis. General employee training, which is required for all employees, enforces site-specific driving and traffic safety. The traffic safety website provides additional educational opportunities. Defensive driving (6-hour course) is offered to all employees on a schedule (for a fee). This is a nationally recognized course to help lower personal insurance fees. Education on fueling CNG and bio-diesel vehicles is provided.

Plans and Projected Performance

BNL will continue to purchase as many AFVs as possible and remove petroleum vehicles as much as practical.

3.2 REDUCTION IN PETROLEUM CONSUMPTION

2% annual reduction in fleet petroleum consumption by FY 2020 relative to FY 2005 baseline

The reduction of gasoline consumption is achieved through the Laboratory's alternative fuel program. Older vehicles are replaced with AFVs, which reduce petroleum consumption. The most fuel-efficient vehicle that can perform the vehicle's mission is selected.

Petroleum consumption at the 2005 baseline was 125,964 gallons. Consumption at the end of FY13 is forecasted at 71,899 gallons or a 42.9% reduction against the baseline.

3.3 PURCHASING ALTERNATIVE FUEL VEHICLES (AFVs)

100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by 2015 and thereafter (75% FY 2000-2015)

Performance Status

The acquisition of government motor vehicles (additional or replacement vehicles) for the BNL motor vehicle fleet is defined under 41 CFR 109, Property Management Regulations. All motor vehicle acquisitions require DOE approval prior to purchase (or reactivation of vehicles in the retired category). Requests to DOE for such acquisitions are managed by the Staff Services Division Manager. The approval process flows through the BHSO, and DOE-HQ approval is needed for the replacement of any passenger classification vehicle through an allotment process.

Vehicles are removed from the fleet based upon age and condition. In the last several years, all light duty vehicles purchased were AFVs with a total of 36 purchased in the last two years.

BNL has also applied for a grant for the incremental costs associated with the purchase of five additional CNG vehicles. Notification regarding the grant application is due in December.

Plans and Projected Performance

In FY 2014, BNL plans to continue purchasing 100% AFVs.

3.4 REDUCE FLEET INVENTORY

Reduce fleet inventory of non-mission critical vehicles by 35% by FY 2013 relative to FY 2005 baseline

The Laboratory has evaluated its government fleet, based upon SC's guidance for right-sizing the fleet. The guidance provided by SC includes the following definition to evaluate each vehicle toward the goal to right size the fleet: "A mission critical vehicle for SC is one that cannot be removed from the inventory 'without sacrificing either critical mission elements or our commitment to operating in a safe, secure and environmentally sound manner' (quoted from Secretary Chu's memo of January 27, 2011). Critical mission elements include the core science capabilities of the Laboratory (as described in the Annual Laboratory Plan guidance), or the functions necessary to ensure safe and secure operations."

BNL's government vehicle fleet was at an inventory of 298 vehicles at the 2005 baseline. In CY 2011, BNL reduced its fleet by 30 vehicles. In CY 2012, BNL further reduced its vehicle fleet by nine vehicles to an inventory level of 259 vehicles, including 253 vehicles classified as mission critical and six vehicles classified as non-mission critical. This level is supported by the Assessment of Fleet Inventory Management (Chatham Consulting Inc. August 2012), as well as a detailed vehicle-by-vehicle assessment. The vehicle-by-vehicle assessment identified each mission critical vehicle in the fleet and summarized the final number of mission critical and non-mission critical vehicles in the inventory. Against the 2005 baseline, BNL identified 45 vehicles as being non-mission critical. In total, non-mission critical vehicles were reduced by 39, representing an 86% reduction and exceeding the Secretary's goal of 35%.

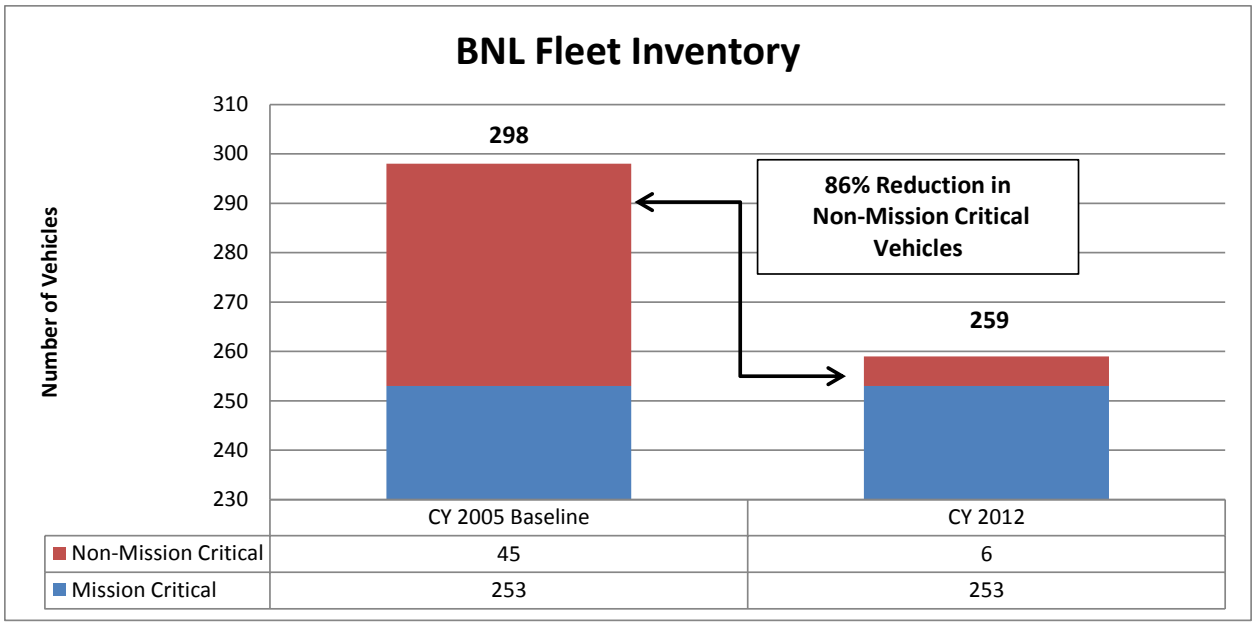


Figure 6. BNL Fleet Inventory Reduction

Goal 4: Water Use Efficiency and Management

4.1 POTABLE WATER INTENSITY

26% potable water intensity (gal per gross square foot) reduction by FY 2020 from FY 2007 baseline

4.2 INDUSTRIAL, LANDSCAPING, AND AGRICULTURAL (ILA) WATER CONSUMPTION

20% water consumption (gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from FY 2010 baseline

BNL has a long history of reducing water consumption even though water on Long Island is plentiful and inexpensive. Seventy-five percent of water used is recharged to groundwater via groundwater recharge basins. The water recharged is of potable water quality. Our minimal formal landscaping is compatible with the local climate and natural rainfall amounts are sufficient to support local flora.

Water Management Plan

BNL's Water Management Plan describes how BNL designs and operates the Laboratory's buildings and facilities to be sustainable and water efficient. It outlines our efforts to meet legislative requirements by implementing best-management practices and details steps to reduce BNL's water consumption by 2% per year (toward the goal of 16% reduction by FY 2015 and 26% reduction by FY 2020 compared to an FY 2007 baseline).

BNL's water management program has been extremely successful, reducing our water consumption (measured in gallons per square foot of building area) by 55% since 1999, and 15.5% since 2007. A significant decrease in once-through process cooling was achieved through operational improvements at the AGS. This reversed a recent trend whereby (1) operating additional research machines increased the demand for process cooling (e.g., start of Central Chilled Water Facility-Phase II operation), and (2) changes in the configuration of the potable water system (well #12 went out of service, increasing Water Treatment Plant backwash cycles) increased water use in FY 2009, FY 2010, and FY 2011.

Presently, we are implementing best-management practices (BMPs) as detailed in Section 2.2 of the Water Management Plan. Implementing water conservation is a significant economic challenge. Water is plentiful and inexpensive at BNL. The variable cost of producing water currently is about $0.39 per thousand gallons. Most water conservation measures are capital- and labor-intensive. We are always evaluating the return on investment of implementing additional BMPs. These BMPs have the potential to lower water consumption by more than 40 million gal/yr. Our ability to implement these capital-intensive measures depends upon obtaining additional benefits (such as replacing obsolete equipment, extending equipments' end-of-life, reduced maintenance costs, reducing waste water discharges to the Sewage Treatment Plant, and increasing energy savings) and upon obtaining capital funding to install them (aligned with other priorities).

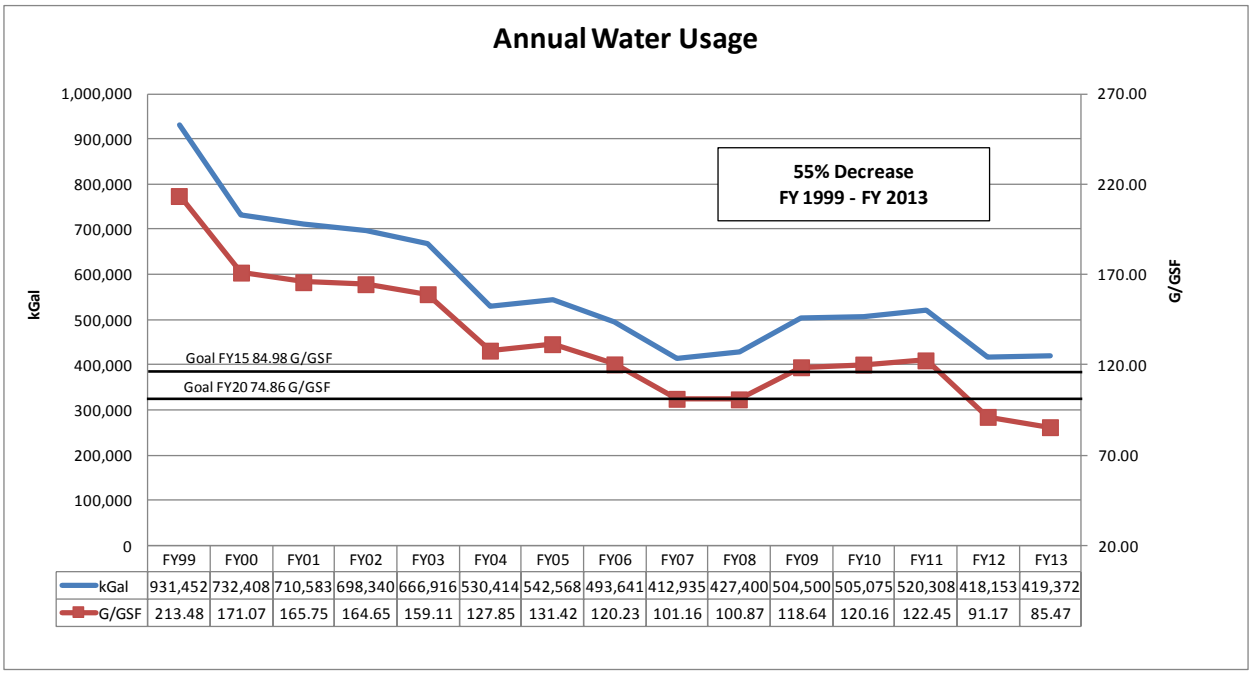
BNL is entering a period of significant programmatic growth. The NSLS-II is under construction. Cooling for NSLS-II will be provided by the new, major addition to BNL's Central Chilled Water Facility, which includes a large cooling tower. This growth, along with the growth of other science programs, will

increase BNL's water consumption. In fact, it is estimated that the NSLS-II alone will raise BNL's annual water usage by over 12%.

Finally, we emphasize that over 75% of BNL's water consumption is returned and recharged to groundwater at potable water quality. We believe that for practical purposes BNL's groundwater recharge fully meets the DOE's water management "recycling" or "non-consumptive" criteria (except for insignificant temperature changes). In an effort to increase the rate of on-site recharge, BNL has implemented a project to re-route the treated effluent from the Sewage Treatment Plant from a surface water discharge to a groundwater recharge system. This project will also eliminate a potential source of trace metals contamination to the Peconic River and improve the quality of the river downstream of BNL. Review of analytical data for the Sewage Treatment Plant effluent shows that the water quality meets all Federal and state groundwater quality standards. This change should result in an increase of 100 million gal recharged locally versus off-site flow via the Peconic River.

Performance Status

BNL has managed an effective water reduction and conservation program for more than 20 years, illustrated in Figure 7 by the trend in annual water usage.



	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
kGal	931,452	732,408	710,583	698,340	666,916	530,414	542,568	493,641	412,935	427,400	504,500	505,075	520,308	418,153	419,372
G/GSF	213.48	171.07	165.75	164.65	159.11	127.85	131.42	120.23	101.16	100.87	118.64	120.16	122.45	91.17	85.47

Figure 7. Annual Water Usage (1999-2013)

Water usage fell from almost 930 million gal/year in FY 1999 (average of 2.55 million gal per day) to about 420 million gal/year in FY 2013 (average of 1.15 million gal per day), a reduction of 55%. When normalized by site growth (building area in gross square feet), BNL's annual water use intensity has decreased from 101 gal per square foot to 85 gal per square foot, a 15.5% water usage reduction since base-year 2007. The graph below shows BNL's Water Use Intensity reduction plan.

