FY15 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 and hosts 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 4.9 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.

The Laboratory's efforts in sustainability focus on four broad principles:

1. Striving to be climate neutral through reducing energy use and effective energy 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 Laboratory remains strongly committed to supporting and achieving the targets in the DOE Strategic Sustainability Performance Plan (SSPP). Leadership in sustainability is demonstrated through the Laboratory's management practices, stewardship of the BNL campus, as well as research and education programs. The efforts in sustainability are communicated widely across the Laboratory and the Senior Leadership team remains engaged.

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.

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. The LISF, located on the BNL site, began delivering power to the LIPA grid in November 2011. The LISF is made up of 164,312 PV panels and can produce up to 32 MW of electricity, making it the largest solar PV power plant in the eastern United States. In FY14, the LISF provided 52 million kilowatt hours per year (kWh/yr) of clean renewable energy to Long Island.

Additionally, the Laboratory has developed a new Northeast Solar Energy Research Center (NSERC) on its campus that will serve as a solar energy research and test facility for the solar industry. The mission of the NSERC is to support the expansion of solar power by providing high-quality data, field-testing, analyses, and solar energy expertise to address technical, economic, environmental, and policy issues facing solar power deployment in northeastern climates. The NSERC will be a proving ground for BNL and our industrial partners to test new solar technologies, including electrical inverters, storage devices, and solar modules, which effectively adds solar energy research to the user facility portfolio of BNL. Construction of Phase I (518kW) of the new solar array was completed in April 2014 and commissioning was completed in May 2014. The array is currently supplying power to the BNL 13.8 kV distribution system. Funding has been identified for Phase II that will deliver an additional 230kW. Once fully built-out, the annual output is estimated at ~ 700,000 kWh.

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. Staff members from the BNL Environment, Biology, Nuclear Science, and Nonproliferation (EBNN) Directorate, Facilities & Operations (F&O) Directorate, 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 include American Superconductor, Blue Oak Energy, BP Solar, Electric Power Research Institute, General Electric, Long Island Power Authority (LIPA), National Renewable Energy Laboratory (NREL), New York State Energy Research and Development Authority (NYSERDA), Stony Brook University (SBU), and University of California at San Diego. The DOE Energy Efficiency and Renewable Energy's Solar Energy Technology Program has also been key in providing research funding.

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. Energy conservation measures identified with this project include 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 is approximately 50% complete as of the end of FY14, and is estimated to result in a nearly 11% reduction in energy intensity. Planning and preliminary audits are underway for potential Phase II projects.

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. At the end of FY14, BNL has achieved 85% HPSB compliance for the 10 buildings that will not achieve LEED certification. MPO has developed a schedule for the completion of the remaining HPSB projects by the end of FY15.

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 58% since 1999). When normalized by site growth (building area in gross square feet), BNL's annual water use intensity has decreased from 101.2 gallons per square foot to 89.1 gallons per square foot, an 11.9% water usage reduction since base-year 2007. However, 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 in FY13 and work was completed in September FY14. Treated effluent from the plant is currently being recharged and recycled to the groundwater.

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. Additionally, over the last several years, BNL has continued to purchase 100% alternative fuel vehicles (AFV) when feasible.

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 June 2014, students and teachers who participated in OSSP were invited to BNL for an OSSP evening celebration, at which students displayed and presented their work to teachers, parents, scientists and others in the environmental community.

Again, BNL remains strongly committed to supporting and achieving the targets in the DOE SSPP. We are continually looking for additional ways to reduce our impact on the BNL site and on our environment. We are delighted to submit this annual report on our progress.

Table 1. Summary Table of DOE Sustainability Goals

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
Goal 1: Greenhouse Gas Reduction				
1.1	28% Scope 1 & 2 GHG reduction by FY 2020 from a FY 2008 baseline (2014 target: 19%)	The FY 2008 baseline was 205,628 $MtCO_2e$. In FY 2014, BNL's Scope 1 and 2 GHG emissions totaled 131,422 $MtCO_2e$—a decrease of 36.1% against the FY 2008 baseline. ***Note:*** *The total above is in accordance with the CEDR. However, this value does not reflect adjustments by the SPO for the Long Island Solar Farm (LISF). BNL estimates the total FY14 GHG value to be approximately 95,500 MtCO2e.*	Continuing efforts in FY14 include hydropower, the Long Island Solar Farm (LISF), on-site photovoltaic (PV) research and development, Renewable Energy Credit (REC) purchases, and energy intensity reduction through the Utility Energy Services Contract (UESC) Phase I. Combined Heat and Power (CHP): A study was initiated to determine how a UESC could be used to finance a "right-sized" CHP at BNL. Preliminary audits by two energy services companies (ESCOs) are underway for potential Phase II work.	Low
1.2	13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline (2014 target: 5%)	Overall, Scope 3 GHG emissions have been reduced by 13.58% from the FY 2008 baseline of 20,136 $MtCO_2e$ to 17,401 $MtCO_2e$ in FY 2014. Emissions specifically from employee business travel have increased by 2.2% from 8,800 $MtCO_2e$ in FY 2008 to 8,995 $MtCO_2e$ in FY 2014.	Planned efforts include further improvements in metrics for measuring commuting GHG reductions; expanding user teleconferencing capabilities through the deployment of enhanced communication technologies during site-wide telephone replacement; convert the current Rideshare website to a Commuter Choice website, adding new intranet links to other BNL web locations to expand visibility and accessibility; identify steps necessary to retrieve accurate counts of exempt	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
			and nonexempt monthly employees working four-day 40-hour and nine-day 80-hour compressed work schedules, as well as the number of telework days from PeopleSoft HR time reporting records; and change the standard allowable rental in domestic and foreign travel standard procedures from a mid-size to a compact vehicle.	
Goal 2: Sustainable Buildings				
2.1	30% energy intensity (Btu per gross square foot) reduction by FY 2015 from a FY 2003 baseline (2014 target: 27%)	BNL's FY14 energy intensity was 251,094 Btu/GSF. This level represents a cumulative reduction of 22.4% from the FY 2003 baseline of 323,780 Btu/GSF.	The UESC was awarded on October 22, 2013. Phase I implementation of the UESC is approximately 50% complete as of 10/31/14. 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. Preliminary audits are underway. Presentations to the	Medium

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
			complexes and facility managers will begin in late fall emphasizing the importance of building temperature setback.	
2.2	EISA Section 432 energy and water evaluations	100% completed within last four years.	Green Energy Surveys are in process and on schedule. 25% of our buildings were surveyed by VFA in FY14. The reporting format has been revised to better emphasize potential energy projects.	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) (2014 target: 95% and 75%, respectively)	The status of individual building metering is as follows: • Electric: +100% (of appropriate meters) • Natural Gas: 100% • Steam: 89.7% • Chilled Water: 100%. Seventeen (17) Ethernet-based Power Quality meters were installed throughout the Laboratory. Five (5) 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. New chilled water meter for 515 has been installed and	Additional meter installations are ongoing. We are investigating the need for additional sub-meters for any IT loads that are not on the uninterruptible power circuits. A potential project to relocate/consolidate BNL data centers provides an opportunity to improve data center performance and metering.	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
		is operating.		
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.	Unless uneconomical, all roof replacements are designed and constructed in accordance with the requirements for cool roofs.	Roof repairs and replacements will be performed at Buildings 725, 624, and 510. Meeting the cool roof requirements will be performed during the design phase.	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 (2014 target: 13%)	MPO continues to make progress toward the 15% requirement. At the end of FY14, BNL is 85% HPSB compliant for the 10 buildings that will not achieve LEED certification. Tasks completed in FY14 include HPSB upgrades at Building 599, re-evaluation of Building 98 for HPSB compliance, and the commencement of the roof replacement at Building 438.	Complete remaining work to meet the 15% milestone. Activities include building 860 RTU and duct replacement, building 98 misc. tasks, remaining retro commissioning, and finalization of procedure and policy changes.	Medium
2.6	All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs	All recently completed projects obtained LEED certifications.	HPSB requirements will be included in the conceptual design for the Building 725 renovation.	Low
2.7	Efforts to increase regional and local planning coordination and involvement.	BNL continues to investigate public transportation and 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.	In FY15, the Laboratory will continue to support federal and local efforts to reduce reliance on petroleum by establishing a working group to reduce single occupancy vehicles and examine alternate work schedules; implement the deer	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
		Stakeholder involvement includes hosting numerous conferences and routine communications with regulatory and community groups.	management program and re-deploy tick management techniques; and continue to host conferences and attend meetings to promote the Laboratory's renewable energy strategies.	
Goal 3: Fleet Management				
3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline (2014 target: 136% cumulative since 2005)	Based on FAST data, the total annual alternative fuel consumption is as follows: • FY 2012: 36,416 gge • FY 2013: 43,563 gge • FY 2014: 51,449 gge	BNL plans to convert to GSA leasing, which will replace older gasoline vehicles with alternative fuel vehicles.	Low
3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline (2014 target: 18% cumulative since 2005)	Based on FAST data, the total annual petroleum consumption is as follows: • FY 2012: 80,418 gge • FY 2013: 71,865 gge • FY 2014: 61,110 gge	BNL plans to convert to GSA leasing, which will replace older gasoline vehicles with alternative fuel vehicles.	Low
3.3	100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2015 and thereafter (75% FY 2000 – 2015)	All purchases are alternative fuel vehicles where available.	GSA leasing can provide 100% of light duty vehicles as alternative fuel vehicles.	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	Annual water use intensity has decreased from 101.2 gallons per square foot to 89.1 gallons per square foot, an 11.9% water usage reduction since base-year	We will continue to implement BNL's Water Management Plan. New construction and renovation will utilize water-efficient processes and plumbing	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
	(2014 target: 14%)	2007. The Sewage Treatment Plant Modification to recharge treated effluent to groundwater was completed in September 2014.	fixtures to conserve water. We expect increased science activities that involve accelerator cooling to increase water consumption, due to cooling tower evaporation.	
4.2	20% water consumption (Gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline (2014 target: 8%)	No permanent landscaping or agricultural water use.	n/a	n/a
Goal 5: Pollution Prevention and Waste Reduction				
5.1	Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris, by FY 2015	Over the past 13 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 FY14, the recycling rate was approximately 66%.	BNL will continue to divert non-hazardous solid waste at or above the 50% baseline level, as well as focus on educating employees on the Laboratory's recycling programs. Continuing with past tradition, the P2 Program will also solicit ideas for partial or full funding of projects that minimize waste or help prevent pollution.	Low
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.	Construction materials will continue to be sent to the Construction & Demolition (C&D) transfer station for sorting and recycling. Concrete and stone/brick demolition debris will continue to be converted to recycled concrete aggregate (RCA) via a concrete crusher.	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
Goal 6: Sustainable Acquisition				
6.1	Procurements meet requirements by including necessary provisions and clauses in 95% of applicable contracts	The requirements for Sustainable Acquisition are incorporated into all of BNL's Terms and Conditions issued by the PPM Division.	The following actions are planned for FY15 and beyond: (1) Develop awareness training for green products for Material Coordinators; (2) Provide technical assistance and education to the Laboratory community on the use and availability of green products and services; (3) Increase communication on Sustainable Acquisition through Lessons Learned and success stories; and (4) Continue to modify the Laboratory's E-Procurement (E-Pro) system to increase green purchasing.	Low
Goal 7: Electronic Stewardship and Data Centers				
7.1	All data centers are metered to measure a monthly Power Usage Effectiveness (PUE) of 100% by FY 2015 (2014 target: 90%)	Initial PUE study indicated current PUE to be above 1.6. Additional electric meters and one new chilled water meter installed in FY14. Continued effort to identify and install additional metering so that a more accurate PUE for each data center may be measured and monitored.	As indicated in 2.3 we are investigating the need for additional sub-meters for any IT loads that are not on the uninterruptible power circuits.	Medium - High
7.2	Core data centers maximum annual weighted average PUE of 1.4 by FY 2015 (2014 target: 1.5)	The most recent evaluation of the main data center calculates the PUE at 1.79 for FY14. The small data center in Building 459 had a PUE of	A potential project to relocate/consolidate BNL data centers provides an opportunity to improve data center performance and metering.	Medium - High