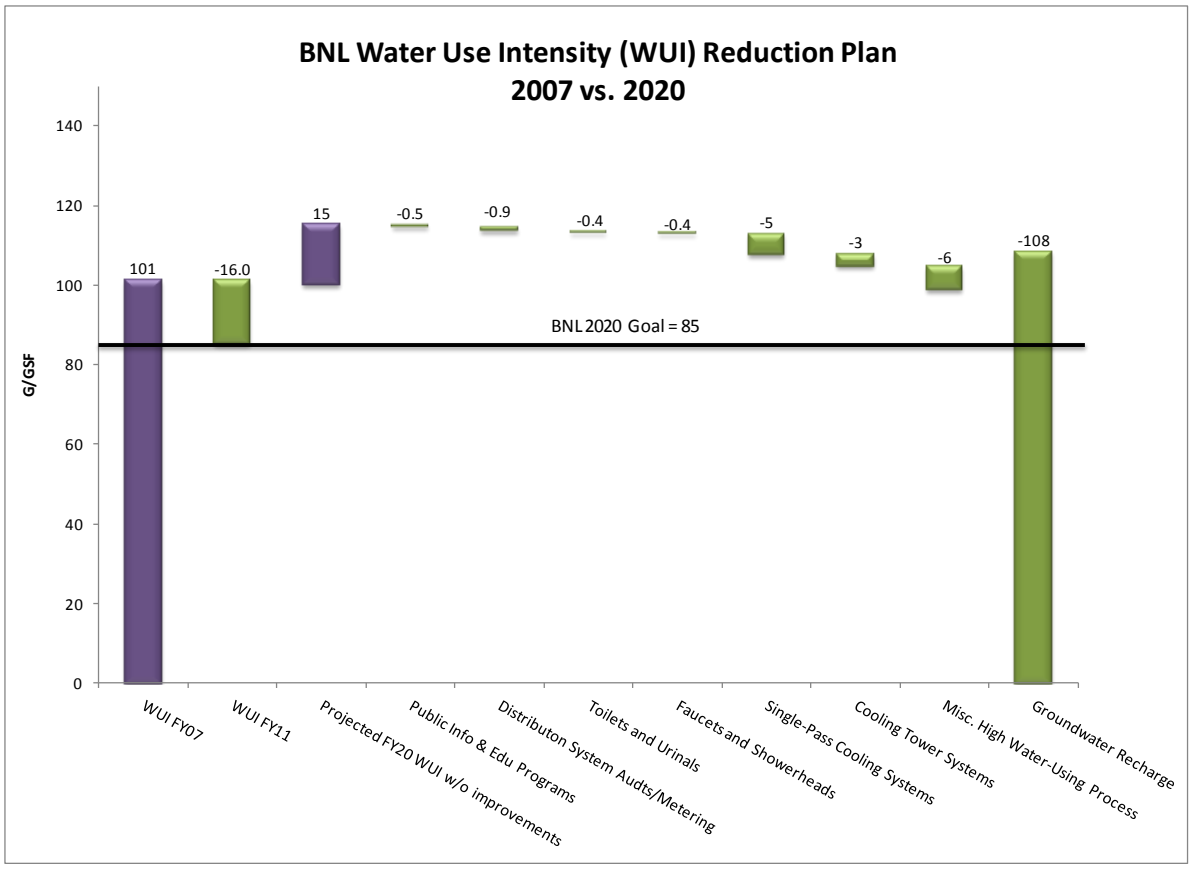


Figure 8. Water Use Intensity Reduction Plan

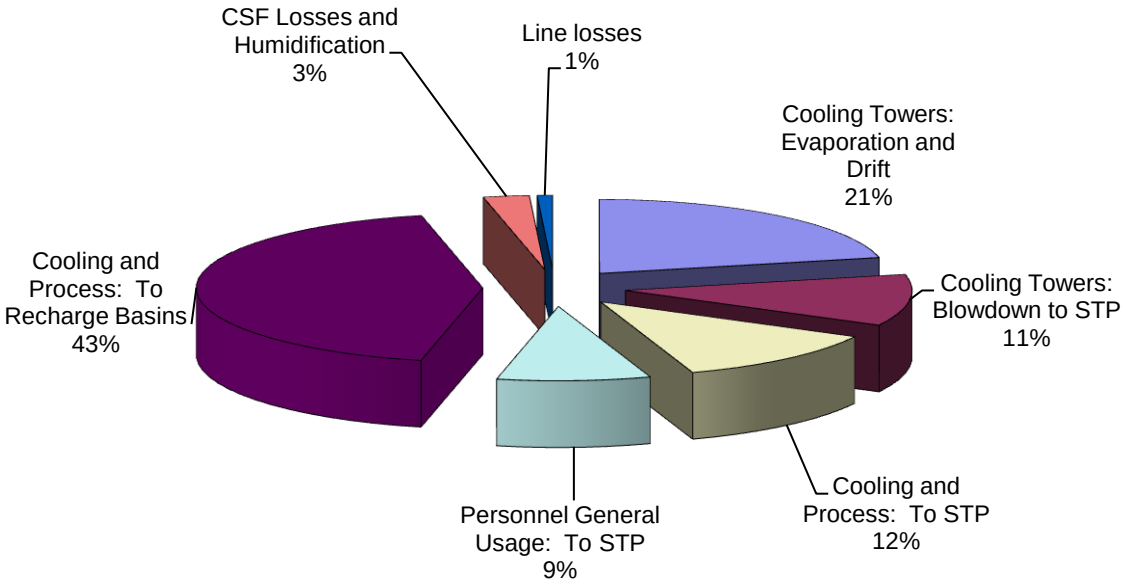


Figure 9. Annual Potable Water Utilization

Figure 9 depicts how BNL uses its potable water, and where it goes thereafter. Less than 10% is used for human consumption and sanitation. The majority of BNL's water production is spent for process cooling. This non-contact cooling water is used (once-through) to cool heat exchangers and returned to the groundwater. Water is also used to make up for evaporative, drift, and blow-down losses from re-circulating cooling towers. Tower blow-down is typically discharged into sanitary or storm sewers, treated, and ultimately, returned to the groundwater.

The following paragraphs summarize BNL's past and present (ongoing) efforts in water conservation; more details are available in BNL's Water Management Plan.

- Public Information and Education Programs. BNL's water-related public information and education programs emphasize the excellent quality of BNL's potable water supply and seek to minimize employees' use of expensive, environmentally unfriendly bottled water.

- Distribution System Audits/Metering. BNL periodically audits its water distribution system as part of infrastructure planning and utility reviews (e.g., 10-year Master Plans). BNL's utility engineers understand BNL's water system to be "tight" and relatively leak-free. Because of the plentiful supply and low cost of water at BNL, water meters are not available at most buildings or major process users. We bill one major process user for water.

- Water-efficient Landscaping. BNL's minimal formal landscaping is compatible with the local climate and rainfall. BNL does not routinely irrigate lawns and landscape.

- Toilets and Urinals. BNL currently specifies low consumption toilets and flushometers (1.6 gallons per flush [gpf] for toilets, 1.0 gpf for urinals) for new constructions, renovations, and maintenance.

- Faucets and Showerheads. BNL specifies low-flow faucets and showerheads for new constructions, renovations, and maintenance.

- Boiler/Steam Systems. BNL has a district steam-system and Central Steam Facility. Depending on the season, 75-85% of the steam exported from the facility returns as condensate. (This is an excellent return for a large district steam-system and the condensate return conserves water and energy).

- Single-Pass Cooling Systems. BNL has reduced water flow through single-pass cooling systems that discharge to the sanitary sewer system. The marked success of these efforts is reflected in the 57% water reduction.

- Cooling-tower Systems. To reduce water use in once-through cooling systems, BNL has 16 cooling towers with a flow rate of over 300 gpm. Many other smaller towers are located around the site. To maximize cooling efficiency and minimize water use, BNL controls the blow-down rates on the large towers to maintain the "cycles of concentration" between 4 and 5.

- Water Reuse and Recycling. Over 75% of BNL's water consumption (except evaporation and drift at cooling towers) is recharged back to the ground (where the well water came from). All of BNL's process water (e.g., make-up and cooling) currently is obtained from the Laboratory's

potable water system and is accounted for in accordance with "Guidance for Water Goals in Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance."

The Sewage Treatment Plant Modification contract was awarded and fieldwork commenced in the fourth quarter of FY13.

Plans and Projected Performance

The contractor is scheduled to complete the Sewage Treatment Plant Modification in the second quarter of FY14. This project will result in the recycling of approximating 70% of the potable water used at BNL.

Goal 5: Pollution Prevention and Waste Reduction

5.1 NON-HAZARDOUS SOLID WASTE

Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris, by FY 2015

5.2 CONSTRUCTION AND DEMOLITION DEBRIS

Divert at least 50% of construction and demolition materials and debris by FY 2015

Performance Status

BNL's Pollution Prevention (P2) and Waste Minimization programs are fully described in Section 2.3.4.4 of the 2012 Site Environmental Report. The Laboratory continues to focus on its pollution prevention and waste minimization measures by evaluating metrics that are geared toward enhancing environmental stewardship.

Pollution Prevention, Waste Reduction, and Recycling

Over the past 12 years, BNL's annual diversion rate of non-hazardous solid waste has been above the 50% baseline level prescribed by the Executive Order, ranging between 54% and 68%. During FY13, the recycling rate was approximately 62%. The Laboratory is very close to achieving 60% recycling as its own baseline standard.

During this past year, BNL's glycol recycling facility began operation and reprocessed/recycled over 700 gal of used glycol.

BNL's Glycol Recycling Facility

BNL currently has two programs for diverting compostable materials. The first program, established in 2005, allows the composting of animal bedding used by the Medical Department that subsequently is mixed in with wood-composted debris to form mulch or soil conditioner. The second program removes organic matter from the on-site Cafeteria and deposits it into an inlet of the Sewage Treatment Plant to sustain appropriate food levels for the system's biological processes. During 2013, animal bedding composting has scaled back considerably, as this type of research is winding down at BNL. During 2014 and beyond, there is expected to be a significant continual decrease.

The Laboratory recycles 95% of construction, demolition, and woody debris. Construction materials (e.g., wood, shingles, metals, etc.) are transported to a C&D transfer station, where they are sorted and recycled by the vendor. Concrete and stone/brick demolition debris is stored on-site and then converted to RCA via a concrete crusher. The generated RCA is then used as road base or as underlay in parking areas. Since the crushed demolition debris is used on-site, there are no transportation-related emissions or landfill space required. By not purchasing RCA for these projects, transportation and manufacturing of RCA is also avoided, as well as the associated impact on the environment presented by these operations. Re-using C&D materials helps to save the environment and represents the essence of sustainability.

Since BNL's recycling efforts are programmatic, population change, construction, and Decontamination & Decommissioning (D&D) activities may impact waste generation rates and volumes but should not impact the recycling diversion percentage rate. In FY 2013, two major construction activities (NSLS-II and ISB-I) were completed. The completion of these construction activities will greatly impact (lessen) the volumetric generation of C&D materials. However, the recycling rates are not expected to change. Environmentally Preferred Purchasing will most likely be impacted by the completion of these projects, as fewer desks, carpets, cabinets, and other items will be purchased in the upcoming years.

The Radiological Control Division has written procedures to ensure that the release and clearance of property with the potential to contain residual radioactive material is conducted in accordance with DOE O 458.1 section 4 k (Release and Clearance of Property). In addition, a Laboratory-wide procedure entitled, “Management of Moratorium and Suspension Encumbered Metals,” establishes BNL’s specific program and survey requirements for managing scrap metal in compliance with DOE directives. This procedure has been reviewed and approved by DOE and has been presented as an example of good practice to other DOE laboratories.

Sustainable Purchasing

One of the P2 Program's shared cost purchases during FY 2013 was a dedicated fuel transfer trailer to help minimize spills during fueling the Laboratory's satellite boilers.

Fuel Transfer Trailer

Another recent development is that BSA, through the Procurement and Property Management (PPM) and Staff Services Divisions, has completed its search for a contractor to operate on-site food services at

the Laboratory. CulinArt Inc. is a Long Island-based company with a large national account base. Its proposal included many innovative and creative approaches for BNL's food service program. This included several items related to sustainability and pollution prevention as follows:

- Segregating Pre-Processed Food Scraps: CulinArt offers used coffee grinds and produce scraps from the kitchen to customers to use as compost and fertilizer. Material is separated from other trash and held for pickup by the customer, who transports it in his or her own vessel. Excess material is offered to maintenance and facilities departments for use on client property, which BNL's treatment plants will use.

- Utilizing Recycling Containers: CulinArt will comply with all local and municipal codes. The integral piece to a successful recycling program weighs heavily on the waste carting company.

- Recycling Waste Oil and Grease: CulinArt's management provides for fryer oil to be recycled with the help of several local vendors.

- Bio-Based Products: CulinArt uses environmentally friendly disposable products where possible. In addition to cups, plates, bowls, and utensils, CulinArt works with their clients to eliminate Styrofoam take-out trays on service lines and replace them with eco-friendly to-go bags to reduce waste and encourage customer involvement in recycling. CulinArt will work with BNL to advance the use of Environmentally Preferable Purchasing items.

Additionally, approximately 99% of the Laboratory's paper has a minimum content of 30% post-consumer fiber. Certain specialty papers, such as photographic paper, do not meet these requirements. Setting printers and copiers to printing on both sides of the paper by default is at the discretion of the departments, as ITD does not have control over these peripherals. However, printing in duplex mode is strongly encouraged across the Laboratory.

The Laboratory is continually working with its scientists, custodians, and operators to find ways to minimize the use of toxic materials and substitute less or non-toxic surrogates in their procedures. Protocols and contracts established by the PPM Division have led to a streamlined, just-in-time method for ordering chemicals, which has minimized the Laboratory's footprint of on-site chemicals.

Employee Engagement

It was noted in last year's Site Sustainability Plan report that BNL's population has increased and that new employees may have come from other geographic regions that did not employ robust recycling and conservation measures. During CY 2013, the Laboratory focused on educating employees regarding BNL's recycling programs. During BNL's Earth Day Vendor Fair, employees were incentivized to visit six environmental displays (recycling, green purchasing, transportation, power management, natural resources, and sustainability). Each display was manned by a Subject Matter Expert who answered questions and stamped a "Passport to Green" card. By visiting all six stations and having their Passport stamped, the individuals were eligible for prizes.

In addition, the following computer-based training (CBT) programs were updated by the Environmental Protection Division to include stronger recycling and environmental sustainability messages:

- Contractor Vendor Orientation (CVO): a 90-minute training course, given to all contractors working on-site, which consists of slides, videos, handouts, and discussion. This class is given daily and is good for one year.
- General Employee Training (GET): a CBT taken by all new BNL employees within their first month of employment to orient them with the Laboratory community.
- Environmental Protection: a CBT taken by new employees to educate them as to the environmental rules and regulations.

The recommended updates were submitted to the Training Division and will be rolled out during FY14.

Pest Management

The Laboratory has a fully integrated Pest Management system and uses native plantings with no in-ground sprinkler systems. During 2012, BNL's Integrated Pest Management program was audited by a third-party team (Cornell Cooperative Extension Program, a non-profit community education agency established in 1917) and found to be fully integrated and functioning.

Plans and Projected Performance

As discussed above, during CY 2014, BNL will implement the revisions to CBTs (CVO, GET and Environmental Protection) focused on educating employees on the Laboratory's recycling programs. In addition, during 2014, BNL will embark on a study to test the efficacy of remanufactured toner cartridges. The goal will be to pick three high-quality remanufacturers and test their products against original equipment manufacturers. Potential cost savings and environmental benefits could prove to be significant. Continuing with past tradition, the P2 Program will solicit ideas for partial or full funding of projects that minimize waste or help prevent pollution.

Goal 6: Sustainable Acquisition

6.1 PROCUREMENTS

Procurements meet requirements by including necessary provisions and clauses (sustainable procurements/bio-based procurements)

Performance Status

The requirements for Sustainable Acquisition are incorporated into all of BNL's Terms and Conditions issued by the PPM Division. Blanket purchase orders currently in place for items under Sustainable Acquisition, including carpets, custodial cleaners, re-refined motor oil, and office furniture. As in FY12, BNL was able to report that all contract actions for construction and custodial products and services met Sustainable Acquisition requirements in FY13.

The following categories were reported to meet the technical requirements for the FY13 priority product section in the PPTRS:

- Construction - concrete
- Construction - lumber/wood
- Construction - paint
- Construction - carpet
- Construction - fiberboard, gypsum, panels, wallboard
- Construction - water heater, heat pumps and energy recovery ventilators
- Custodial - toilet paper
- Custodial - floor care
- Custodial - carpet, glass, hand, multipurpose cleaners
- Custodial - plastic trash bag.

Approximately 99% of the paper purchased in FY13 had a minimum content of 30% post-consumer fiber, which meets the recycled content requirements of the EPA's Comprehensive Procurement Guidelines. When purchasing desktop or laptop computers in FY13, BNL selected products that are registered with the Electronic Product Environmental Assessment Tool (EPEAT) and Energy Star-qualified where feasible. EPEAT standards have been approved for copiers, printers, and televisions, and Energy Star settings are in place when the systems come in from the supplier.

Plans and Projected Performance

The following actions are planned for FY14 and beyond:

- Ensure that requirements for Sustainable Acquisition are documented in the PPTRS and CEDR
- Ensure that reporting requirements for bio-based products are documented in the SAM
- Develop awareness training for green products for Material Coordinators, who are matrixed from PPM to the Integrated Facility Management (IFM) complexes
- Arrange green vendor fairs on-site to encourage the use of green products
- Provide technical assistance and education to the Laboratory community on the use and availability of green products and services
- Increase communication on Sustainable Acquisition by preparing Lessons Learned and documenting success stories.

Goal 7: Electronic Stewardship and Data Centers

7.1 DATA CENTER METERING

All data centers are metered to measure monthly power utilization effectiveness (PUE) of 100% by FY 2015

7.2 POWER UTILIZATION EFFECTIVENESS (PUE)

Maximum annual weighted average power utilization effectiveness (PUE) of 1.4 by FY 2015

Performance Status

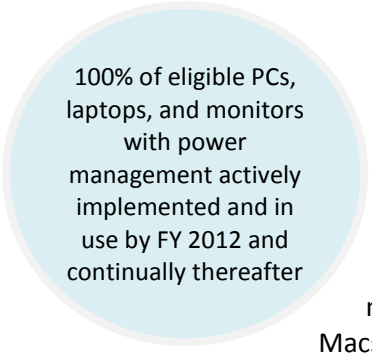
BNL operates a 22,000-gsf data center for scientific computing and network operations and a 2,000-gsf administrative data center for site-wide information technology functions. It has undertaken a variety of practices to minimize energy consumption by servers and operate the data centers efficiently. Approximately 70% of applications are now run on virtual servers. Energy efficient blade servers have replaced old servers as they are retired. Both data centers use efficient UPS systems, with either battery-supplied UPS systems with 90% to 97% efficiency under operating loads, or by flywheel UPS systems with 98% efficiency. Spot cooling is used in older parts of the data center to bring cold air to the high-density equipment. Air conditioning systems in the data centers are fairly new. Cloud computing has recently been approved through Amazon. The initial PUE study indicated the current combined PUE to be above 1.6. BNL is working to install additional metering so that a more accurate PUE for each data center may be measured and monitored. The metering is expected to be completed in third quarter of FY 2014.

BNL recycles used and obsolete electronic equipment, including desktop and laptop computers, cameras, printers, scanners, and network servers, to reduce pollution and prevent toxic materials from entering the environment. Electronic equipment at the end of its lifecycle is sent to a local, recycling facility, which has a zero-landfill policy.

BNL has had a policy to procure EPEAT-certified systems for a number of years. When these systems come in from the vendor, the Energy Star settings are already in place.

Plans and Projected Performance

BNL will continue all current electronic stewardship practices implemented to date. Once all meters are in place, PUE will be monitored to evaluate the course of action needed to meet the goal of 1.4. Energy efficient servers will be purchased as the need is justified and finances are available. Upgrades to the data centers will be considered where cost effective.



7.3 ELECTRONIC STEWARDSHIP

Performance Status

All systems in the BNL domain that are capable of power management have the setting enabled. Users have control over this through LANDesk self-service. All laptops by default have stricter power management settings, mostly to conserve battery life. The majority of our Macs fall in to this category. Macs are a small percentage of our systems and are not centrally managed to enforce power management.

Plans and Projected Performance

BNL will continue to evaluate the feasibility of extending this desktop computer power management policy to other operating systems.

Goal 8: Renewable Energy

8.1 ELECTRICITY CONSUMPTION FROM RENEWABLE SOURCES

20% of annual electricity consumption from renewable source by FY 2020 and thereafter (7.5% FY 2013)

Performance Status

BNL purchased 40 million kWh of RECs for FY 2013. This equals about 9% of BNL's total usage of electric and thermal energy. The recent requirement to increase renewable energy from 7.5% to 20% will require further evaluation to determine the best course of action. However, for now we will continue to purchase RECs as appropriate.

As indicated in previous Site Sustainability Plan submissions, BNL was an instrumental partner in the development of the LISF, currently the largest solar PV facility in the Northeast. The LISF is located on 195 acres of land at BNL and became operational in November 2011. In FY13, it provided 54 million kWh/yr of clean renewable energy to Long Island.

BNL completed a CHP detailed study in August 2013 and a comprehensive Wind Study in June 2013.

The following renewable energy projects have also been implemented on-site:

- A solar thermal hot water heating system in Building 461 (Gymnasium)
- Solar-powered traffic signals in various locations
- Solar-powered lights in remote parking lots
- A solar hot-water demonstration project integrating flat-panel solar hot water collectors and a high efficiency condensing oil-fired boiler in Building 30 (Brookhaven Center); this is a partnering project with funding from NYSERDA, the Federal Energy Management Program (FEMP), and BNL.

Although BNL has championed several renewable energy projects, they are rarely economically favorable.

Plans and Projected Performance

In addition to the LISF, BNL is also nearing completion of the first phase of a 700 kW on-site solar PV facility, which will be used for research purposes as well as providing BNL with renewable energy. When the project is complete, it will provide an estimated +1,000,000 kWh/year of renewable energy. This facility, part of the NSERC, will become operational in early 2014. This research array is a result of BNL's partnership with the LISF project.

In FY 2013, BNL completed a detailed CHP study, which expanded upon the recent preliminary feasibility study that included biomass. This detailed study evaluated the viability of integrating a CHP, from between 60 and 130 MW, to BNL's Central Steam Facility. While the report determined that bio-fuel use would be prohibitive, the results are encouraging regarding overall energy use and reduced GHG emissions. There is the potential to provide nearly 100% of BNL's steam production and the option to receive a portion of the output to supplement BNL's hydropower. Given the size and cost of the potential CHP, additional analyses are required.

A detailed wind and biomass system feasibility study was also completed in FY13. This study focused on establishing a small-scale demonstration project (0.5 to 2 MW) at BNL and the potential impacts to the BNL grid. The results of the report clearly indicate that it is not possible to provide an economic justification at this time. However, BNL will continue to explore opportunities for a demonstration project and alternative financing and potential subsidies.

BNL has expanded the use of bio-based fuels for on-site vehicles and will continue to use bio-based fuel for satellite boilers and diesel-fueled utility vehicles.

QUALITATIVE GOALS

Goal 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning

2.8 LOCAL AND REGIONAL PLANNING

Regional Transportation Planning

Through BNL's Master Planning process, the Laboratory continues to collaborate with New York State and local transportation departments. For example, in FY 2011, NYSDOT gave BNL the opportunity to comment on the "Sunrise Highway Corridor Sustainable Transportation Study," and we expect similar cooperation in the future.

In addition, BNL is working with the Long Island Sustainability Council to support their transportation agenda, which includes, in part, determining the viability of the Laboratory as a transit-served center, and expanding pedestrian and bicycle mobility. The Long Island Sustainability Council will formalize the integration of local and regional planning with each site's 10-year planning process. However, BNL is located on eastern Long Island, a more rural setting, and is not well served by the existing public transportation infrastructure. Discussions have been held with Suffolk County Bus to ascertain the viability of establishing a bus route to serve BNL commuters. Such a service would have to be self-supporting and based upon survey results, ridership could not be guaranteed.

BNL continues to review transportation options and incorporate considerations for sustainable building locations and sites into acquisition plans for off-site office buildings, off-site user housing, and other facilities. The process has not been formalized into policy and guidance documents. BNL only has one lease which is within close of proximity of BNL. As no public transportation stops at BNL, it was a non-factor in the decision process for selecting the lease site.

With regard to on-site employee movement, the overall landscape of the BNL site is changing. Research centers are being located centrally, which will foster better pedestrian and bicycle movement among facilities. An on-site shuttle service is also available to move staff from building to building, thereby reducing single occupancy ridership. A shuttle service is also provided from the Long Island Railroad station in Ronkonkoma and from SBU.

National Environmental Protection Act (NEPA)

As required under NEPA legislation, energy usage is considered a part of all Environmental Impact Statements and Environmental Assessments. NEPA documents also include impacts of construction vehicles on local traffic.

Renewable Infrastructure

The BNL site was chosen as the host site for the construction of the LISF, a 32 MW solar power station. The DOE worked closely with LIPA and BP Solar in the development and construction of the facility. Construction was completed in late October 2011 and power delivered to the grid on November 1, 2011. Solar power generated from the 195-acre PV array will produce enough electricity to power 4,500 homes.

Long Island Solar Farm (LISF) at BNL

BNL expects NSERC will become operational in early 2014. This research center will provide for developing, testing, and affirming performance of the next generation solar energy power systems. BNL is also working collaboratively with SBU on the development of better and more efficient battery systems to improve long-term energy storage needed to make solar power a more viable energy alternative.

BNL's CNG service continues to be used to fuel the BNL CNG fleet and memoranda of agreement are in place to permit use by the Town of Brookhaven and Dowling College. Losses to the BNL fleet have, however, reduced use of natural gas as an alternative fuel. E-85 and biodiesel continue to be utilized as replacements for their pure petroleum counterparts.

Environmental/Ecosystem Management

BNL maintains proactive environmental and ecological management programs intended to protect and improve natural resources. As part of BNL's natural resource strategies, BNL focuses on continuing its leadership role within the greater Long Island Central Pine Barrens ecosystem by participating on many local and regional committees and societies. This includes the Central Pine Barrens Commission, Pine Barrens Society, Peconic Estuary Program, Long Island Invasive Species Management Area, and the Long Island Native Plant Initiative, and ensures that BNL is represented in the decisions that could impact wildlife management at BNL.

The Laboratory implemented precautions to protect on-site habitats and natural resources. Activities to eliminate or minimize negative effects on sensitive or critical species are either incorporated into BNL procedures or into specific program or project plans. Human access to critical habitats is limited. In some cases, habitats are enhanced to improve survival or increase populations. Even routine activities, such as road maintenance, are not undertaken until they have been evaluated and determined to be unlikely to affect habitat. BNL is committed to continually improve the natural environment of its site. Specific goals are established and tracked in the BNL Natural Resource Management Plan.

Wildlife at BNL

Through BNL's restoration program over the past 21 years, significant improvements in the BNL natural environment have been realized, such as the removal of contaminants from soils, groundwater, and the Peconic River both on and off the BNL campus. The effectiveness of these remediation projects are measured annually and reported to regulatory agencies, DOE, and the public. Efforts to complete the clean-up of groundwater will continue through 2030 for most volatile organic compound contaminants and 2070 for strontium 90.