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
		2.1.		
7.3	Power management – 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
7.4	Electronic Stewardship - 95% of eligible electronics acquisitions meet EPEAT standards	In FY14, the contract governing the procurement of printers, laptop and desktop computers ordered through the BNL E-Procurement system required that they have an EPEAT "Gold" certification.	The Laboratory will continue to require that all printers, laptops, and desktop computers ordered through the E-Procurement System have an EPEAT "Gold" certification.	Low
Goal 8: Renewable Energy				
8.1	20% of annual electricity consumption from renewable sources by FY 2020 (2014 target: 7.5%)	BNL purchased 40 million kWh of RECs, which equals 8.1% of BNL's total usage of electric and thermal energy. LISF began operations November 2011 and in FY14, provided 52 million kWh/yr of clean renewable energy to Long Island. The on-site NSERC solar array became operational in May 2014. Once fully built-out the annual output is estimated at ~ 700,000 kWh.	A commercial evaluation of the 2013 CHP/biomass study was initiated in FY14 to further determine the viability of CHP at BNL. It will be completed in early 2015. REC purchases will continue and the quantity will need to be significantly increased due to the 20% requirement.	Low
Goal 9: Climate Change Resilience				
9.1	Address DOE Climate Change Adaptation Plan	The Laboratory has developed a working group with regional researchers to	BNL will take a leadership role in further developing the regional working group,	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
	goals	better understand the interaction of the urban environments and the atmosphere. A case study on the influence of NYC on the formation of a tornado on LI has begun. The Biological, Environmental and Climate Sciences (BECS) Department at BNL has been involved in a consortium to better predict frequency and intensity of extreme weather events. BNL maintains a meteorological station on-site, and has posted an annual report on the web. BNL has also shared real-time solar irradiation data with companies interested in solar farm development in the region. BNL, supported by the New York State Energy Research and Development Authority (NYSERDA), has started to work on a project to forecast the damage induced by weather on utility distribution systems in Rockland and Putnam counties.	and the case study started in FY14 is expected to be submitted for publication. The Laboratory will also continue to participate in the NYS RISE effort; maintain and share meteorological data collection, including real-time solar irradiation; and forecast potential damage to utility distribution systems caused by weather events.	
Goal 10: Energy Performance Contracts				
10.1	Utilization of Energy Performance Contracts	The UESC was awarded on October 22, 2013. Phase I implementation of the UESC is approximately 50% complete as of 10/31/14.	Preliminary audits are underway for potential Phase II projects. Planned initiatives include providing free cooling, improving the	Low

SSPP Goal #	DOE Goal	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-attainment
		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.	steam system, and CHP.	

II. PERFORMANCE REVIEW AND PLAN NARRATIVE

Goal 1: Greenhouse Gas Reduction

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 remains committed to meeting this important goal and is currently below the FY 2020 target of 148,000 $MtCO_2e$ due to a combination of hydropower (obtained in March 2011) and hosting and support for innovative projects, such as the Long Island Solar Farm (LISF), Northeast Solar Energy Research Center (NSERC), and Renewable Energy Credit (REC) purchases. 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.

BNL is on target to reduce Scope 1 and 2 greenhouse gas (GHG) emissions by at least 28% by FY 2020 when compared to the FY 2008 baseline. The FY 2008 baseline was 205,628 $MtCO_2e$, making the FY 2020 target 148,000 $MtCO_2e$. According to the CEDR calculation, in FY 2014, BNL's Scope 1 and 2 GHG emissions totaled 131,422 $MtCO_2e$—a decrease of 36.1% against the FY 2008 baseline. However, this value does not reflect adjustments by the SPO for the LISF. BNL estimates the total FY14 GHG value to be approximately 95,500 $MtCO_2e$.

With existing initiatives and planned projects and activities, it is estimated that BNL will exceed the target by over 33%, despite the substantial programmatic growth that is expected by 2020. Without these efforts, BNL's projected GHG emissions in 2020 would be more than 144% above the goal at 297,000 $MtCO_2e$.

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	205,628		
28% GHG Reduction Target	148,000	-28%	
2020 Projected GHG Emissions	297,000	+144%	+101%
2020 Projected GHG Emissions with Initiatives	97,000		-33%

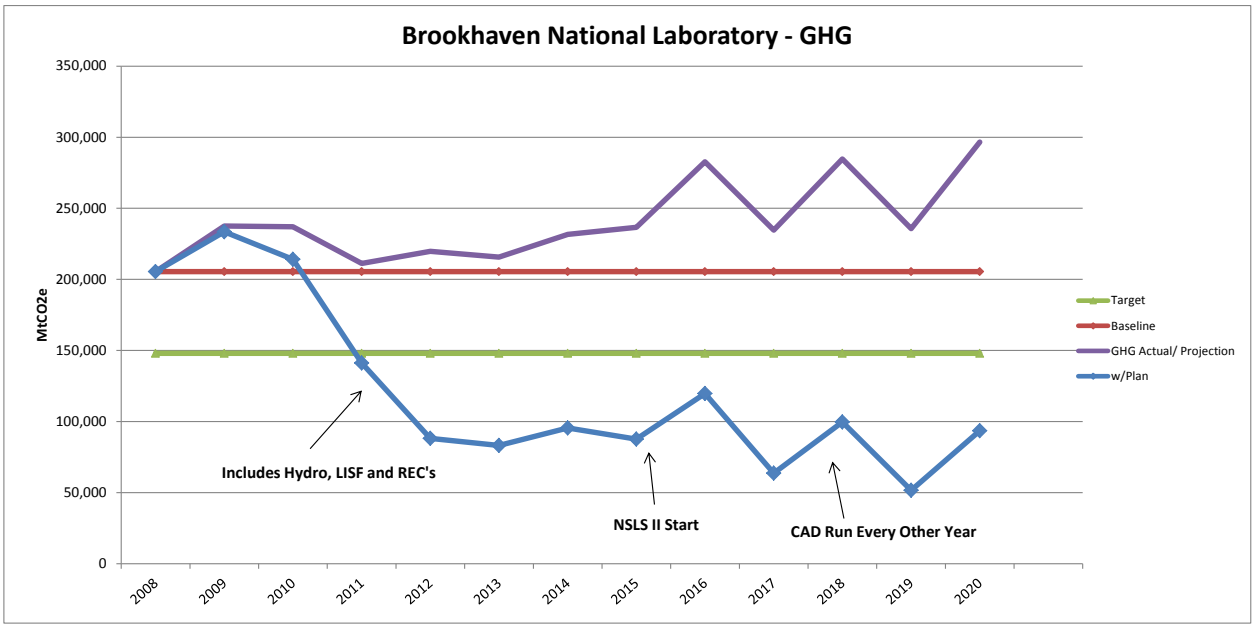


Figure 1. Scope 1 and 2 Greenhouse Gas Emissions

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 GHG emissions. In FY 2014, 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 2013 fugitive GHGs that can be attributed to the purging of carrier gases from these subsystems.

Table 3. Fugitive GHG Emissions

Gas	Subsystem	Detector	Percentage of Total BNL Fugitive GHG Emissions
1,1,1,2-tetrafluoroethane (HFC-134a)	time of flight counter west & resistive plate chamber subsystems	PHENIX	5.3 % (892 $MtCO_2e$)
Sulfur hexafluoride (SF_6)	time of flight counter west & resistive plate chamber subsystems	PHENIX	4.3 % (724 $MtCO_2e$)
perfluoromethane (PFC-14)	muon tracking chamber north and south subsystems	PHENIX	68.7 % (11,648 $MtCO_2e$)
1,1,2-tetratfluourethane (HFC-134a)	multi-gap resistive plate time of flight (TOF) subsystem	STAR	4.7 % (798 $MtCO_2e$)
1,1,1,2-tetratfluourethane (HFC-134a)	Multi-gap resistive plate muon detector	STAR	5.4 % (912 $MtCO_2e$)

In 2012, BNL's PHENIX Group began acquiring funds to upgrade the single pass circulation system used by the resistive plate chamber (RPC) detector 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 90% complete. Plans are to complete the recirculation system in time for the FY 2015 PHENIX experimental run.

Meanwhile, the new gas recirculation system on the multi-gap resistive plate time of flight (TOF) subsystem, which BNL's STAR Group completed prior to the FY 2014 experiment, reduced TOF HFC-134a gas purge rates by more than 50 % from 87 to 42 liters per hour.