Community Outreach

BNL maintains strong positive relationships with regulatory agencies, environmental groups, local residents, and other stakeholders. The principal modes of communication include routine interface with regulatory agencies and DOE through submittal of performance reports, conference calls, and periodic meetings. The Laboratory communicates with local community groups and environmental groups through monthly meetings of the Community Advisory Council and through presentations at local community group meetings.

BNL also partners with many organizations to expand sustainability objectives outside of BNL's campus. Activities in 2013 included the Long Island Earth Summit held during Earth Week, co-sponsored by BNL and the Citizens Campaign for the Environment. BNL participated with several presentations relating to sustainability including renewable energy, the health of our waterways, and regional approaches to preserving open space.

The Open Space Stewardship Program sponsored by BNL's Office of Educational Programs partners with organizations, such as BSA, Central Pine Barrens Joint Planning and Policy Commission, Foundation for Ecological Research in the Northeast, NYS Department of Environmental Conservation, NYS Office of Parks and Recreation, Suffolk County, Town of Brookhaven, Town of Southampton, and the U.S. Fish and Wildlife Service. The program fosters partnerships between schools and land stewards in their local communities. Students in grades K through 12 participate in environmental research on undeveloped

land owned by either a public or private agency. In 2013, the program worked with students from over 35 schools in Suffolk County and fully expects to increase that number in 2014.

BNL sustainability leaders are invited to participate in numerous conferences, symposiums, and workshops both locally and worldwide. The ALD for F&O was invited to present BNL and its sustainability plan at the opening session of the World Green Energy Symposium (WGES.US) in March 2013 at Hunter College. Since its inception in 2008, the WGES.US has earned a track record for showcasing the newest alternative, sustainable, and innovative products while serving as a world stage for launches and programs updates. It provides a platform to showcase products and technologies and includes top echelon speakers, scientists, researchers, innovators, officials, corporate leaders, exhibitors, program and contracting officers from the government, academic, non-profit, and private sectors.

Other activities included hosting the Nassau and Suffolk Soil Conservation District workshops on-site. We will continue to support such efforts in 2014.

Plans and Projected Performance

Renewable Energy

BNL is committed to continue to support federal and local efforts at reducing reliance on petroleum-based energy. Renewable energy research projects are being developed for the NSERC. Through implementation of the Natural Resource Management Plan, BNL will also continue to measure and report on the ecological impacts of large scale solar installations.

Transportation

BNL continues to pursue increasing carpool ridership and is working with local authorities to examine mass transit opportunities. In FY 2014, BNL will continue to measure automobile occupancy rates and establish a working group to identify additional ways to reduce single occupancy vehicles. This working group will also examine alternate working schedules and other efforts to reduce Scope 3 GHG emissions.

The most significant barrier to BNL's performance in Regional Planning is its location. Due to the rural nature of BNL's surrounding area, service by mass transit is limited and locating BNL facilities near transit centers is impractical.

Environmental Resource Management

BNL continues to support natural resource improvements through implementation of the Natural Resource Management Plan. In FY 2014, BNL will continue to evaluate management techniques to improve the health of the on-site deer herd and will re-deploy the new tick management technique (4-Poster) in the spring. We will host the next Long Island Natural Resource Conference, Long Island Earth Summit in partnership with the Citizens Campaign for the Environment, and Long Island Green Infrastructure Conference with Nassau and Suffolk Counties.

Sharing Knowledge

BNL has been invited to participate and present at the "2nd Workshop on Energy for Sustainable Science at Research Infrastructures" hosted by CERN, Geneva, Switzerland, October 23-25, 2013. This is a forum for representatives of major science laboratories and future science projects around the world to present their sustainability programs, energy management/carbon reduction successes, and future plans for more sustainable research machines and laboratory infrastructure.

The Manager of the Energy & Utilities Division/F&O Chief Engineer will present BNL's Sustainability Program. The following is the abstract for the presentation:

> "Brookhaven National Laboratory (BNL), located on Long Island, New York, USA, has maintained robust energy management and sustainability programs since the first energy crisis in the early 1970's. Our presentation will overview BNL's science mission; physical plant infrastructure; energy and carbon footprints; and past energy and sustainability accomplishments. We will also highlight some notable features of BNL's sustainability program including the 32 MW Long Island Solar Farm at BNL; use of renewable hydroelectric power; chilled water thermal storage; LEED-certified research facilities; and investment strategies. Finally, we will touch on BNL's Site Sustainability Plan, including our goals and future vision."

Summer Sundays

Summer Sundays 2014 will feature a variety of "Science Talks," which will educate visitors about BNL's sustainability efforts as well as provide them with information that they can use to enhance their energy savings and become better stewards of the environment.

Goal 9: Climate Change Adaptation

9.1 CLIMATE CHANGE ADAPTATION

Goal 1: Improve understanding of climate change effects and impacts

Climate Change Effects and Impacts

Objective 1.1: Work with other agencies to improve our understanding of climate change

The Atmospheric Science Division in the Department of Environmental Sciences at BNL has a Science Focus Area award from DOE to study the effects of clouds and aerosols on climate forcing, as well as a separate award focused on improving the representation of clouds in climate models at the global down to regional scale. The Department has strong research collaborations with NASA-Goddard Institute for Space Studies and the National Oceanic and Atmospheric Administration's (NOAA's) Geophysical Fluid Dynamic Laboratory at Princeton. These collaborations will continue and will be expanded if appropriate.

Objective 1.2: Work with other Federal agencies and local jurisdictions (as appropriate) to develop regional partnerships for climate change information sharing and collaboration

BNL is a major partner in the Atmospheric Radiation Measurement (ARM) Climate Research Facility within DOE. The ARM Climate Research Facility provides data on atmospheric conditions around the world. BNL ARM-funded staff develop and maintain state-of-the-art instrumentation, data analysis techniques, data interpretation, and web-based data retrieval and visualization tools. The department also manages meteorological instrumentation on-site. The data collected by BNL staff scientists is shared through the ARM facility as well as through publications with other agencies and researchers.

The LISF, a 32 MW solar PV power plant located at BNL

The Environmental Science Department provides detailed meteorological data to evaluate the performance of the LISF, which is a partnership between BNL and LIPA.

Goal 2: Improve understanding of climate change vulnerabilities and risk

Vulnerabilities and Risk

Objective 2.2: Conduct detailed risk or vulnerability assessments, as appropriate, for specific DOE programs or facilities

One of the anticipated outcomes of BNL's effort in the NYS Resiliency Institute for Storm & Emergencies consortium is a better assessment of the risk for landfall hurricanes on Long Island. Hurricanes can lead to a major disruption of Laboratory operations, infrastructure and services in the surrounding communities, and prevent employees living in high-risk areas to come to work even if the Laboratory is functioning.

Larger-scale global models will provide guidance on average temperature changes as well as the likelihood of changes in precipitation and heat waves, which can affect operations, employee health, and on-site energy demand. The effort to develop a regional climate model may provide predictions at a spatially more resolved scale than current global models.

The on-site meteorology station provides real-time data on current weather conditions via a publicly accessible webpage. The site provides historical data as well as forecasts.

Goal 4: Improve the climate resiliency of all DOE sites

Climate Resiliency

Objective 4.1: Update all appropriate DOE site plans to address climate change resiliency

BNL continues to refine hurricane and storm preparedness, including updating employee personal contact information. During hurricanes and other events, the Office of Emergency Management (OEM) uses the Everbridge Mass Notification System to send urgent messages to Laboratory employees via email, text messaging, and voice messages. In addition, an emergency notification banner is posted on the BNL's internal and external homepages and a Laboratory-wide broadcast email is sent to every @bnl.gov address.

In October 2012, the site experienced the effects of a record hurricane, Sandy, which impacted most of the northeast. Most utility systems remained operational during this event. The greatest effects were those of downed trees and minor building envelope issues. Significant upfront planning was initiated for this storm to understand building vulnerabilities and potential effects on the science mission. Directly after the storm, Preliminary Damage Assessment (PDA) Teams were directed by OEM to begin the process of assessing the site and restoring services. As a direct result of planning and coordination, the overall impact to BNL was minimal and there was no major impact to any ongoing project on-site. BNL was able to re-open for business earlier than planned, which provided a significant cost savings to BNL and DOE, and enabled researchers to continue their experiments.

In February 2013, BNL experienced another severe weather event with Winter Storm Nemo, which resulted in historic snowfall of 30+ inches. OEM implemented the Severe Weather Plan and closed the Laboratory to all but emergency personnel. As a result of planning and recovery efforts, there was no

disruption to any BNL mission essential functions. A three-phased Damage Assessment Plan was implemented for storm recovery.

Another area of focus is how the regional electric grids function and perform during severe weather events and other major events. Through the Governor's Regional Economic Development Initiative, support has been provided for SGRID3. SGRID3 combines resources from SBU's AERTC with BNL to create two leading edge facilities and establish New York as the undisputed leader in design and control of "smarter grid" systems and technology development and deployment. SGRID3 will provide a laboratory for proving existing technologies, developing needed technologies, and improving operational effectiveness.

Objective 4.2: Identify or establish and participate in regional climate change adaptation partnerships

BNL is a partner in a new consortium formed in the aftermath of Superstorm Sandy. The consortium, NYS Resiliency Institute for Storm & Emergencies, is funded by the State and spearheaded by SBU and New York University. BNL contributes in three areas: 1) Improvement of long-range data for long-lead prediction of landfall hurricanes affecting the NY area; 2) Data-driven analysis of the impact of storm on power distribution systems; and 3) Simulation and visualization of storm surge levels on community scales on the web and on the Virtual Reality Deck, a high definition, large-scale visualization system located at SBU.

In order to establish leadership in renewable energy and sustainability in the northeast, BNL has developed strong relationships with NYSERDA and the New York State Smart Grid Consortium (NYSSGC). BNL has also developed a strong presence in energy storage and solar energy as a member of the New York Battery and Energy Storage Technology Consortium (NYBEST) and research partner with the U.S. Photovoltaic Manufacturing Consortium (PVMC), respectively.

In October 2012, BNL hosted a highly successful DOE State Energy Advisory Board (STEAB) meeting. The STEAB develops recommendations for the DOE and Congress regarding initiation, design, implementation, and evaluation of federal energy efficiency and renewable energy programs. STEAB praised BNL as a model for leadership and engagement in working with NYS and regional entities, including NYSERDA, LIPA, NYSSGC, and NYBEST.

III. FLEET MANAGEMENT

FY13 Site Fleet Right-Sizing Plan

BNL evaluated its government fleet based upon SC's guidance for right-sizing the fleet. BNL's government fleet is determined mission critical at an inventory of 253 vehicles. This level is supported by the Assessment of Fleet Inventory Management (Chatham Consulting Inc. August 2012) as well as a detailed vehicle-by-vehicle assessment (December 2012) that was conducted to identify each mission critical vehicle in the fleet and summarize the final mission critical fleet numbers and the non-mission critical fleet numbers to remain in the inventory.

BNL's government vehicle fleet was at an inventory of 298 vehicles at the 2005 baseline. In CY 2012, BNL reduced its fleet by 30 vehicles. As a result of the Rightsizing Plan in CY 2013, BNL further reduced its vehicle fleet by nine vehicles to an inventory level of 259 vehicles. At this level, BNL's vehicle fleet includes 253 vehicles classified as mission critical and 6 vehicles classified as non-mission critical. Against the 2005 baseline, BNL identified 45 vehicles as being non-mission critical. The CY 2012 and CY 2013 reductions totaled 39 non-mission critical vehicles, which represents an 86% reduction of non-mission critical vehicles and exceeds the Secretary's goal of 35%.

The vehicles that were eliminated were mostly gasoline-fueled vehicles, supporting the reduction of petroleum consumption.

Table 6: BNL Fleet Size

	Total Vehicles
Inventory as of 2005 Baseline	298
Inventory as of CY 2012 Right Size Effort	268
Inventory as of CY 2013 Right Size Effort • Mission Critical Vehicles - 253 • Non-Mission Critical Vehicles - 6	259
Total Reductions to Right Size Fleet	39

IV. SITE INNOVATION

BNL is committed to leadership in sustainability through its management practices, stewardship of the BNL campus, and its research and education programs. The Laboratory's efforts in sustainability are rooted in four guiding principles:

- Energy Use and Management: Strive to be climate neutral through energy efficiency, conservation, low-carbon on-site generation, and strategic procurement of clean and renewable energy supply.

- Built Environment: Lower the environmental impact of BNL's infrastructural elements and processes (e.g., waste management) by incorporating sustainability principles into master planning and the redevelopment of the BNL campus (campus design, new and renovated buildings, walkways, process systems, etc.).

- Research: Leverage and enable BNL's strategic goals in R&D to transform BNL's environmental footprint, energy usage, built environment, and energy systems and supply, including mission-critical energy-intensive research facilities.

- Community: Foster a culture of sustainability by integrating sustainability practices, principles, and objectives into our daily activities, core processes, and communications.

To date, these guiding principles have shaped the Sustainability Plan and the efforts of the Laboratory and yielded many beneficial programs. However, over the last three years, BNL has also begun to align strategic goals in energy research with the sustainability goals of the Laboratory, therein creating several innovative projects that promise to be transformative for both.