Sulfur Hexafluoride Emissions

To more accurately account for and effectively manage leaks of SF_6 associated with gaseous dielectric used in its high voltage electric equipment, BNL finalized a High Energy Equipment Management Plan that the Energy & Utilities (EU) Division's Electric Distributions Group will follow in FY 2015. The plan establishes a proactive process to identify and repair leaks by setting up a periodic inspection and maintenance schedule for each piece of equipment. It also incorporates recognized utility industry practices to safely handle and minimize releases of SF_6 as a Standard Operating Procedure for Electrical Distributions Group personnel to follow whenever SF_6-insulated switchgear, switches, and circuit breakers are serviced. The plan also uses EPA Mandatory Reporting Rule 40 CFR 98, Subpart DD Electrical Transmission and Distribution Equipment Use emissions monitoring practices to accurately calculate annual SF_6 emissions and determine the weighted average leak rate for all active high-energy equipment.

Plans and Projected Performance

The following summarizes ongoing and planned efforts.

Hydropower

Starting in March 2011, BNL began receiving 15 MW of hydropower from the New York Power Authority (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.

Long Island Solar Farm (LISF)

Starting in November 2011, the LISF began producing approximately 32 MW of alternating current electricity. This project avoids 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 is nearly 50% complete. It will be completed by late FY 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 GHGs. This facility became operational in May 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 4. 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. Construction is nearly 50% complete and will be completed by late FY 2015.
Energy Intensity Reduction – UESC Phase II			-6,000	-4%	$7,450,000	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 $7.5 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)	0.7	736	-500	-0.3	N/A	R&D array of 700 kW at FLH of 0.12. Online May 2014.
Renewable Energy Credits (RECs)		119.089	77,100	-52%	$536,000	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			**-197,100**		**$20,186,000**	

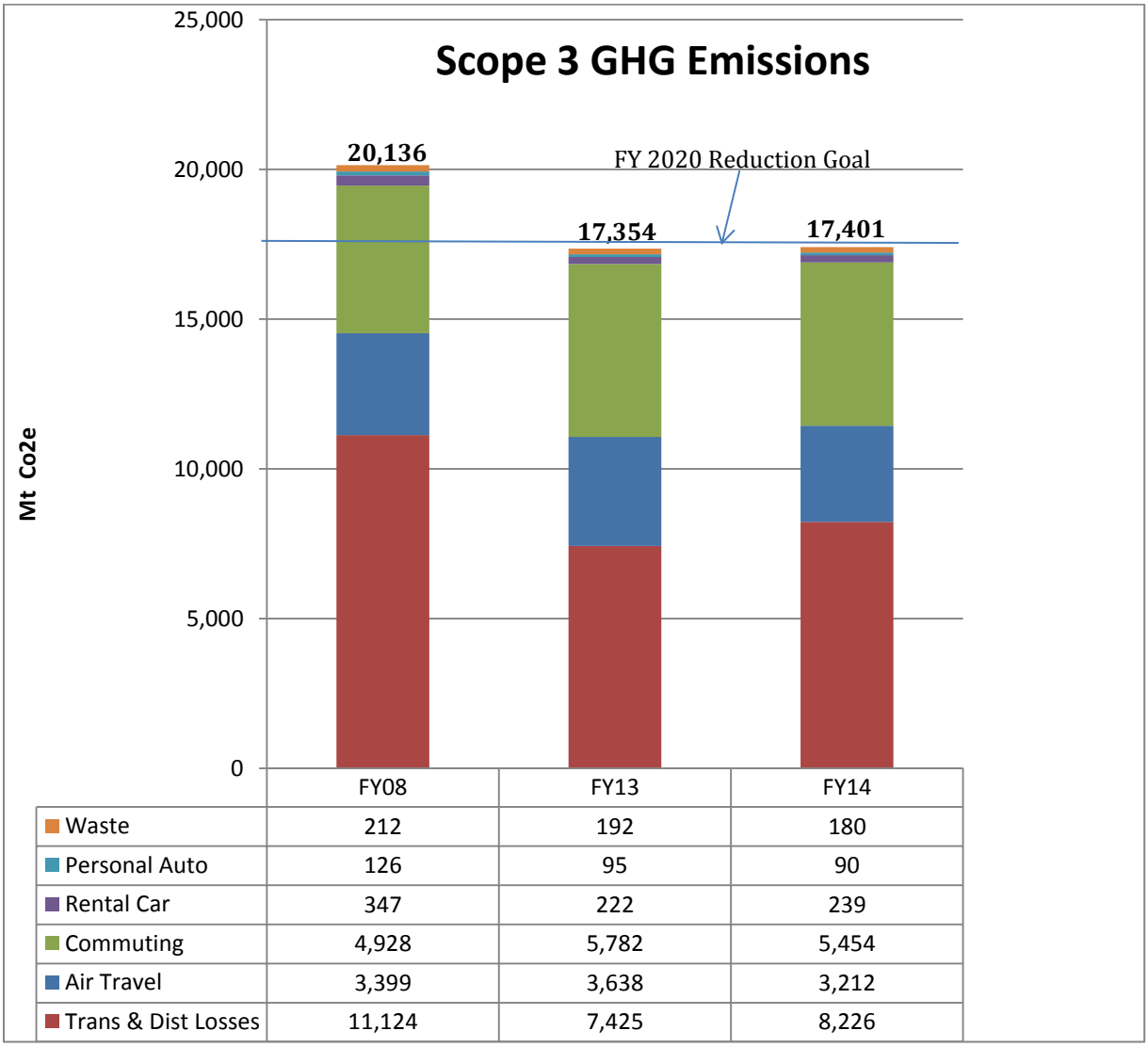
There is a difference of 149,000 $MtCO_2e$ between the reduction target of 148,000 $MtCO_2e$ and the projected FY 2020 GHG emissions of 297,000 $MtCO_2e$ without initiatives. The % values in the table reflect each initiative's impact on the 149,000 $MtCO_2e$ value.

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 up 0.27% from FY 2013 (47 MtCO2e), and 13.58% lower than the FY 2008 baseline value. Baseline Scope 3 emissions from commuting increased by 133 MtCO2e after an emissions calculations error was corrected (see CEDR tab 8.4 for more details).



	FY08	FY13	FY14
Waste	212	192	180
Personal Auto	126	95	90
Rental Car	347	222	239
Commuting	4,928	5,782	5,454
Air Travel	3,399	3,638	3,212
Trans & Dist Losses	11,124	7,425	8,226

Figure 2. Scope 3 Greenhouse Gas Emissions

Note: Discrepancies in transmission distribution losses recorded in CEDR Tab 1.2b and those reported in Figure 2 above have been identified and are currently under review.

Transmission and Distribution Losses

From FY 2008 to FY 2014, GHGs from electrical transmission and distribution losses dropped 26.1%, or 2,898 $MtCO_2e$, despite a 25.0% increase in purchased electricity. Hydropower purchases of 120,146 MWh in 2014 from NYPA accounted for 41.5% of all electrical power purchases. Lower e-Grid GHG emission factors for the Long Island sub-region in FY 2014 versus that of FY 2008, combined with a decrease in the transmission and distribution loss factor from 6.85% in FY 2008 to 6.18% in FY 2014, also helped to reduce transmission and distribution loss GHGs.

Commuting

Commuting GHGs dropped 5.7%, or 328 $MtCO_2e$, from FY 2013. 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. A modest decline in the average employee round trip commute from 28.18 miles in FY 2013 to 27.70 miles in FY 2014, combined with a 5.6% decline in the number of full- and part-time employees are the factors responsible for the decrease in commuting GHGs. The drop in the average commuting distance and the number of full- and part-time employees account 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.

During the week of December 9, 2013, the Facilities & Operations (F&O) Directorate asked employees and guests to take part in a short survey to assess the Laboratory's transportation needs and preferences. In July 2014, F&O reported that 349 employees and 678 guests/users completed the survey. Since the survey allowed respondents to answer questions on behalf of their students and guests commuting with them, the number responding to questions is not equal to the number of respondents. The results showed that more than 1,200 individuals plan to use the on-site shuttle during the year, and that more than 400 individuals expressed the need for an off-site shuttle to a nearby Long Island Road (LIRR) station around 1:30 pm on weekdays. The results also showed that nearly 1,600 individuals expressed interest in pay-per-use bicycles similar to the Citi Bike program deployed in New York City and its boroughs. To address the need for enhanced off-site shuttle service to nearby LIRR stations, a three-month pilot program to run an additional shuttle to the LIRR Yaphank station was initiated on July 21, 2014.

By the end of December 2013, BNL's Badging Office completed its efforts to renew employee and guest ID badges and corresponding stickered vehicle database records. As a result, stickered vehicle database records for more than 1,500 employees have been updated, accounting for 3,632 employee vehicles from model years 1984 to 2014. By using available employee vehicle make, model, and year data combined with EPA combined mileage ratings from the DOE fuel economy website, BNL has an improved approach for estimating the average fuel economy of employee vehicles and annual commuting GHG emissions. Using this approach, the average fuel economy of employee vehicles is expected to rise from 23.2 miles per gallon in FY 2014 as employees gradually replace older vehicles with more fuel efficient vehicles that reflect the higher Corporate Average Fuel Economy (CAFE) Standards established for vehicle manufacturer fleets by the National Highway Traffic Safety Administration (NHTSA) as noted below. As the average fuel economy of employee vehicles continues to increase, employee commuting GHG emissions are expected to decline.

Table 5. Projected Fuel Economy Standards

	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	33.6	34.4	35.2	36.4	38.2	39.6	41.1
Light Trucks	25	25.6	26.2	27.1	28.9	29.1	29.6
Combined Cars & Tucks	29.8	30.6	31.4	32.6	34.3	35.1	36.1
Table is based on CAFE certification data from model year 2010, a car-truck sales split from the Energy Information Administration's Annual Energy Outlook for 2012, and future sales forecasts by JD Powers.							

In April 2014, BNL's Laboratory Protection Division (LPD) announced a new pilot program to expand the number of site access points to BNL bicycle commuters from two to three. The program was developed to provide bicycle commuters residing south and east of the Laboratory more direct access into the site via a gate at the southeast corner of the site. The program also allows registered bicyclists to enter the site via the Main Gate from the west and the North Gate without having to slow down and present their badge every time they enter the site. As of September 30, 2014, 88 employee bicyclists had registered to participate in the program. After one year, the LPD and Laboratory management will evaluate the program to decide if it should be extended, cancelled, or made permanent.