BNL's 10 Year Laboratory Plan describes the vision for the future of Brookhaven science programs. BNL's Annual Laboratory Plan outlines the actions it will undertake in each fiscal year in support of the BNL Strategy. As described in the BNL Strategic Plan, the Laboratory's energy strategy has two main research thrusts, each with several core research areas:

1. Science and Technology for the 21st Century Electric Infrastructure
   - Decarbonized generation
   - Renewables integration
   - Grid-scale storage
   - Robust and effective distribution system

2. Sustainable Chemical Conversions
   - Improved catalysts for synthesis of fuels by sustainable pathways
   - Electro-catalysis chemical-electrical conversion in fuel cells
   - Solar-to-fuel conversion through oxidation-reduction reactions.

The first of these thrusts includes several projects that utilize BNL's site infrastructure to develop leading research programs in "Smarter Grid," as well as building energy efficiency research. These efforts are conducted through a partnership between the GARS and F&O Directorates.

BNL is addressing the four specific aspects of electric infrastructure that focus on energy challenges and opportunities that are especially important in the northeastern United States. These efforts all involve innovative research and development, which is being deployed at the site level in support of BNL sustainability goals. This work is also being conducted in partnership with an extensive network of collaborators and consortia, including NYSSGC and NYBEST—two prominent organizations in New York State in which BNL plays key leaderships roles.

Two of the core research areas involve de-carbonized generation and integration of renewable energy sources into the grid. The intermittent and geographically dispersed character of many renewable energy sources (e.g., wind and solar) offers challenges as their adoption becomes more widespread. These challenges have unique characteristics for the northeast, where electricity congestion and weather patterns exacerbate intermittency and grid integration.

BNL has led the DOE complex in site transformation by actively pursuing the development of the 32 MW LISF on 195 acres on the east end of the site. This is the largest solar PV plant east of the Mississippi and the sixth largest completed PV solar plant in the country. Construction of this plant was completed on November 1, 2011, when it "went live" and began delivering power to the grid. This project was conceived from the outset as a private-public partnership with an integrated research agenda, enabling the unique study of utility-scale PV plant performance and grid integration in the northeast. It was funded in part through BNL science investments (Laboratory Directed Research and Development [LDRD]) and through a Cooperative Research and Development Agreement (CRADA) with the Electric Power Research Institute (EPRI).

BNL is also developing an on-site solar test array with a design capacity of 700 kW, the largest in the DOE complex. The first phase of the array (512 kW) is presently under construction, will be completed in late 2013 and integrated into BNL's electrical infrastructure.

Solar Test Array

The BNL test array is funded through a CRADA with BP Solar. The purpose of this array is to test advanced solar conversion electronics (inverters) and advanced electrical conversion topologies, study grid integration on distribution circuits, and test the advanced power quality (DVAR) features of advanced inverters, which are presently incorporated into inverters that are entering production. This work is being done in partnership with BP Solar, LIPA, and EPRI, among others.

Coupled with this, BNL is utilizing its electricity distribution system to develop a micro-grid test-bed in support of its research in effective distribution system. The first phase of this development will also be completed in late 2013. This project involves working with a small start-up company, Smart Energy Instruments (SEI), which has developed advanced smart grid sensors for the distribution layer. The sensors will be deployed on the BNL electricity distribution system to test their capabilities and ultimately, integrated into energy management functions of the distribution system. The initial phases of this work are funded through BNL LDRD funds.

As an important part of its research in Smarter Grid, BNL is also working with a small software developer, Electrical Distribution, Design, Inc (EDD) to test and validate leading simulation tools for dynamic electricity systems modeling of the distribution layer. One aspect of this will be the development of a detailed representation of the BNL distribution system to model time-resolved power flows and electricity utilization. This work has the dual goals of demonstrating the effectiveness of the EDD software for modeling and "tuning" electricity distribution systems, as well as reducing power system losses in the BNL electricity distribution system.

In FY 2012, BNL engineering research staff used the EDD Distribution Engineering Workstation Software and worked with Orange and Rockland Utility (ORU) to perform simulations in support of efforts to manage load-growth on the ORU system.

A detailed model of the BNL electricity distribution system is presently being developed and will be used to study reactive power losses in the BNL distribution system and develop strategies that could reduce those losses. Advanced sensors, including the SEI sensors, will be deployed across the BNL system to monitor power quality and identify power losses across the Laboratory. This includes, for example, electrical transients, reactive power flows, output from the solar array (power quality and quantity), as well as phase imbalance and other functions. Real-time measurements are vital inputs to the BNL distribution system modeling.

The solar array, along with the BNL micro-grid project, is central to BNL's vision for the NSERC, which will serve as a focal point for research and industrial involvement in addressing systems performance and grid integration issues. To this end, this work is being conducted in partnership with SEI, ORU, Virginia Tech, and EDD.

BNL is also working on the development and implementation of advanced building controls in order to sustain peak energy efficiency and enable the reduction of energy consumption upon request, i.e., demand response based upon a utility signal to reduce power. BNL has engaged commercial partners in the development of proposals to demonstrate this technology, which would utilize the BNL micro-grid. The first phase would utilize a set of BNL buildings for research, test, and demonstration purposes. The goal would be to deploy energy monitors and advanced software by using existing BNL building HVAC controls, and document the potential energy savings that can be realized through closed-loop control systems. If successful, this effort would enable widespread use of new demand-response schemes, potentially saving energy and money for industrial and commercial energy consumers.

Another area of focus is how the regional electric grids function and perform during severe weather events and other major events. The power of the BNL modeling approach is in the fact that the models are geo-spatially referenced. That is, the geo-spatial or GPS coordinates of all elements in the electricity distribution system are stored and can be projected onto electronic maps, thereby enabling the study of the vulnerability and effects of weather events on electricity distribution systems. This work has been

funded, in part, through the Governor's Regional Economic Development Initiative. These investments support the SGRID3, which brings SBU's AERTC resources together with BNL to create two leading edge facilities that will establish New York as the undisputed leader in "smarter grid" systems design and control and technology development and deployment. Building SGRID3 will provide a laboratory for proving existing technologies, developing needed technologies, and improving operational effectiveness. A core element of the SGRID3 mission is to develop advanced modeling capabilities for forecasting and managing power system response and restoration due to severe weather events.

V. MANAGEMENT AND FUNDING

BNL's Facilities and Infrastructure Mission Readiness Program provides the facility and infrastructure strategic planners with critical information focused on capability and reliability requirements for current, committed, and anticipated research missions for the Laboratory. This knowledge, when coupled with infrastructure and facility capacity information, facilitates gap identification, and solution development. Sustainability needs are part of that gap analysis to ensure not only that are DOE goals met but also that BNL's facilities remain sustainable and ready to meet mission needs. Once gaps are identified, those relating to facilities are defined in discrete projects for prioritization and execution.

Funding for the facility project portion of BNL's Sustainability Program is provided through the Project Planning, Programming and Budgeting Process (3PBP). The process was developed to assist in meeting the key objectives of DOE and Laboratory senior management. The 3PBP:

- Provides an integrated, prioritized list of projects for accomplishment in the current fiscal year and the two successive years, forming a three-year rolling plan
- Provides an integrated, prioritized list of projects to be incorporated in the Laboratory budget submission to DOE for the Budget Year (CY+2)
- Identifies key unfunded projects and prompts development of near-term measures to reduce associated risks
- Develops a backlog list for input to strategic planning and decision-making processes
- Ensures that stakeholders' concerns are considered in the resources allocation process
- Provides a mechanism to link the Laboratory's goals with project approval decisions
- Ensures that decisions regarding prioritization and allocation of Laboratory resources are made with the most current information and are well-documented
- Provides a mechanism to identify time critical issues that can impact Laboratory mission readiness capabilities
- Allows flexibility for introduction of new priorities throughout the year
- Provides a mechanism for conversion of project priorities to budget documents
- Provides a mechanism for conversion of project priorities to the Annual Laboratory Plan.

The development of the project list discussed above starts with the collection of all the projects needs that have been identified. This collection of needs is called the Consolidated Unfunded Requirements List (CURL). Each project is assigned to a Level 1 Manager who champions the project, and independent groups evaluate the risk/benefit of the project and its relation to BNL's overall strategic objective. Sustainability projects are championed by the ALD for F&O, who evaluates the goals of the sustainability program; looks for alternate opportunities for funding, including the potential synergies with other projects; and then presents those to the BNL Policy Council. The Council's other members represent the projects they champion so that the most effective solution to meet all mission readiness needs can be selected, while keeping in mind budgetary constraints based on current budgets and DOE guidance on future budgets.

BNL initiated a UESC in October 2013. The project has been carefully crafted to ensure the best outcome in terms of realized energy savings while enhancing infrastructure needs. BNL has expended considerable effort developing this UESC and is confident it will be successful. It includes a robust Performance Assurance Plan, which is based on using all of the cost savings to cover the financing costs

of the project. Operating and maintenance budgets have been developed to ensure sufficient project management and maintenance issues are addressed and included within the CURL.

An example of the latest CURL that highlights Sustainability, Energy, and Water-related projects is provided below. Please note that this list includes projects that are not necessarily justified on sustainability alone but do provide related benefits. Further, this list does not match the information currently contained in the CEDR. BNL has recently determined a significant revision to the information in Tab 3.3 is necessary and will be reflected in further Site Sustainability Plans.

Table 7. BNL Sustainability, Energy, and Water-related Projects

Brookhaven National Laboratory
Sustainability, Energy and Water Related Projects

Legend	
	Continuing Project
	New Starts

PDS	JN	ADS TITLES	TEC	PY	FY14	FY15	FY16	OUTYR
PROGRAM INITIATIVES								
DA - GARS								
13-011		B/830 WINDOW REPLACEMENT FRONT OFFICES & L12, L13	225	0				225
13-006	13172	SOLAR ARRAY FENCING & SEEDING	175	0	175			
10-055		SOLAR ENERGY RESEARCH SUPPORT LABS, B/526 PH I	4,063	63		600	3,400	
11-017		SOLAR ENERGY RESEARCH SUPPORT LABS, B/526 PH II	2,000	0				2,000
DC- Basic Energy Science								
09-185		AIR HANDLER REPLACEMENTS K-9, B/555	330	0				330
DOE								
NEW	12466	REPLACE B/464 HVAC	250	-	40	210		
SUSTAINABILITY								
11-069	12767	HPSB-HVAC REPLACEMENTS & COMISSIONING	420	210	20	190		
11-072	12769	HPSB-METERING&MISC PROJECTS	219	169	50			
11-071	12725	HPSB-ROOFING PROJECTS	150	0	5	145		
11-062	12774	LIGHTING & CONTROLS IMPROVEMENTS	199	99		100		
11-067	12773	HVAC & CONTROLS IMPROVEMENTS	4,675	2025	1,250	1,400		
11-068	12772	DATA CENTER IMPROVEMENTS	518	18		500		
CAPITAL RENEWAL								
14-001	13158	ROOF REPLACEMENT, B/463 WEST	480	0	480			

14-002	13159	ROOF REPLACEMENT, B/555 WEST WING	200	0	200			
14-003	13160	ROOF REPLACEMENT, B/1010A	150	0	150			
14-011	13175	B/930 CHILLER REPLACEMENT	480	0	480			
13-005	13101	ROOF REPLACEMENT, B/902 SOUTH WING	581	256	325			
08-074	12545	STEAM SYSTEM REPAIRS MH 11-14 & 65 PH II	1,471	271	1,200			
08-074	12545	STEAM SYSTEM REPAIRS MH 11-14 & 65 PH II	2,036	136		800	1,100	
09-104		STEAM SYSTEM REHAB, MH 10	460	0				460
09-105		STEAM SYSTEM REHAB, MH 56	460	0				460
05-050		AIR HANDLER REPLACEMENT, B/510 AC7	330	0				330
09-106		AIR HANDLER REPLACEMENT, B/463 LV-1	1,000	0				1,000
12-045		AIR HANDLER REPLACEMENT, B/463 LV-2	1,200	0				1,200
12-046		AIR HANDLER REPLACEMENT, B/463 LAC-1	1,000	0				1,000
12-047		AIR HANDLER REPLACEMENT, B/463 LAC-2	1,000	0				1,000
12-048		AIR HANDLER REPLACEMENT, B/902 SF3 & FRC3	500	0				500
12-049		AIR HANDLER REPLACEMENT, B/911 AHU #2	450	0				450
12-050		AIR HANDLER REPLACEMENT, B/911 S&R Zone 1	330	0				330
12-051		AIR HANDLER REPLACEMENT, B/911 S&R Zone 2	330	0				330
12-052		AIR HANDLER REPLACEMENT, B/911 S&R Zone 3	330	0				330
12-053		AIR HANDLER REPLACEMENT, B/911 S&R Zone 4	330	0				330
12-054		AIR HANDLER REPLACEMENT, B/911 S&R Zone 5	330	0				330
12-055		AIR HANDLER REPLACEMENT, B/911 S&R Zone 6	330	0				330
11-061		AIR HANDLER REPLACEMENTS AC-6, B/510	330	0				330
09-107		AIR HANDLER REPLACEMENT, B/490 LV2	500	0				500
05-058		CHILLER REPLACEMENT B/930	480	0				480
11-063		CHILLER REPLACEMENT B/911	275	0				275
11-064		CHILLER REPLACEMENT (Trane) B/830 ROOF	300	0				300
11-065		CHILLER REPLACEMENTS (Trane) B/725	300	0				300
11-066		CHILLER REPLACEMENTS (Trane) B/725 (2nd Unit)	300	0				300
SITE & UTILITIES								
		ENGINEER REPLACEMENT OF CHILLERS 1,2,3			150			

09-032		REPLACE ELECTRIC CENTRIFICAL CHILLER #2, B/600	1,100	0		1,000		
02-071		REPLACE CCWF CCOOLING TOWER	2,196	186	10	2,000		
09-127		REPLACE EMCS PANELS, VARIOUS BLDGS	514	164		50	50	250
09-184		REPLACE ELECTRIC CENTRIFICAL CHILLER #3, B/600	1,100	0			1,100	
12-040		REPLACE ELECTRIC CENTRIFICAL CHILLER #4, B/600	1,300	0				1,300
12-064	12500	UESC PROJECT MANAGEMENT SUPPORT	1,704	154	600	950		
12-069		CHILLER #7	2,664	2014	650			
12-059		CHILLER #9	3,775	0	50	3,725		
				TOTAL NEEDS	5,835	11,670	5,650	20,310

Table 8. Recently Completed Energy and Water Savings Measures

Energy/Water Conservation Measures	**TEC - $k**
Water efficiency improvements: Low flow fixtures	$100
Building controls upgrades	$50
HPSB (Bldg. 438 and 817 HVAC improvements)	$1,900
Metering: Steam, Electric and Chilled Water	$35
Metering support	$20
Auditing: Green Assessments	$41
Lighting: Relamping with high efficiency fixtures	$100
Lighting: Demonstration projects	$3
Wind Study	$50
Combined Heat and Power Study (IGA)	$95
REC's for 2013	$48
UESC IGA	$126
Total	**$2,567**

VI. ELECTRICAL ENERGY PROJECTIONS AND HIGH-ENERGY MISSION-SPECIFIC FACILITIES

This section provides an overview of the five identified High-Energy Mission-Specific Facilities (HEMSFs) at BNL: ISB-I, the Center for Functional Nanomaterials (CFN), National Synchrotron Light Source (NSLS-I), NSLS-II, and RHIC. These descriptions include the scientific equipment, buildings, and associated support systems that comprise the HEMSFs.

We are confident that GHG reduction target will be achieved, even with the impact that facilities growth will have on our GHG emissions. NSLS-II and other HEMSF facilities will increase our load both in energy consumption, GHG, and water usage.

Significant progress has been made with the UESC project and a contract was awarded on October 22, 2013. The first phase of work, focusing on building features and controls for lighting, steam, heating, and cooling, is planned to commence in early 2014. A detailed investment grade audit was completed this year on locating a CHP plant at BNL. Several configurations and scenarios were evaluated and initial results are positive. The CHP configurations recommended will require a substantial investment in both resources and funding. Further evaluation is necessary and will continue throughout 2014.

Interdisciplinary Science Building I (ISB-I)

ISB-I is designed to group energy research scientists together into one facility with gathering spaces to facilitate and realize the scientific benefits of multi-disciplinary collaboration. The project is 37 percent more energy efficient than conventional design, exceeding the Federal mandates and DOE directives in the area of energy efficiency. Design strategies used to optimize energy conservation include: orienting the building along the north-south axis, installation of a coil loop heat recovery system for the laboratories requiring 100% outside air, installation of high-performance fume hoods with automatic sash closing feature, increased natural day lighting with vacancy and occupancy light sensors, and enhanced building envelope design.

ISB-I received LEED Gold certification from the U.S. Green Building Council on November 19, 2013. The sustainable design elements of the building meet the prerequisites of the Environmental Performance Criteria produced by LABS 21 program and align with the DOE GPs. ISB-I has a thermoplastic roof with a high solar reflectance (SRI 78), which meets the criteria for DOE's Cool Roof program. It also meets Secretary Chu's July 2010 directive for all DOE new and replacement roofs to be cool roofs and have a minimum R-value of 30, if economically feasible.

The ISB also notably reduced potable water use by 55% from the calculated baseline design through the installation of low-flush and low-flow fixtures throughout the building and by using native/drought tolerant planting in the landscaping design. The use of permeable concrete, bio-retention ponds, and underground storm water chambers allows 90% of the storm water to be captured and treated within the building footprint.

Interdisciplinary Science Building I

Center for Functional Nanomaterials (CFN)

The CFN provides state-of-the-art capabilities for the fabrication and study of nanoscale materials, with an emphasis on atomic-level tailoring to achieve desired properties and functions. The CFN is a science-based user facility, simultaneously developing strong scientific programs while offering broad access to its capabilities and collaboration through an active user program. The overarching scientific theme of the CFN is the development and understanding of nanoscale materials that address the nation's challenges in energy security, consistent with the DOE mission.

Center for Functional Nanomaterials

The CFN is one of five nanoscale science research centers across the United States funded by the DOE-SC. The CFN supports the Laboratory's goal of leadership in the development of advanced materials and processes for selected energy applications.

As a premier user facility for conducting interdisciplinary nanoscience research, the CFN serves as a focal point and enabler of advanced materials study in the northeastern United States.

The CFN, NSLS, and in the future, NSLS-II complement each other to facilitate the nanoscale revolution. The synergy among these world-class machines, with BNL's own scientific staff working collaboratively with university, industrial, and government laboratory researchers, offers unique opportunities for breakthroughs in energy research.

The science at the CFN is organized around these five scientific themes:

- Electronic Nanomaterials
- Interface Science and Catalysis
- Electron Microscopy
- Soft and Biological Materials
- Theory and Computation.

The experimental capabilities at the CFN are arranged into seven laboratory facilities:

- Synthesis and Characterization
- Advanced Optics
- Nanofabrication
- Proximal Probes
- Electron Microscopy
- Theory and Computation
- CFN End stations at NSL.

Access to the user program at the CFN is provided through a simple, peer-reviewed proposal process with a call for proposals that takes place three times per year. This facility is not designated in FIMS as "excluded."

National Synchrotron Light Source (NSLS-I)

As a national user research facility funded by the DOE-SC, the NSLS-I provides intense beams of infrared, ultraviolet, and x-ray light for basic and applied research in physics, chemistry, medicine, geophysics, environmental, and materials sciences. This allows scientists to examine materials and processes at a scale that is not possible at other types of research labs or facilities. The NSLS has approximately 2,100 visiting scientists per year from more than 400 national and international universities, laboratories, and other research institutions.

National Synchrotron Light Source

Synchrotron radiation facilities provide unique and powerful tools for characterizing the temporal and spatial evolution of working catalysts. The properties of catalysts can be studied using a wide range of x-ray techniques, such as x-ray powder and/or single-crystal diffraction, small-angle x-ray scattering, and many x-ray spectroscopy methods.

Condensed matter physics deals with the macroscopic physical properties of matter. In particular, it is concerned with “condensed” phases, which occur when the number of constituents in a system is extremely large and the interactions between the constituents are strong. The most familiar examples of condensed phases are solids and liquids, but more exotic condensed phases include the superfluid and the Bose-Einstein condensate found in certain atomic systems at very low temperatures, superconductivity, and the magnetic phases of spins on atomic lattices.

One major thrust of biological and soft-matter research at synchrotron facilities is protein crystallography, which uses x-rays to see the crystal structure of proteins and other biological molecules. Other research focuses on using x-rays to image tissue and cells, and to “watch” biological processes that occur on very short time scales, such as protein folding. The information learned from these fundamental studies is used to design drugs and treatments for disease, predict and detect disease, and understand the vast array of biological processes that govern life. This facility is designated in FIMS as “excluded.”

National Synchrotron Light Source II (NSLS-II)

The purpose of NSLS-II is to provide extremely bright x-rays for basic and applied research in biology and medicine, materials and chemical sciences, geosciences and environmental sciences, as well as nanoscience.

National Synchrotron Light Source II (aerial view)

National Synchrotron Light Source II (wide view)

As the successor to NSLS-I, the NSLS-II is scheduled to be operating by 2015 as the world's most advanced synchrotron light source. The new facility will have extremely high brightness and flux, exceptional beam stability, and a suite of advanced instruments, optics, and detectors. Taking advantage

of these new capabilities, scientists will be able to image materials with nanoscale resolution and determine chemical activity in fine detail.

The NSLS-II will accommodate more than 60 beamlines using 27 straight sections for insertion-device sources and 31 bending-magnet or three-pole-wiggler sources, with additional beamlines possible through canted insertion devices and multiple branches.

Six beamlines were selected in 2008 and are now funded within the NSLS-II project. These project beamlines encompass research programs in inelastic x-ray scattering, hard x-ray nanoprobe, coherent hard x-ray scattering, coherent soft x-ray scattering and polarization, submicron resolution x-ray spectroscopy, and x-ray powder diffraction. This facility is designated in FIMS as “excluded.”

Relativistic Heavy Ion Collider (RHIC)

RHIC is the first machine in the world capable of colliding heavy ions, which are atoms where the outer cloud of electrons has been removed. RHIC primarily uses ions of gold, one of the heaviest common elements, because its nucleus is densely packed with particles.

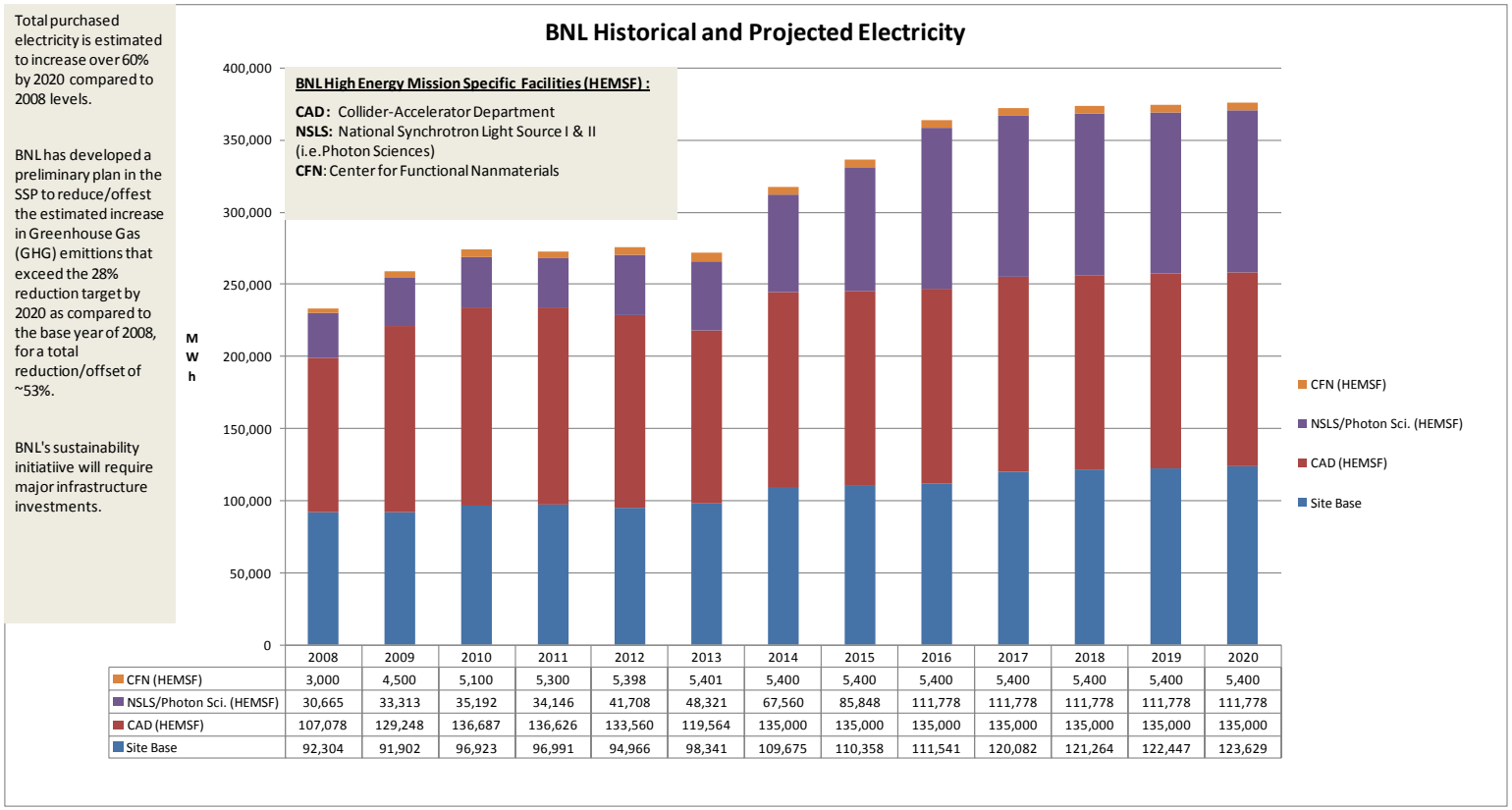
RHIC collides two beams of gold ions head-on when they're traveling at nearly the speed of light (what physicists call relativistic speeds). The beams travel in opposite directions around RHIC's 2.4-mile, two-lane "racetrack." At six points, the lanes cross, leading to an intersection. When ions collide at such high speeds fascinating things happen.

Relativistic Ion Collider (RHIC), aerial view and tunnel

Research at RHIC can be applied in nuclear physics (the study of atomic nuclei), particle physics (the study of the atom's constituents), astrophysics (the study of stars and planets), condensed matter physics (the science of solid matter) and cosmology (the study of the universe).

The following experiments and collaborations take place at RHIC: PHENIX, STAR, pp2pp, Electron Ion Collider Collaboration, and Zero Degree Calorimeter. This facility is designated in FIMS as “excluded.”