In May 2014, BNL staff met with administrators of MetroPool Long Island—a New York State Department of Transportation (NYSDOT) regional commuting services contractor—to review the scope of customized rideshare portal options intended to enhance employee interest and participation in ridesharing. After the meeting, BNL staff reconsidered planned Environmental Protection Division (EPD) rideshare website improvements, deciding instead to work with the Laboratory's Web Services group to convert the current rideshare website to a Commuter Choice website. The new website will stress both the environmental work/life balance benefits of more sustainable commuting options and the resources available to enable employees to rideshare, commute by bicycle, use the LIRR, and establish compressed work or telework schedules. EPD staff subsequently met with the Web Services group to review the current rideshare website and to discuss potential elements for the Commuter Choice website.

In September 2014, Human Resources (HR) completed revisions to the BNL Standards-Based Management System (SBMS) Flexible Work Arrangements Subject Area, streamlining the approval process for exempt and nonexempt monthly staff that request compressed work schedules.

To increase employee awareness and appreciation of the environmental, health, and economic benefits of more sustainable means of transportation, BNL participated in the 2nd Annual Car Free Day LI celebration on September 22, 2014. To participate, employees completed an online pledge on the Car Free Day LI website to be car-free or car-lite on September 22 by carpooling, biking, walking, or telecommuting. To promote the event, a short web streaming video was produced that featured three employees describing why they carpool, bicycle, and telecommute on a regular basis. Additionally, 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 426 $MtCO_2e$, a decrease of 11.7% from the FY 2013 total. This decrease was in part due to a 9.54% reduction in the number of scheduled trips. With this decline, FY 2014 airline travel GHGs were 5.5% less than the FY 2008 baseline.

Rental Cars

GHG emissions resulting from rental vehicles used for employee business travel rose 7.7%, but are still 30% below the 2008 baseline value.

Personal Auto (Business)

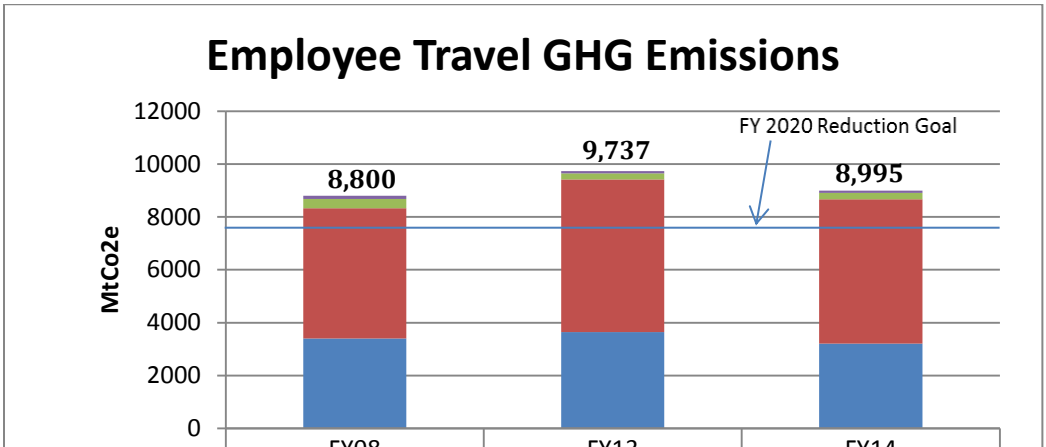
GHGs from employees using their personal vehicles for business use have decreased 28.6% since FY 2008.

Waste

Since 2008, GHGs from contracted waste are down 15.09% 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 has 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 12% employee business travel GHG emission reduction goal, BNL must lower overall Scope 3 GHGs and employee travel GHGs by 2,618 $MtCO_2e$ and 1,056 $MtCO_2e$, respectively. Figure 3 illustrates the challenges that BNL must face in order to achieve the employee business travel GHG reduction goal.



	FY08	FY13	FY14
Personal Auto	126	95	90
Rental Car	347	222	239
Commuting	4,928	5,782	5,454
Air Travel	3,399	3,638	3,212

Figure 3. Employee Travel Greenhouse Gas Emissions

Despite 2013 BNL Badging Office efforts to renew employee/guest ID badges and corresponding stickered vehicle database records, a comparison of stickered vehicle database records with a September 2014 HR list of current employees revealed that registered vehicle records of 1,288 current employees had not been updated. To address this database gap, BNL's Information Technology Business Systems Group will be sending an e-mail request to these employees during the second quarter of FY 2015 asking them to add the vehicle model for all of their registered vehicles.

HR plans to investigate the steps necessary to retrieve accurate counts of exempt and nonexempt monthly employees that work four-day 40-hour and nine-day 80-hour compressed work schedules from PeopleSoft HR time reporting records, as well as the programming changes needed in PeopleSoft to flag and retrieve the number of telework days that employees work.

BNL will continue to deploy greatly enhanced Unified Communications technologies in 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.

BNL will continue its efforts to convert the current EPD rideshare website to a Commuter Choice website. Several new intranet links to other BNL web locations (i.e., Staff Services Transportation, HR Careers, BNL Users Group, and others) will be established to make the Commuter Choice website visible and accessible to more individuals.

To affect reductions in rental car GHGs, efforts will be made to amend the standard allowable rental in BNL's Domestic Travel and Foreign Travel standard procedures from a mid-size to a compact vehicle.

Goal 2: Sustainable Buildings

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 251,094 Btu/gsf, based on CEDR FY 2014 data. This level represents a cumulative reduction of 22.4% 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.

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 3.3a of the *CEDR FY 2014* includes projects that, if implemented, are estimated to reduce energy intensity that will meet or exceed the 30% goal.

BNL/DOE is nearly 50% complete with a UESC that was awarded on October 22, 2013. This first Task Order (Phase I) 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.

Plans and Projected Performance

Phase I implementation of the UESC was approximately 50% complete as of October 31, 2014. When complete, it is estimated to result in a nearly 11% reduction in energy intensity. At least one additional Task Order is anticipated to be awarded in the near future to obtain even greater reductions. Further UESC Phases and other planned initiatives include providing free cooling, building automations systems and retro-commissioning, improving the steam system, and potentially combined heat and power (CHP) and/or biomass.

BNL had direct appropriations for energy conservation efforts of over $2.6 million in 2014 and expects to spend approximately $2.5 million/year in 2015 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 various initiatives, such as aggressive building temperature setback, in an effort to meet the goal of reducing energy use intensity by 30% in FY 2015 and beyond. BNL has identified the following projects to further reduce energy intensity.

HVAC Setback

A setback capability for heating, ventilation, and air-conditioning systems (HVAC) continues to be installed throughout the BNL campus. The Facility Complex Managers and their staff regularly 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.

The HVAC setback initiative will be emphasized extensively during FY 2015 as part of BNL's educational effort for the facility managers. This is part of a larger site-wide effort to encourage active employee participation in various conservation efforts.

Steam Charge-back

A steam cost charge-back program is planned for implementation in the near future 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. A steam charge-back program was recently piloted; it is planned 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. This effort is actively monitored to ensure compliance on an annual basis.

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 $50,000/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. All building survey information is entered in the EPA Energy Star Portfolio Manager database, making benchmarking of the facilities easier and more robust.

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) (2014 Target: 95% and 75%, respectively)

Performance Status

The status of individual building metering is as follows:

- Electric: +100%
- Natural Gas: 100%
- Steam: 89.7%
- Chilled Water: 100%.

In FY14, BNL continued its successful history in advanced metering and currently meets the goal for electricity, natural gas, and chilled water. Advanced electric meters are installed in 294 buildings, advanced chilled water meters are installed in 39 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 32 buildings. However, 38 buildings still have conventional steam meters that will be upgraded 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.

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 Interdisciplinary Science Building I (ISB-I) was commissioned and included advanced potable water metering.

Electric

Seventeen (17) Ethernet-based Power Quality meters were installed throughout the Laboratory.

Steam

- Five (5) steam meters were upgraded to the advanced metering platform
- 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

- A new chilled water meter for the Building 515 data center non-computer load has been installed and is operating

- Chilled water metering in the new National Synchrotron Light Source II (NSLS-II) includes segregated metering for the ring/process loads and the Laboratory-Office Building (LOB) cooling loads.

Plans and Projected Performance

Additional meters will be installed as opportunities become available. Electric and steam often require extensive coordination and shutdown of operations. BNL strives to install at least five (5) electric meters and three (3) steam/condensate meters annually.

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

The BNL Modernization Project Office (MPO) designs all new roofs to meet the cool roof requirements. When roofs are repaired or replaced, MPO performs an analysis to determine if cool roof requirements can be met. If they cannot, the analysis is documented and placed into the project file.

Plans and Projected Performance

Roof repairs and replacements will be performed on Buildings 725, 624, and 510. Meeting the cool roof requirements will be addressed during the design phase.

2.5 HIGH PERFORMANCE SUSTAINABLE BUILDINGS (HPSB) – EXISTING BUILDINGS

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

Performance Status

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). At the end of FY14, BNL has achieved 85% HPSB compliance for the 10 buildings that will not achieve LEED certification. Tasks completed in FY14 include HPSB upgrades at Building 599, re-evaluation of Building 98 for HPSB compliance, and the commencement of roof replacement at Building 438.

FIMS Sustainability fields are updated as needed and at least annually. The DOE validates accuracy each year as part of the annual FIMS audit. BNL will evaluate the new expanded definition of “not applicable” to identify any assets that meet the new criteria and include them as part of the FY15 updates.

BSA is in the process of completing all procedure, policy, and specification changes to comply with the HPSB Guiding Principles. All actions will be completed in FY15.

Plans and Projected Performance

In FY15, BSA will complete the remaining work to meet the 15% milestone. Activities include Building 860 RTU and duct replacement, Building 98 miscellaneous tasks, remaining retro-commissioning, and finalization of procedure and policy changes.

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

MPO requires all new construction and major renovations to meet the HPSB requirements. Design specifications are being updated to remove LEED requirements for these activities and replace them with the HPSB requirements.

Plans and Projected Performance

In FY15, HPSB requirements will be included in the conceptual design for the Building 725 renovation.

2.7 REGIONAL AND LOCAL PLANNING

Performance Status

Efforts to increase regional and local planning coordination and involvement

Regional Transportation Planning

In FY 2014, the Laboratory continued to investigate public transportation and increased carpool ridership. 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.

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 and Stony Brook University.

Renewable Energy 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 the Long Island Power Authority (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. In FY 2014, the LISF provided 52 million kWh/yr of clean renewable energy to Long Island.

Additionally, the Laboratory is developing a new Northeast Solar Energy Research Center (NSERC) on its campus that will serve as a solar energy research and test facility for the solar industry. The mission of the NSERC is to support the expansion of solar power in the northeast by providing high-quality data, field-testing, analyses, and solar energy expertise to address technical, economic, environmental, and policy issues facing solar power deployment in northeastern climates.

Construction of the planned first phase (518kW) was completed in April 2014 and commissioning was completed in May. The array is currently supplying power to the BNL 13.8kV distribution system. Funding has been identified for Phase II that will deliver an additional 230kW.

National Environmental Protection Act (NEPA)

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

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 has 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.

On March 24, 2014, the Assistant Laboratory Director for F&O met with the Empire State Development Corporation's Chief Operating Officer and LI Regional Director to better familiarize them with Discovery Park, as well as discuss AEGIS and the Laboratory's energy strategy.

BNL also partners with many organizations to expand sustainability objectives outside of BNL's campus. Activities in 2014 included partnering with the Sierra Club and Suffolk County to promote Go Electric Week 2014, participation in Car Free Day Long Island, and the annual Long Island Earth Summit held during Earth Week. The Earth Day event included a presentation on the UESC, a tour of the NSERC, green vehicle and green office showcases, the opportunity for employees to sign up for rideshare and bicyclist commuter programs, and the launch of a new bicycle commuting and e-waste recycling programs.

In order to enhance the convenience and accessibility of commuting by bicycle, the pilot program allows bicyclist commuters to enter by the southeast corner of the site and expands the times that bicyclists can enter and leave through the North Gate. Additionally, the Laboratory's new E-waste Program collects and recycles personal electronic waste from employees on a quarterly basis.

The Open Space Stewardship Program (OSSP), which is sponsored by BNL's Office of Educational Programs and several other local organizations, fosters partnerships between schools and land stewards in their local communities. Students in grades K through 12 are involved in authentic environmental research on properties in their own communities, fostering a sense of ownership and responsibility for open space within their neighborhoods. In June 2014, students and teachers who participated in OSSP were invited to BNL for an OSSP evening celebration, at which students displayed and presented their work to teachers, parents, scientists and others in the environmental community.

Each year, the Laboratory opens its doors to the public to host Summer Sundays. More than 4,700 neighbors and guests attended Summer Sundays 2014, which featured a variety of "Science Talks" to 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.

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. Additionally, BNL will continue to host conferences and attend meetings to promote the Laboratory's renewable energy strategies on an ongoing basis.

Transportation

In FY 2015, 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.

Environmental Resource Management

BNL continues to support natural resource improvements through implementation of the Natural Resource Management Plan. In FY 2015, 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.

Goal 3: Fleet Management

3.1 ALTERNATIVE FUEL CONSUMPTION

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

Performance Status

BNL currently has alternative fuel infrastructure with on-site facilities for E-85, CNG, and biodiesel, 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. Low-speed electric vehicles are also used on-site; however, electric charging stations are not metered.

Based on FAST data, FY14 alternative fuel consumption was 51,449 gge, compared to 43,564 gge in FY13. This represents an 18% increase in consumption of alternative fuel during FY14.

Plans and Projected Performance

BNL plans to convert to GSA leasing, which will replace older gasoline vehicles with alternative fuel vehicles (AFVs).

3.2 REDUCTION IN PETROLEUM CONSUMPTION

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

Performance Status

Petroleum consumption at the 2005 baseline was 125,964 gallons. Based on FAST data, petroleum consumption at the end of FY14 totaled 61,110 gge, which is a 51.5% reduction against the baseline.

The Laboratory fleet contains 255 vehicles, including a variety of work vehicles (cargo vans, pickups, medium and heavy trucks, and fire equipment), all of which are owned by the Laboratory. Within the fleet, 149 vehicles are AFVs. The average age of a vehicle is 8.6 years and typically, 20 vehicles are replaced each year.

The reduction of gasoline consumption is achieved through the Laboratory's alternative fuel program. Vehicles are replaced in consultation with users, maintenance staff and others to ensure that the most energy efficient vehicle that fulfills the vehicle’s mission is obtained. Vehicle utilization is reviewed periodically using mileage sheets from vehicle users as well as fueling and maintenance information.

Laboratory policies regarding vehicle procurement and use are documented in the SBMS Government Vehicles Subject Area. The anti-idling policy is also documented in the SBMS Government Vehicles Subject Area, stating, “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.

In an effort to reduce the amount of vehicle miles traveled, the BNL Shuttle Service provides transportation among on-site buildings. Additionally, the Shopping Shuttle reduces trips by individuals on- and off-site by providing group transportation to local shopping centers.

Plans and Projected Performance

BNL will continue to reduce petroleum consumption through the Laboratory's alternative fuel program, in which older vehicles are replaced with most fuel-efficient vehicle that can perform the vehicle's mission.

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). The Staff Services Division Manager makes requests to the DOE for such acquisitions. 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 vehicles purchased by BNL have been AFVs when possible.

The Laboratory uses biodiesel fuel in utility vehicles and newer diesel vehicles that are rated for biodiesel. Alternative fueling facilities are available on-site for biodiesel, as well as E-85 and CNG.

Plans and Projected Performance

In FY15, BNL plans to continue purchasing 100% AFVs.

Goal 4: Water Use Efficiency and Management

4.1 POTABLE WATER INTENSITY

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

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

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

Performance Status

BNL has a long history of reducing water consumption even though water on Long Island is plentiful and inexpensive. BNL recently implemented groundwater recharge of treated wastewater at its Sewage Treatment Plant. Currently, about 80% of water used is recharged to groundwater via groundwater recharge basins. The water recharged is near 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 the Laboratory's 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 a 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 58% since 1999, and 12% since 2007. Total water consumption was up about 3% in FY14 due to increased programmatic activities at BNL, particularly the start of machine operations at the NSLS-II. It is estimated that when fully operational, NSLS-II will raise BNL's annual water usage by over 12%.

Presently, the Laboratory is 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 is currently less than $0.50 per thousand gallons. Most water conservation measures are capital- and labor-intensive, however, evaluation of the return on investment of additional BMPs is ongoing. These BMPs have the potential to lower water consumption by more than 40 million gal/yr. The ability to implement these capital-intensive measures depends upon obtaining additional benefits (such as replacing obsolete equipment, extending equipment end-of-life, reducing 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).

Finally, it is important to emphasize that over 80% of BNL's water consumption is returned and recharged to groundwater at potable water quality. We believe that 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 recently completed 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 eliminates a potential source of trace metals contamination to the Peconic River and improves 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 gallons recharged locally versus off-site flow via the Peconic River.

The Sewage Treatment Plant Modification contract was awarded and fieldwork commenced in the fourth quarter of FY13. The contractor completed the Sewage Treatment Plant Modification in September 2014. Treated effluent from the plant is currently being recharged and recycled to the groundwater.

Sewage Treatment Plant

BNL has managed an effective water reduction and conservation program for more than 20 years, illustrated in Figure 4 by the trend in annual potable water usage (includes process water).

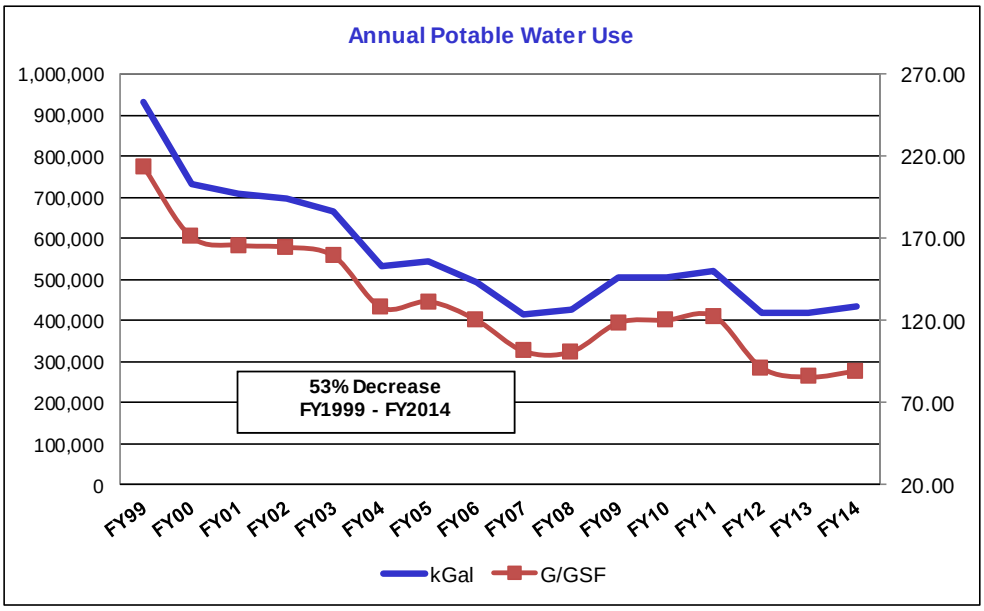


Figure 4. Annual Potable Water Use (1999-2014)

Potable water usage fell from almost 930 million gallons/year in FY 1999 (average of 2.55 million gallons per day) to about 434 million gallons/year in FY 2014 (average of 1.19 million gallons per day), a reduction of 53%. 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 89 gallons per square foot, an 11.9% water usage reduction since the base year of 2007.

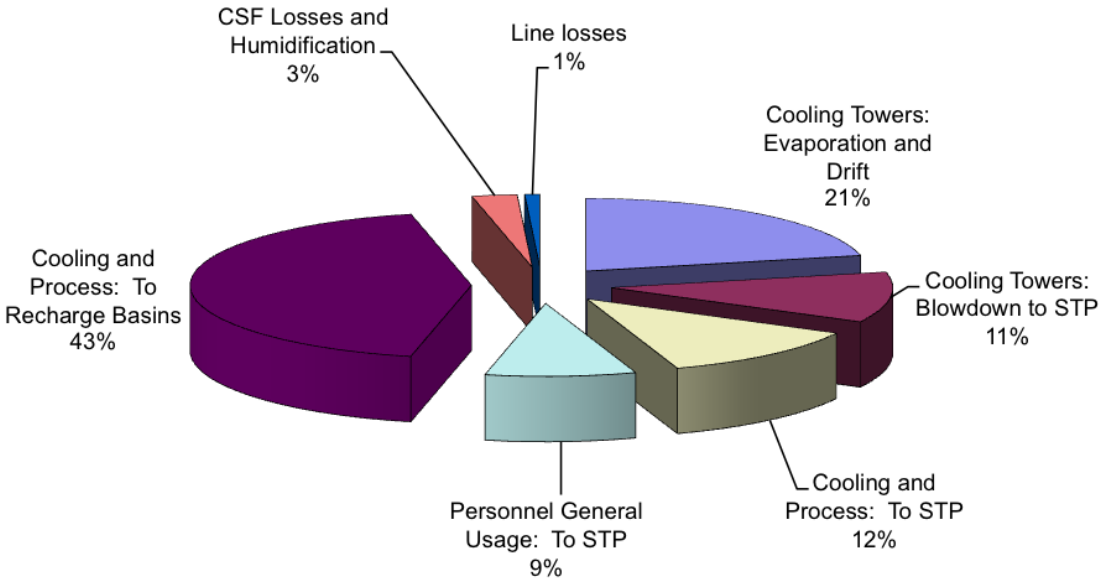


Figure 5. Annual Potable Water Utilization

Figure 5 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, returns to the groundwater.