The following chart summarizes BNL’s historical and projected electricity usage for HEMSF and the Site Base.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CFN (HEMSF)	3,000	4,500	5,100	5,300	5,398	5,401	5,400	5,400	5,400	5,400	5,400	5,400	5,400
NSLS/Photon Sci. (HEMSF)	30,665	33,313	35,192	34,146	41,708	48,321	67,560	85,848	111,778	111,778	111,778	111,778	111,778
CAD (HEMSF)	107,078	129,248	136,687	136,626	133,560	119,564	135,000	135,000	135,000	135,000	135,000	135,000	135,000
Site Base	92,304	91,902	96,923	96,991	94,966	98,341	109,675	110,358	111,541	120,082	121,264	122,447	123,629

Figure 10. Historical and Projected Electricity Usage

The small increase in the Site Base over time is due primarily to general computer load increases, the addition of ISB-I, and the future construction of ISB-II. Both of the new buildings are more energy intensive than the buildings being replaced. Further, BNL continues to eliminate unnecessary space and consolidate various operations. While these actions reduce operating costs and increase overall efficiency, it places pressure on meeting the energy intensity reduction goal.

VII. UTILITY COSTS

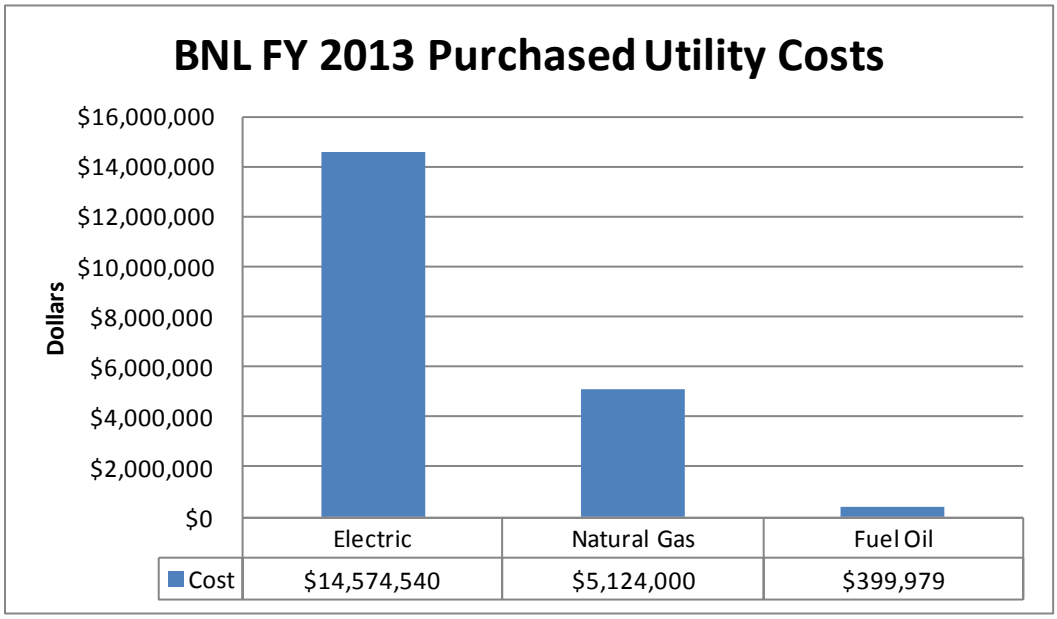


Figure 11. FY13 Purchased Utility Costs

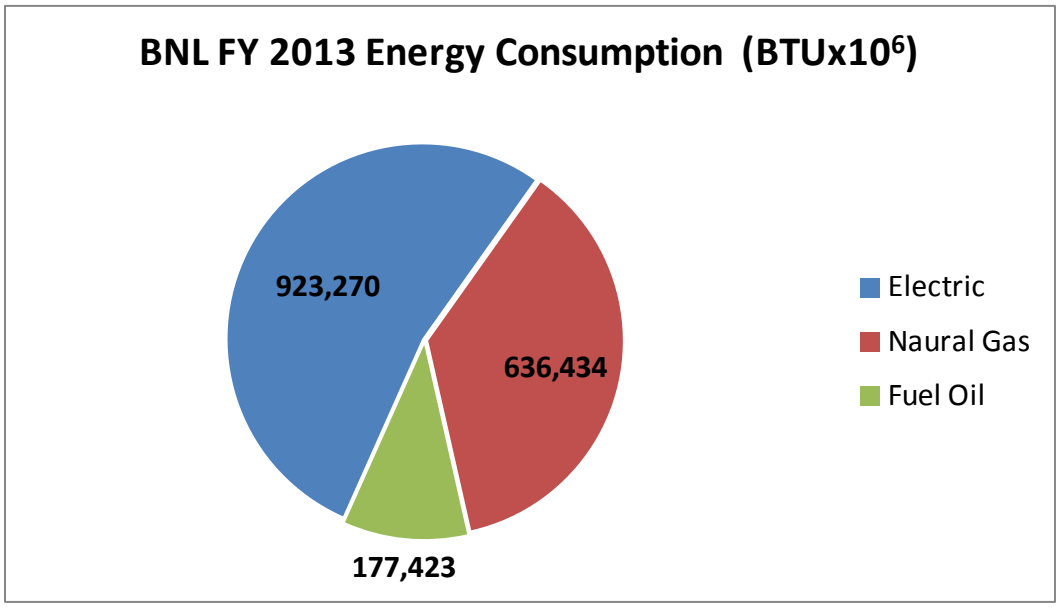


Figure 12. FY13 Energy Consumption

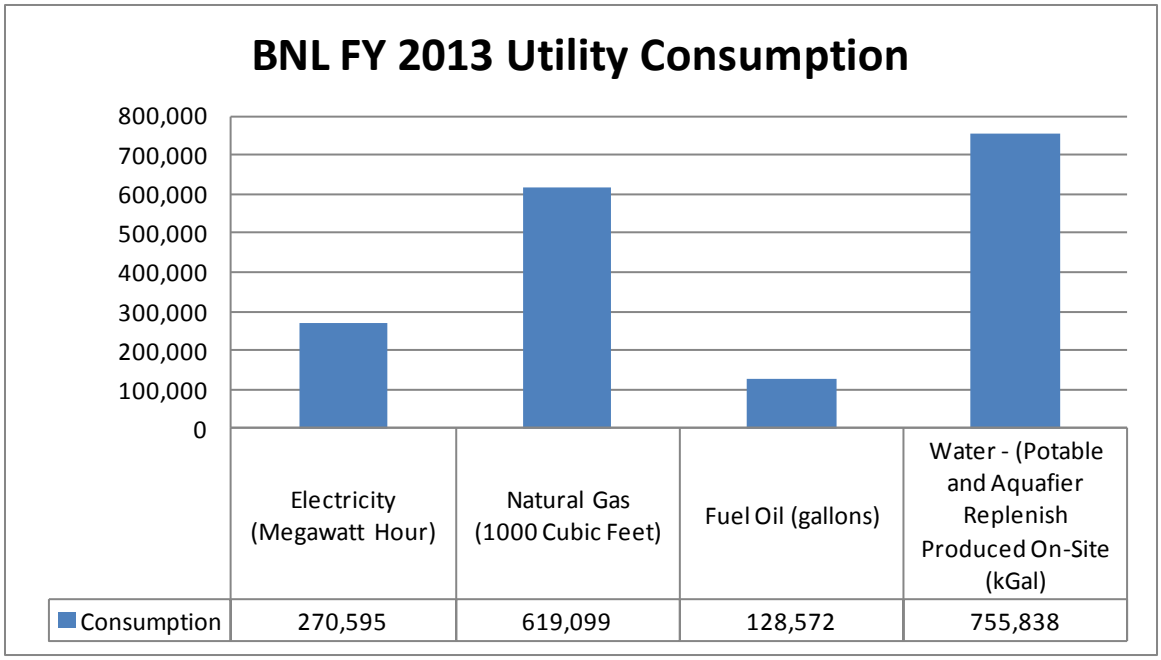


Figure 13. FY13 Utility Consumption

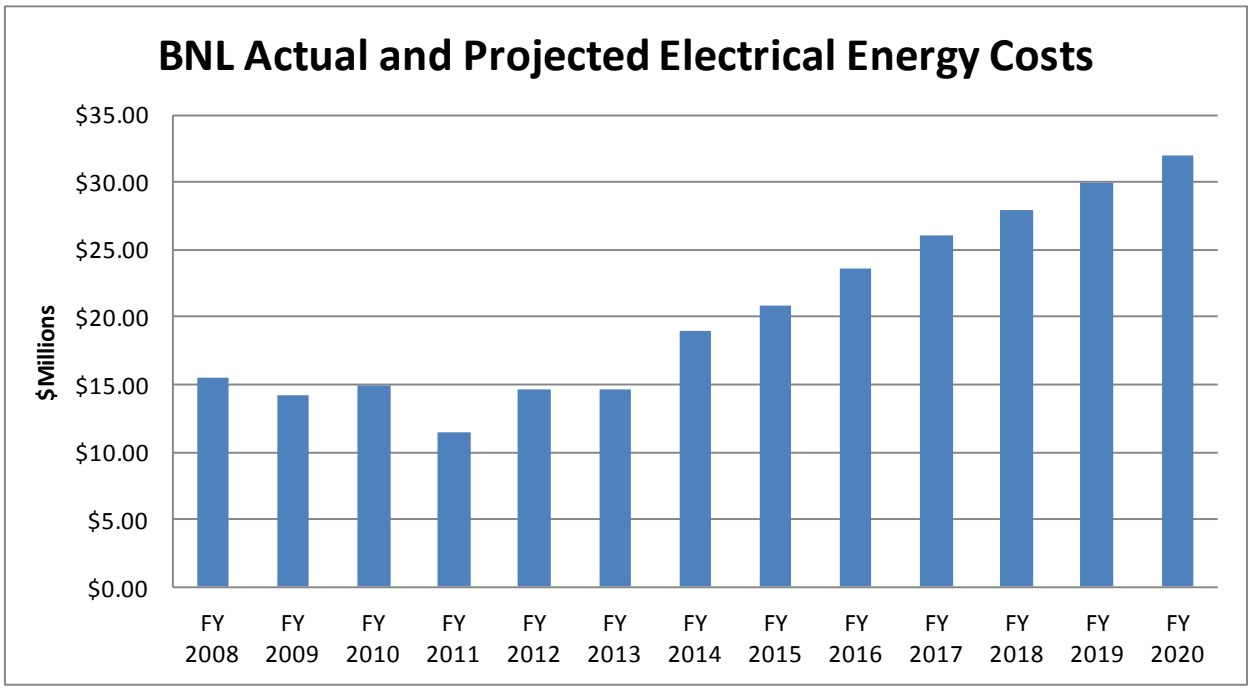


Figure 14. Actual and Projected Electrical Energy Costs

APPENDIX A: CONSOLIDATED ENERGY DATA REPORT (CEDR)

The Consolidated Energy Data Report is provided as a separate file.

APPENDIX B: ENERGY CONSUMING EXCLUDED BUILDINGS AND TRAILERS LIST

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
TR506	134937	Lab	G - Metered intensive loads	Trailer	408	408
TRAILER PART OF LIGHT SORCE ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR268	134836	Office, Riggers	G - Metered intensive loads	Trailer	656	656
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR272	134840	Office	G - Metered intensive loads	Trailer	572	572
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR067	134793	Storage	G - Metered intensive loads	Trailer	347	347
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR074	134798	Storage	G - Metered intensive loads	Trailer	361	361
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR078	134802	Data Collection	G - Metered intensive loads	Trailer	293	293
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1010B	134754	Phobos Counting House	G - Metered intensive loads	Building	1,137	1,137
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0741	210629	Lab Office Building 1	H - Impracticability	Building	42,393	42,393
Building meets the 4 critical findings of exclusion 1)Process dedicated energy overwhelms building energy consumption 2)Energy consumption reports conducted annually 3)Compliance with all energy efficiency requirements 4) Implementation of all energy efficiency projects (LEED Bldg.)						
0913B	124370	Fan House B - North	G - Metered intensive loads	Building	654	654
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913L	124447	Proton House J18	G - Metered intensive loads	Building	402	402
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1006C	124590	Star Counting House	G - Metered intensive loads	Building	1,838	1,838
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1006B	134508	6 O' Clock Cryo Service Building	G - Metered intensive loads	Building	3,245	3,245
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1006A	124461	Star Service Building	G - Metered intensive loads	Building	4,466	4,466
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0745	210633	Lab Office Building 5	H - Impracticability	Building	42,810	42,810
Building meets the 4 critical findings of exclusion 1)Process dedicated energy overwhelms building energy consumption 2)Energy consumption reports conducted annually 3)Compliance with all energy efficiency requirements 4) Implementation of all energy efficiency projects (LEED Bldg.)						
1101	124479	CAD Warehouse	G - Metered intensive loads	Building	2,490	2,490
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913O	124101	Proton House L18A	G - Metered intensive loads	Building	1,042	1,042
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913N	124445	Proton House L18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0744	210632	Lab Office Building 4	H - Impracticability	Building	42,243	42,243
Building meets the 4 critical findings of exclusion 1)Process dedicated energy overwhelms building energy consumption 2)Energy consumption reports conducted annually						

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
3)Compliance with all energy efficiency requirements 4) Implementation of all energy efficiency projects (LEED Bldg.)						
1006D	135852	Office Modulars	G - Metered intensive loads	Building	1,432	1,432
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1007W	124460	West Ejection Power Supply	G - Metered intensive loads	Building	5,000	5,000
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1005H	124464	RHIC Facility Compress Bldg	G - Metered intensive loads	Building	12,063	12,063
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1002A	124466	Instrumentation/Brahms Service	G - Metered intensive loads	Building	4,117	4,117
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1005E	124425	East Ejection Power Supply	G - Metered intensive loads	Building	5,539	5,539
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1006	124462	Star Experimental Hall	G - Metered intensive loads	Building	16,795	16,795
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1008E	135853	Office Modular	G - Metered intensive loads	Building	4,276	4,276
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913F	124471	Proton House D18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0919I	134882	PTR Rect.House #2	G - Metered intensive loads	Building	527	527
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0931	124451	BLIP	G - Metered intensive loads	Building	2,066	2,066
MEDICAL RESEARCH LAB. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0929	124375	RF Power Supply	G - Metered intensive loads	Building	13,471	13,471
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						