The following paragraphs summarize BNL's past and present (ongoing) efforts in water conservation (best management practices); 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 employee's 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, WaterSense 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% to 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 a 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 80% 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) is currently 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."

Plans and Projected Performance

BNL's Water Management Plan will continue to be implemented. New construction and renovations will utilize water-efficient processes and plumbing fixtures to conserve water. However, it is expected that increased science program activities and their need for accelerator cooling will tend to increase water consumption due to cooling tower evaporation. This is not as significant an issue at BNL as it is at DOE facilities located in arid locales. Groundwater recharge from annual precipitation (almost all storm water is recharged on-site) is significantly greater than BNL's water usage that is "lost" due to evaporation in cooling towers.

Goal 5: Pollution Prevention and Waste Reduction

5.1 NON-HAZARDOUS SOLID WASTE

5.2 CONSTRUCTION AND DEMOLITION DEBRIS

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

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 2013 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 13 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 FY14, the recycling rate was approximately 66%. The Laboratory is very close to achieving 60% recycling as its own baseline standard.

During this past year, BNL's glycol recycling facility reprocessed/recycled over 800 gal of used glycol and has produced product with a value of $5.3K.

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 involves the transferring of food prep waste from the on-site Cafeteria that is deposited into an inlet of the Sewage Treatment Plant. This serves to supplement the existing food levels to achieve maximum efficiency of the system's biological processes. During 2014, animal-bedding composting has scaled back considerably, as this type of research is winding down at BNL and is expected to significantly decrease

over the next few years. In addition, the Lab operates a “stump-dump,” which receives and composts on-site leaves, tree debris, and stumps. The compost that is generated is reused on-site as needed.

The Laboratory recycles 95% of construction, demolition, and woody debris. Construction materials (e.g., wood, shingles, metals, etc.) are transported to a Construction & Demolition (C&D) transfer station, where they are sorted and recycled by the vendor. Concrete and stone/brick demolition debris are stored on-site and then converted to Recycled Concrete Aggregate (RCA) using 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. Reusing C&D materials helps to save the environment and represents the essence of sustainability. This reuse process aided four Laboratory user buildings (ISB, CFN, NSLS-II, and RSB) in achieving LEED certification.

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. During 2014, BNL focused on increasing recycling awareness at the employee level. The recycling booth in the cafeteria was modified to direct users on how to recycle properly. Posters were installed above each of the disposal slots, indicating what was acceptable. As an added visual aid, the disposal slot for bottles and cans was cut into the shape of a large bottle.

On-site Cafeteria Recycling Booth

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 barcode printer and scanner to help a department to develop a labeling system for management of their samples, intermediates, and wastes. Development and implementation of this system will begin during the 2015 calendar year.

One development from last year is that, through the Procurement and Property Management (PPM) and Staff Services Divisions, the Lab contracted with CulinArt to operate the 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 on request used coffee grinds and produce scraps from the kitchen to customers to use as compost and fertilizer. Food prep waste is separated from other trash and held for pickup by members of the Sewer Treatment Plant who transport it to the plant for sewage enrichment to increase the overall efficiency of the plant that uses bacteria to treat the sewage.

- Utilizing Recycling Containers: CulinArt complies with BNL contractual requirements and with all local and municipal codes. CulinArt participates in the existing BNL Recycling Program by separating recyclable plastics, metals, cardboard, and mixed papers. BNL uses recycling vendors who facilitate recycling, and BNL properly segregates recyclables in separate containers. Members of the EPD conduct impromptu inspections of recyclable containers and interface with the recycling vendors when non-recyclables are found inside recyclable containers. The integral piece to a successful recycling program weighs heavily on a strong environmental program and reliable recycling vendors.

- Recycling Waste Oil and Grease: CulinArt's uses BNL's local, oil-grease recycling vendor who provides fryer oil recycling services.

- Bio-Based Products: CulinArt uses environmentally friendly disposable products where possible. In addition to cups, plates, bowls, and utensils that are designated as USDA "bio-based" (containers containing >72%/Cutlery, >48%/dishware, >72% bio-based materials – sugar cane). CulinArt has worked with BNL to eliminate Styrofoam takeout trays on service lines and have replaced them with eco-friendly to-go bags to reduce waste and encourage customer involvement in recycling. Additionally, CulinArt is required to use trash bags made from recyclable materials, and they utilize food vendors that are located locally (within 100 miles). As per the existing BNL-CulinArt cafeteria contract, CulinArt will use the above bio-based materials

and will work with BNL to advance the use of Environmentally Preferable Purchasing (EPP) 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 the Information Technology Division (ITD) does not have control over these peripherals. However, printing in duplex mode is strongly encouraged across the Laboratory.

During 2014, the Conference Services group rolled out its guidelines on "Conducting Eco-Friendly Meetings and Conferences." When the group is contacted to schedule conference rooms, the requester is sent a copy of the following guidelines with their packet of information:

- **Meeting Introductions** - During meeting introductions, while indicating the emergency exits, emergency shelter in place, and location of the restrooms, also share the locations of all recycling bins.
- **Use Paperless Technology** - To minimize printing, encourage use of USB thumb drives, laptop computers, and tablet devices for document transfer and review.
- **Close the Recycling Loop** - Publishing materials on recycled paper along with holding a duplex only policy for the Conference Services copy machine will reduce costs and waste. All ink should be soy based.
- **Practice the 3 R's** - Accessible **R**eduction, **R**euse, and **R**ecycling of paper, metal, plastic, and glass. In addition to the everyday 3-R tasks, implement a Badge Cover Recycle Program by offering a bin for disposable plastic badge covers at the end of your meeting. This will remind visitors that they can dispose of their badges in an eco-friendly way.
- **Limit CFCs** - Recommend that BNL attendees bring their own travel mugs, thereby minimizing the use of polystyrene cups.
- **Save Energy** - Coordinate with Staff Services to ensure that lights and air conditioning will be turned off when the rooms are not in use.
- **Spread the Word** - Share this information with others. Talking about the program's success is good role modeling and an incentive to others to "keep up the good work."

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 previously noted 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 FY 2014, the Laboratory focused on educating employees regarding BNL's recycling and reuse programs. During BNL's Earth Day, a mock employee office was set up in Berkner Hall using a Greenguard certified office desk, office items containing significant recycled content, Energy Star electronics, used electronic equipment from the warehouse, and recycling containers for metal, plastics, mixed paper, and cardboard.

In addition, the following computer-based training (CBT) programs that were updated during 2013 by the EPD to include stronger recycling and environmental sustainability messages were submitted and rolled out by the Training Division:

- 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.

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. During 2014, the Cornell Cooperative Extension Program gave a lunchtime presentation on the "Identification and Concerns of Ticks and Mosquitoes on Long Island." Members of the F&O Site Resources Division that apply pesticides are licensed through the NYS Department of Environmental Conservation (NYSDEC) and except for one herbicide (Round-Up), they purchase regulated materials that do not contain glycophosphates. In fact, a non-restricted pesticide that is less toxic than most materials and contains cedar oil is being applied for tick control in areas allowed by the NYSDEC regulations.

Plans and Projected Performance

During FY 2015, BNL will continue to focus on educating employees on the Laboratory's recycling programs. Continuing with past tradition, the P2 Program will solicit ideas for partial or full funding of projects that minimize waste or help prevent pollution and encourage the purchase of EPP items.

Goal 6: Sustainable Acquisition

6.1 PROCUREMENTS

Procurements meet requirements by including necessary provisions and clauses in 95% of applicable contracts

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 are currently in place for items under Sustainable Acquisition, including carpets, custodial cleaners, re-refined motor oil, and office furniture. As in FY13, BNL was able to report that all contract actions for construction and custodial products and services met Sustainable Acquisition requirements in FY14.

The following categories were reported to meet the technical requirements for the FY14 priority product section in the CEDR (NOTE: this work has not been completed for this past fiscal year):

- 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 FY14 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 FY14, 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.

During 2014, BNL began to revamp the E-Procurement (E-Pro) system, which is used by Laboratory personnel to order office supplies, computers, laboratory supplies, and materials for the trades. The E-Pro system combines multiple vendors for ease of ordering these supplies. Previously, in the category of office supplies, the E-Pro system did not differentiate between items with high to little recycling contents. The user may have had 10 choices of notebooks, but was not able to make an informed decision with respect to recycled content. Subsequently, a column was added to stipulate if the product had recycled content. Upon review of the data, it was noted that the top five office supplies ordered by BNL's administrative staff included: composition notebooks, binders, file folders, index cards, and toner cartridges. BNL had the vendor (Veterans Imaging Products) only offer the products with the highest recycled content for the first four items.

With toner cartridges, BNL took a different approach. BNL reviewed the documented history of remanufactured toner cartridges (remans) and decided on the following:

- No foreign remans or local "drill and fill"
- Color cartridges will remain OEM (original equipment manufacture), due to the complexity and cost of the machines
- Black toner remans will be obtained from one of the following manufactures: Clover Technologies, LMI, or Katun
- OEMs will be offered if cheaper or if remans are not available. In addition to the recycling/reuse associated with remans, there was also an average cost savings of 27 percent.

These changes were instituted during 2014 and will be tracked during 2015 with respect to cost savings and performance.

Another modification that was made during 2014 with BNL's office supply vendor was the generation of an end of year report that highlights environmental savings in terms of factors with which employees can relate. A copy of this annual report summary is shown in the table below.

Table 6. Environmental Savings Report Summary

Total Volume	101,472.69	(lbs)
Total Post-Consumer Recycled Content	29,479.18	(lbs)
Average Post-Consumer Recycled Content	29.05	(%)
Greenhouse gas emissions reduced (CO2) equivalents	32,736.63	(lbs)
Equivalent number of average US cars not driven per year	3.17	(cars)
Water saved	150,270.14	(gallons)
Trees saved	250.57	(trees)
Wood Resources saved	102,292.77	(lbs)
Total energy (BTUs) saved	250,573,065.24	(BTUs)
Energy equivalent to oil saved	1,789.81	(gallons)
Equivalent number of average US Homes heated per year	6.48	(homes)
Energy equivalent to electricity saved	71,347.68	(Kwh)
Equivalent number of average US homes powered per year	6.29	(homes)

The work above was cited as the main reason for BNL being awarded the EPA's National Federal Green Challenge Award for Procurement during the 2014 year.

Plans and Projected Performance

The following actions are planned for FY15 and beyond:

- Develop awareness training regarding green products for Material Coordinators, who are matrixed from PPM to the Integrated Facility Management (IFM) complexes
- 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
- Continue upgrades and modifications to the Laboratory's E-Pro system to increase green purchasing.

Goal 7: Electronic Stewardship and Data Centers

7.1 DATA CENTERS

All data centers are metered to measure monthly PUE of 100% by FY 2015

Additional electric meters and one new chilled water meter were installed in FY14 to better assess data center energy usage.

Significant effort was undertaken in FY14 to identify and install additional metering so that a more accurate Power Usage Effectiveness (PUE) for each data center may be measured and monitored. However, it is apparent that additional effort is necessary due to identification of various non-IT loads in the main BNL data center. Given a potential project to relocate and consolidate BNL data, additional efforts in this area may be deferred until a final decision is made.

7.2 POWER USAGE EFFECTIVENESS (PUE)

Performance Status

Core data centers maximum annual weighted average PUE of 1.4 by FY 2015

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.

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.

The initial PUE study indicated the current combined PUE to be above 1.6. Significant effort was undertaken in FY14 to identify and install additional metering so that a more accurate PUE for each data center may be measured and monitored. BNL then conducted a detailed evaluation of the main data center and calculated the PUE at 1.79, as well as the small data center in Building 459, which had a PUE of 2.1. One of the results of this evaluation is the determination that additional analysis is required.

Plans and Projected Performance

BNL will continue all current electronic stewardship practices implemented to date. A potential project to relocate and consolidate BNL data centers provides an opportunity to improve data center performance and metering. If this project is undertaken, continued evaluation the Building 515 data center will be stopped.

7.3 POWER MANAGEMENT

100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY 2012

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 the Laboratory's Macs fall into this category. Macs are a small percentage of BNL's systems and are not centrally managed to enforce power management.

Plans and Projected Performance

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

7.4 ELECTRONIC STEWARDSHIP

95% of eligible electronics acquisitions meet EPEAT standards

Performance Status

The contract governing the procurement of printers, laptops, and desktop computers ordered through the BNL E-Pro system requires that they have an EPEAT "Gold" certification. Servers procured for administrative computing are primarily blade architecture, which are approximately 25% more energy efficient than conventional servers. Efficiency is further increased through extensive use of server virtualization software, which allows multiple servers to run on a single piece of hardware (a single blade can typically handle 5 to 10 virtual instances). The implementation of this technology has allowed the Laboratory to shed over 100kw of power from its data centers.

The deployed scientific servers are more purpose-built to fit the program's needs so efficiency varies greatly. They do, however, seriously consider electrical usage during their design and procurement due to the limitations on available power and cooling.

Plans and Projected Performance

The Laboratory will continue to require that all printers, laptops, and desktop computers ordered through the E-Pro System have an EPEAT "Gold" certification.

Goal 8: Renewable Energy

8.1 ELECTRICITY CONSUMPTION FROM RENEWABLE SOURCES

20% of annual electricity consumption from renewable source by FY 2020

Performance Status

BNL purchased 40 million kWh of RECs for FY 2014. This equals about 8.1% 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, BNL will continue to purchase RECs as appropriate.

As indicated in previous Site Sustainability Plan submission, 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 FY14, it provided 52 million kWh/yr of clean renewable energy to Long Island.

LISF close up and aerial view

BNL completed a detailed CHP study in August 2013, a comprehensive Wind Study in June 2013, and initiated a follow-up CHP study in FY14 to better evaluate the financial viability of CHP at the Laboratory.

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), which is a partnering project with funding from NYSERDA, the Federal Energy Management Program (FEMP), and BNL
- The NSERC became operational in May 2014 and is estimated to produce approximately 700,000 kWh of solar PV generation per year.

Although BNL has championed several renewable energy projects, they have yet to be economically favorable.

Northeast Solar Energy Research Center (NSERC)

Plans and Projected Performance

As indicated above, the NSERC facility became operational in May 2014. It is currently providing approximately 500 kW of peak generation, which is expected to be increased to 700 kW in FY 2015. Further plans will increase the capacity to 1 MW, which will produce an estimated +1,000,000 kWh/year of renewable energy. 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.

In FY 2014, an additional study was initiated to further evaluate the financial viability of an on-site CHP project, specifically under the UESC model. The results are expected in the second quarter of FY 2015.

BNL continues to expand 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.

Goal 9: Climate Change Resilience

9.1 CLIMATE CHANGE RESILIENCE

Address DOE Climate Change Adaptation Plan goals

Objective 1: DOE Climate Change Adaptation Screening Assessment

BNL completed the DOE Climate Change Adaptation Screening Assessment on December 1, 2014.

Objective 2: Determining Risk

While the link between the frequency and intensity of hurricanes and extreme weather events, such as Superstorm Sandy and snowstorm Nemo, are still debated, these types of storm events have proven to have a significant impact on the Laboratory. While the site itself is on one of highest topographic features of Long Island, many of the staff live in areas that were impacted significantly by flooding, interruption of power, and inaccessibility of roads as a result of debris or excessive snow. Storms like Sandy also lead to power interruptions away from the flood zones, impact delivery of fuel and supplies, and negatively impact staff to travel to the site. With all major airports (JFK and LaGuardia) located in flood zones, travel to and from the Laboratory by staff or guests can be delayed or impossible during major storms leading to a storm surge. Some climate models predict an increase in frequency and intensity of extreme weather events; hence, it is likely that interruptions as a result of extreme weather events will be more common in the future.

The Atmospheric Science program in the Department of Biological, Environmental and Climate Sciences (BECS) at BNL has initiated several collaborative efforts with academic institutions and the National Oceanic and Atmospheric Administration (NOAA) to position it for a leadership role in the development of a regional climate model that will allow for an improved capability to predict frequency and intensity of extreme events.

Researchers from the Atmospheric Science program in BECS and from Sustainable Energy Technologies have prepared news articles to inform BNL personnel of the climate vulnerabilities of the electricity distribution infrastructure. These materials are disseminated through the BNL website. In addition, climate-related news items are regularly featured on the BNL website to raise awareness.

Objective 3: Current Activities

BNL has already dealt with a number of extreme weather events over the last few decades. There are emergency response programs in place that have been tested during real storms. Aspects of climate change that are not related to extreme weather events, such as the possibility of increased frequency and intensity of heat waves, have not been considered in long-range planning. However, the output from various climate models remains too uncertain to provide a clear indication that heat waves will be more frequent and intense. Hence, planning for this type of impact of climate change on local energy use and working conditions has not been the focus of efforts at BNL.

Objective 4: Future Activities

BNL remains committed to increase coordination and interaction with the various levels of government in the region. The desired outcome is better coordination and interaction in the event of an extreme weather event that impacts the region.

The Laboratory has started to work with several utility companies on ways to use real time radar data to forecast possible damage to their electricity distribution systems. This effort, funded by New York State, is a demonstration project that could lead to strategies that can be adopted by other companies in the region. With possibly more severe extreme events as part of a changing climate, this effort can limit the duration of outages. The Atmospheric Sciences program within BECS has been leading this two-year effort.

BNL maintains an on-site meteorological measurement station. This station provides real time data and historical data. The data collection will continue in FY15 and is the responsibility of a senior professional in BECS. The annual data report will be posted on a dedicated BNL website and is an open access resource. Local meteorological instrumentation is also used to determine the solar irradiation in real time and compare this data to the performance of the on-site LISF. This information is important to develop strategies to forecast the performance of solar arrays in the northeast. Several companies are now interested in working with BNL on this.

BNL scientists, led by the Associate Laboratory Director (ALD) for the Environment, Biology, Nuclear Science, and Nonproliferation (EBNN) Directorate, are forming a working group to position BNL for a leadership role in the study of the interaction of urban environments and the atmosphere. One of the key questions is the effect of climate change on temperatures in cities, which are generally higher than in the surrounding areas (so called Urban Heat Island). Power consumption for cooling in cities during heat waves leads to peak loads, which may strain the region's power generation capacity. The Laboratory is also currently finishing a study of the effect of the urban landscape on storms that enter the region. This study, led by Wei Wu in collaboration with City College of NY and the Upton National Weather Service, indicates that the presence of NYC influences precipitation patterns and wind fields in the nearby region. A manuscript reporting this study should be submitted for publication in FY15.

Objective 5: Real Property and Supply Chain Resilience

During FY13/14, an assessment of the Storm Drainage System using hydraulic modeling was made to areas that had become increasingly prone to flooding. Recommendations were made based on two 6-hour event scenarios—a 50-year storm and 100-year storm. Corrective actions were identified in several areas and will be implemented using a phased approach over the next several years.

Objective 6: Regional and Local Coordination

Climate research conducted by BNL scientists is regularly featured on the BNL website to inform the general audience.

BNL manages meteorological instrumentation on-site, and shares real time and historical data. The BNL staff member responsible for the meteorological measurement services on-site has been approached by New York Police Department (NYPD) to set up several meteorological stations in NYC. Although the

stations are designed to provide decision support in the event of a dirty bomb, the sites are going to provide more detailed weather information than previously available.

BNL scientists have started to coordinate with academic institutions, as well as NOAA scientists, to study the interaction of the urban environment and climate. BNL also has strong interactions with the Stony Brook University Storm Surge program, which provides surge forecasts for the region.

Objective 7: Removing and Reforming Barriers

The Laboratory has not identified policies or programs that unintentionally discourage or disallow investments by external partners or contract recipients that would improve preparedness for climate impacts.