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U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0921	124357	Exp. Power Supply Bldg. G-2	G - Metered intensive loads	Building	3,903	3,903
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0927	124377	N. Experimental Tunnel	G - Metered intensive loads	Building	1,236	1,236
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1070	134563	Environmental Monitoring Station	G - Metered intensive loads	Building	75	75
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0922	124356	Scientific Assembly	G - Metered intensive loads	Building	15,238	15,238
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0953	134551	Rectifier House A	G - Metered intensive loads	Building	654	654
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0740	210040	NSLS II Ring, Injection, RF, & Service B	G - Metered intensive loads	Building	394,349	394,349
LIGHT SOURCE. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						

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U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0913M	124446	Proton House K18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements.						
0913J	124468	Proton House H18	G - Metered intensive loads	Building	402	402
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913E	124367	Fan House E - Southwest	G - Metered intensive loads	Building	671	671
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0932	124373	F-10 House Equipment	G - Metered intensive loads	Building	1,737	1,737
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0919G	133111	G-2 R&D Refrigerator Room	G - Metered intensive loads	Building	983	983
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0912A	124392	Mechanical Equipment Building	G - Metered intensive loads	Building	5,864	5,864
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0907	124421	Heavy Ion Power Supply A	G - Metered intensive loads	Building	1,944	1,944
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1002	124359	Brahms Experimental Hall	G - Metered intensive loads	Building	4,948	4,948
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1002B	134504	2 O'Clock Cryo Service Building	G - Metered intensive loads	Building	3,267	3,267
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1004D	134752	Fast Electronics Hut	G - Metered intensive loads	Building	504	504
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0966	136609	SCRF Facility Tech Shop	G - Metered intensive loads	Building	1,123	1,123
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR869	138133	Office	G - Metered intensive loads	Trailer	601	601
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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U.S. Department of Energy
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Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

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1005R	134553	Cryogenics Refrigerator Wing	G - Metered intensive loads	Building	12,223	12,223
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1000P	124361	W-Line Power Supply Building	G - Metered intensive loads	Building	2,484	2,484
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1000	124448	Injection Tunnel	G - Metered intensive loads	Building	261,487	261,487
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913C	124369	Fan House C - Northweat	G - Metered intensive loads	Building	1,632	1,632
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913P	124444	Proton House A18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0951	134547	Tower Equipment - T.E.Building	G - Metered intensive loads	Building	657	657
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1008	124459	Phenix Experimental Hall	G - Metered intensive loads	Building	12,513	12,513
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913	124391	AGS Tunnel	G - Metered intensive loads	Building	47,891	47,891
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0906	124395	PET Imaging Laboratory	G - Metered intensive loads	Building	4,805	4,805
MEDICAL RESEARCH LAB. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0901A	132348	Van De Graaff Building	G - Metered intensive loads	Building	65,611	65,611
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1012	134519	Future Facility/Experimental	G - Metered intensive loads	Building	8,818	8,818
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0916	124388	AGS Well 102	G - Metered intensive loads	Building	404	404
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office SC

Site 03004 Brookhaven National Laboratory

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1004B	134506	4 O'Clock Cryo/Main Power Supply	G - Metered intensive loads	Building	5,927	5,927
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1008B	134514	Service Bldg.	G - Metered intensive loads	Building	4,007	4,007
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1010	134517	Phobos Experimental Hall	G - Metered intensive loads	Building	8,501	8,501
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0725	124416	National Synchrotron Light Source	G - Metered intensive loads	Building	156,204	156,204
LIGHT SOURCE. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0919C	124382	G-2 Plan-B Refrigerator Room	G - Metered intensive loads	Building	1,066	1,066
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0919A	124384	AGS Crogenics/Target Group	G - Metered intensive loads	Building	4,876	4,876
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0941	124254	Power Supply & Support Building	G - Metered intensive loads	Building	1,362	1,362
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0908	124420	Heavy Ion Power Supply B	G - Metered intensive loads	Building	660	660
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913A	124415	Fan House A - Northeast	G - Metered intensive loads	Building	664	664
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0942	124218	AGS Booster Tunnel	G - Metered intensive loads	Building	13,507	13,507
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0919	124385	G-2 Experiment Group	G - Metered intensive loads	Building	16,463	16,463
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0919J	134883	PTR Rect.House #3	G - Metered intensive loads	Building	810	810
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0913R	124442	Proton House C18	G - Metered intensive loads	Building	402	402
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0918	124386	AGS Warehouse	G - Metered intensive loads	Building	16,526	16,526
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913K	124467	Proton House I18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913D	124368	Fan House D - Southwest	G - Metered intensive loads	Building	662	662
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0949	134540	G -2 Tunnel	G - Metered intensive loads	Building	4,474	4,474
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0956	141349	NSRL Beam Tunnel	G - Metered intensive loads	Building	4,829	4,829
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1010A	134518	10 O'Clock Cryo/Phobos Service	G - Metered intensive loads	Building	6,690	6,690
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0957	141350	NSRL Equipment Building	G - Metered intensive loads	Building	5,160	5,160
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0958	141351	NASA Space Radiation Laboratory	G - Metered intensive loads	Building	4,554	4,554
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0976	206401	Water Monitoring HZ	H - Impracticability	Building	81	81
nasa - Energy usage is driven by programmatic requirements for large machines which are significantly different from conventional bldg. requirements						
1005P	134552	Cooling Tower No. 7 Pump House	G - Metered intensive loads	Building	989	989
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0923	124355	Electronic Equipment Repair	G - Metered intensive loads	Building	11,511	11,511
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0928	124376	Siemens MG Power Supply	G - Metered intensive loads	Building	18,080	18,080
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0909	124424	Heavy Ion Beam Tunnel	G - Metered intensive loads	Building	13,161	13,161
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1012A	134520	12 O'Clock Cryo/Polarimeter Service	G - Metered intensive loads	Building	6,492	6,492
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0913H	124469	Proton House F18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0919H	134881	PTR Rect.House #1	G - Metered intensive loads	Building	992	992
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1008F	137348	Mixing Building	G - Metered intensive loads	Building	787	787
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0913Q	124443	Proton House B18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0913G	124470	Proton House E18	G - Metered intensive loads	Building	401	401
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0920	124358	E-10 Power Building	G - Metered intensive loads	Building	1,525	1,525
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1008A	124353	Phenix Service Building	G - Metered intensive loads	Building	9,867	9,867
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1002D	134753	Brahms Counting House	G - Metered intensive loads	Building	1,134	1,134
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
1004A	124465	RHIC RF Support Building	G - Metered intensive loads	Building	6,270	6,270
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0914	124390	Booster Equipment	G - Metered intensive loads	Building	8,612	8,612
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0747	210042	Cooling Tower Pump House	G - Metered intensive loads	Building	3,185	3,185
LIGHT SOURCE. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0912	124393	AGS Experimental Halls	G - Metered intensive loads	Building	183,132	183,132
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0964	124363	Electrical Storage-CAD support	G - Metered intensive loads	Building	526	526
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0946	124100	Beam Stop Pump House	G - Metered intensive loads	Building	324	324
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0975	124362	Machine Shop/SPS	G - Metered intensive loads	Building	6,354	6,354
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
1013	134559	Equipment Storage	G - Metered intensive loads	Building	202	202
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0746	210041	Compressor Bldg.	G - Metered intensive loads	Building	3,600	3,600
LIGHT SOURCE. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
0940	124476	On-Line Data Facility	G - Metered intensive loads	Building	2,252	2,252
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0930	124374	200 Mev Linac	G - Metered intensive loads	Building	105,435	105,435
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1005S	124463	Collider Center	G - Metered intensive loads	Building	40,781	40,781
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR280	134846	Tech Shop	G - Metered intensive loads	Trailer	806	806
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0913S	134502	H-10 Equipment House	G - Metered intensive loads	Building	1,828	1,828
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR068	134794	Storage	G - Metered intensive loads	Trailer	361	361
TRAILER PART OF ACCELERATOR COMPLEX. Energy usage in this trailer is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
TR038	134779	Storage, P.S. Group	G - Metered intensive loads	Trailer	510	510
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0925	124379	Works Building	G - Metered intensive loads	Building	6,814	6,814
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Building is metered for energy consumption which will be reported annually as process load.						
1008C	134515	Mechanical Equipment Building	G - Metered intensive loads	Building	1,163	1,163
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0919B	124383	Works Building	G - Metered intensive loads	Building	8,234	8,234
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
0742	210630	Lab Office Building 2	H - Impracticability	Building	42,398	42,398
Building meets the 4 critical findings of exclusion 1)Process dedicated energy overwhelms building energy consumption 2)Energy consumption reports conducted annually 3)Compliance with all energy efficiency requirements 4) Implementation of all energy efficiency projects (LEED Bldg.)						
0913I	124103	Proton House G18	G - Metered intensive loads	Building	400	400
ACCELERATOR. Energy usage in this building is driven by programmatic requirements for large machines which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						
0743	210631	Lab Office Building 3	H - Impracticability	Building	47,835	47,835
Building meets the 4 critical findings of exclusion 1)Process dedicated energy overwhelms building energy consumption 2)Energy consumption reports conducted annually 3)Compliance with all energy efficiency requirements 4) Implementation of all energy efficiency projects (LEED Bldg.)						
0644	209985	Freon-11 Remediation Facility	G - Metered intensive loads	Building	216	216
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements. Part of metered energy intensive loads whose group is metered and their consumption will be reported annually as part of process load.						

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APPENDIX C: LIST OF ACRONYMS & ABBREVIATIONS

3PBP	Project Planning, Programming and Budgeting Process
AEGIS	Advanced Electric Grid Innovation and Support
AERTC	Advanced Energy Research and Technology Center
AFV	alternative fuel vehicle
ALD	Associate/Assistant Laboratory Director
ARM	Atmospheric Radiation Measurement
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
BHSO	Brookhaven Site Office
BMP	best management practice
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
Btu	British thermal unit
C&D	Construction & Demolition
CBT	computer-based training
CEDR	Consolidated Energy Data Report
CFN	Center for Functional Nanomaterials
CHP	Combined Heat and Power
CHW	Chilled Water
CNG	compressed natural gas
CRADA	Cooperative Research and Development Agreement
CURL	Consolidated Unfunded Requirements List
CVO	Contractor Vendor Orientation
D&D	Decontamination & Decommissioning
DOE	Department of Energy
EDD	Electrical Distribution, Design, Inc
EISA	Energy Independence and Security Act
ELS	Environment & Life Sciences
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
EPRI	Electric Power Research Institute
ESPC	Energy Savings Performance Contract
F&O	Facilities and Operations
FCA	Facility Condition Assessment
FEMP	Federal Energy Management Program
FIMS	Federal Information Management System
gal	gallons
GARS	Global and Regional Solutions
GET	General Employee Training
GHG	Greenhouse Gas
GP	Guiding Principle
gpf	gallons per flush
gsf	gross square feet
HFC-134a	1,1,1,2-tetratfluourethane
HEMSF	High-Energy Mission-Specific Facility
HPSB	High Performance Sustainable Buildings

HQ	Headquarters
HVAC	heating, ventilation, and air-conditioning systems
IFM	Integrated Facility Management
ISB-I	Interdisciplinary Science Building I
ITD	Information Technology Division
kW	kilowatt
kWh/yr	kilowatt hour per year
LDRD	Laboratory Directed Research and Development
LEED	Leadership in Energy & Environmental Design
LIPA	Long Island Power Authority
LISF	Long Island Solar Farm
LOB	Laboratory/Office Building
mmBtu	one million Btu
MPO	Modernization Project Office
$MtCO_2e$	metric tons of carbon dioxide equivalent
MW	megawatts
MWh	megawatt hours
NEPA	National Environmental Protection Act
NOAA	National Oceanic and Atmospheric Administration
NREL	National Renewable Energy Laboratory
NSERC	Northeast Solar Energy Research Center
NSLS-I	National Synchrotron Light Source
NSLS-II	National Synchrotron Light Source II
NYBEST	New York Battery and Energy Storage Technology Consortium
NYPA	New York Power Authority
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
NYSSGC	New York State Smart Grid Consortium
OEM	Office of Emergency Management
OEP	Office of Educational Programs
ORU	Orange and Rockland Utility
OSSP	Open Space Stewardship Program
P2	Pollution Prevention
PDA	Preliminary Damage Assessment
PFC-14	perfluoromethane
PM	preventative maintenance
PPM	Procurement and Property Management
PPTRS	Pollution Prevention Tracking and Reporting System
PUE	power utilization effectiveness
PV	photovoltaic
PVMC	Photovoltaic Manufacturing Consortium
R&D	Research and Development
RCA	recycled concrete aggregate
REC	Renewable Energy Credit
RHIC	Relativistic Heavy Ion Collider
RPC	resistive plate chamber
RSL-II	Renovate Science Laboratory II
SAM	System for Award Management

SBMS	Standards-Based Management System
SBU	Stony Brook University
SEI	Smart Energy Instruments
SF_6	sulfur hexafluoride
SGRID3	Smarter Electric Grid Research, Development, Demonstration and Deployment Center
SSPP	Strategic Sustainability Performance Plan
STEAB	State Energy Advisory Board
STEM	Science, Technology, Engineering and Mathematics
TOF	time of flight
UESC	Utility Energy Service Contract
WGES.US	World Green Energy Symposium