Objective 8: Organizing Resources to Address Climate Change

There has been some discussion about addressing climate change in the group that is responsible for the Site Sustainability Program, but there has not been a concerted effort to specifically address the impact of climate change on-site.

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

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

Goal 10: Energy Performance Contracts

10.1 ENERGY PERFORMANCE CONTRACTS

Utilization of Energy Performance Contracts

Performance Status

The UESC was awarded on October 22, 2013. Phase I implementation of the UESC was approximately 50% complete as of October 31, 2014.

The $12.2 million UESC includes upgrading lighting systems in 17 buildings, replacing and enhancing energy management controls in nine buildings, and installing a new high-efficiency 1,250-ton water chiller and related components at the Laboratory's Central Chilled Water Facility. The improvements are expected to reduce the Laboratory's annual energy intensity by approximately 11% compared to baseline measurements, and reduce GHG emissions by over 7,000 MtCO2e per year.

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.

New Chiller at the Central Chilled Water Facility

UESC Improvements to Lighting and Building Controls

Plans and Projected Performance

Preliminary audits are underway for potential Phase II projects. Planned initiatives include providing free cooling, improving the steam system, and CHP.

III. FLEET MANAGEMENT

BNL Fleet Management organization consists of the BSA Fleet Manager (Staff Services Manager), BNL Fleet Manager, Assistant Fleet Manager, Motor Vehicle Maintenance Supervisor, Automotive Mechanics (5) and Administrative personnel.

BNL's fleet consists of 255 vehicles. All vehicles are owned. One hundred forty-nine (149) vehicles are alternative fueled vehicles. Vehicles average age is 8.6 years and typically 20 vehicles are replaced each year. Vehicles are replaced in consultation with users, maintenance staff, and others to ensure that the most energy efficient vehicle that fulfills the vehicle's mission is obtained. Vehicle utilization is reviewed periodically using mileage sheets from vehicle users as well as fueling and maintenance information.

Replacement vehicles are selected with input from the user group to ensure the vehicle will accomplish the group's mission and vehicle maintenance personnel. The most energy efficient vehicle that can perform the mission is selected. BHSO, DOE Chicago, and Headquarters approve purchases when required.

BNL has fueling infrastructure for biodiesel, CNG, and E-85. All replacement vehicles are AFV when available.

All employees driving government vehicles are properly licensed. When specialized vehicles are issued, the user group is given a briefing or training on the unique features of the equipment. The BNL site follows all NYS regulations. NYS limits idling to five minutes with exceptions for specific vehicles and conditions. Idle limiters are installed in some vehicles. Periodically, vehicle users are reminded to minimize vehicle idling whenever possible.

BNL provides guidance to employees and contractors regarding BNL site driving rules. Vehicle users with AFVs have fueling cards that limit them to alternative fuels.

In FY 2015, most of BNL's vehicles will transition to GSA leasing. GSA leasing will replace all gasoline vehicles with AFVs. In addition GSA's timely replacement will continue to improve fuel efficiency.

IV. FUNDING

Table 7. Summary of Sustainability Project Funding ($K)				
Category	**FY14 Actual**	**FY15 Planned**	**FY15 Projected**	**FY16 Projected**
Sustainability Projects	2,059	1,845	1,845	500
ESPC/UESC Contract Payments (if applicable)	-	1,805	1,805	1,462
Renewable Energy Credits (REC) Costs	53	73	134	172
Misc. Energy-related	510	600	600	650
UESC Support	-	99	99	101
Total	**2,623**	**4,422**	**4,483**	**2,885**

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

This section provides an overview of the 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.

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)

The new National Synchrotron Light Source II (NSLS-II) 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.”

NSLS-II achieved "first light" on October 23, 2014, when operators opened the shutter to begin commissioning the first experimental station (called a beamline), allowing powerful x-rays to travel to a phosphor detector and capture the facility's first photons. While considerable work remains to realize the full potential of the new facility, first light counts as an important step on the road to facility commissioning.

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.

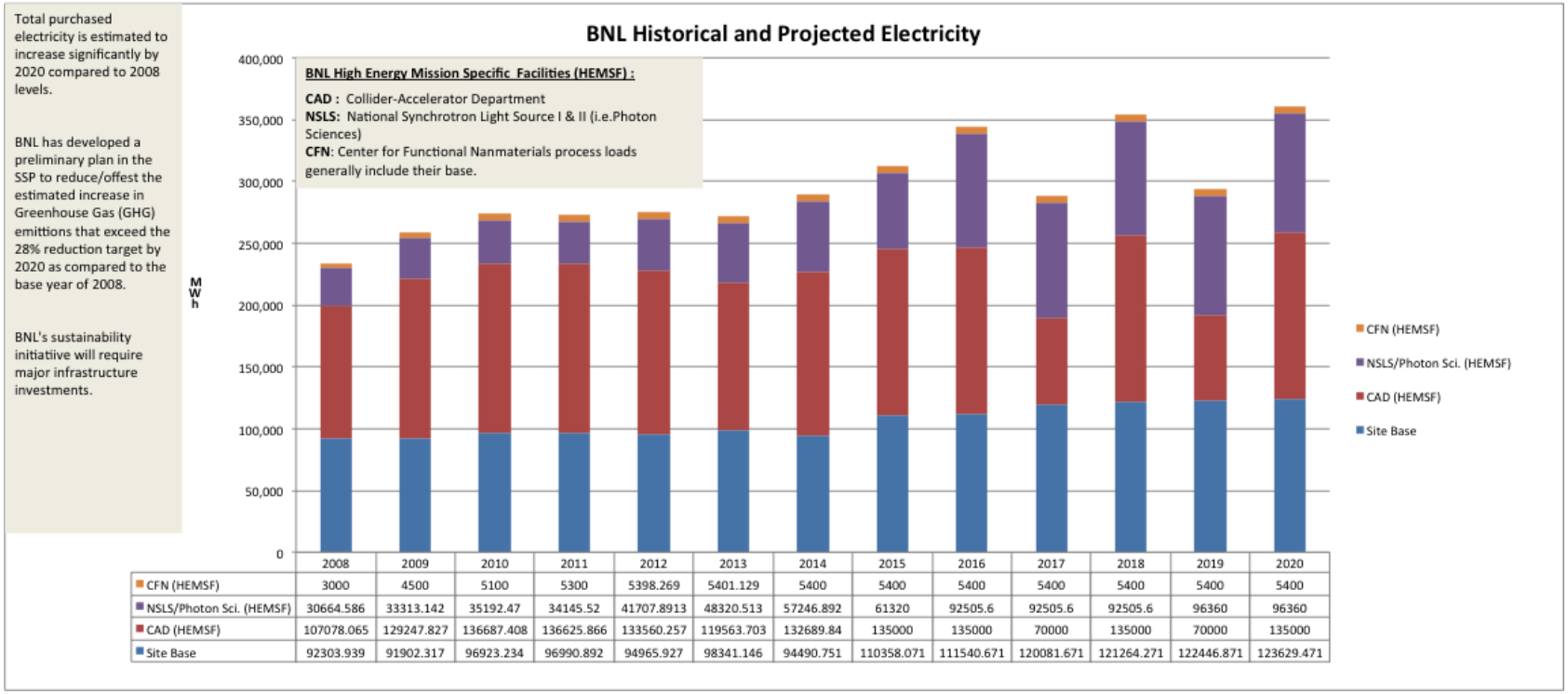
RHIC collides two beams of gold ions head-on when they're traveling at nearly the speed of light (what physicists call relativistic speeds). The beams travel in opposite directions around RHIC's 2.4-mile, two-lane "racetrack." At six points, the lanes cross, leading to an intersection. When ions collide 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)	3000	4500	5100	5300	5398.269	5401.129	5400	5400	5400	5400	5400	5400	5400
NSLS/Photon Sci. (HEMSF)	30664.586	33313.142	35192.47	34145.52	41707.8913	48320.513	57246.892	61320	92505.6	92505.6	92505.6	96360	96360
CAD (HEMSF)	107078.065	129247.827	136687.408	136625.866	133560.257	119563.703	132689.84	135000	135000	70000	135000	70000	135000
Site Base	92303.939	91902.317	96923.234	96990.892	94965.927	98341.146	94490.751	110358.071	111540.671	120081.671	121264.271	122446.871	123629.471

Figure 6. BNL Historical and Projected Electricity

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.

The RHIC facility will not be conducting scientific operations in FY17 and FY19 as they begin preparing for eRHIC.

APPENDIX A: 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 Facilities (GSF)
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.						
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.						
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.						

This report qualifies DOE Owned, DOE Leased, Contractor Leased, Contractor License and Permit buildings and trailers where the Excluded Facilities (GSF) is greater than zero.

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

Program Office SC

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
OS-1	134643	OER Pump & Treat Con (Off Site @ I.P.)	G - Metered intensive loads	Building	1,503	1,503
Building is metered separately - Energy usage is operational driven and not influenced by conventional building energy conservation measures.						
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.						
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.)						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
1101	124479	CAD Warehouse	G - Metered intensive loads	Building	4,592	4,592
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 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.						
0519	134535	Ground Water Pumping Station	G - Metered intensive loads	Building	277	277
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						

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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 Facilities (GSF)
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.						
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.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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.						
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.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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	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.						
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.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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.						
0346	124519	Laboratory Protection Storage	D - Essentially only lighting	Building	282	282
Building consumes essentially only lighting energy. Lighting can be no more efficient in a lifecycle cost effective manner						
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.						
0406	124480	Site Resources Storage 4	D - Essentially only lighting	Building	1,781	1,781
Building consumes essentially only lighting energy. Lighting can be no more efficient in a lifecycle cost effective manner						
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.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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	Electron Cooling Res.& Devel. Experiment	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.						
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.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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.						
0539	141343	WSB Ground Water Recovery Unit	G - Metered intensive loads	Building	120	120
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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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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.						
0389	124440	Environmental Monitoring Station P4	D - Essentially only lighting	Building	114	114
Building consumes essentially only lighting energy. Lighting can be no more efficient in a lifecycle cost effective manner						
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.						
TR868	138136	Storage	G - Metered intensive loads	Trailer	421	421
ENVIR. RESTORATION The trailer is used for environmental restoration program - DOE requirement for environmental retoration.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
0645	134492	Well Control House	G - Metered intensive loads	Building	64	64
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						
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.						
0521	134487	Solar Research Control Room	G - Metered intensive loads	Building	1,814	1,814
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						
0598	134436	Ground Water Treatment Plant	G - Metered intensive loads	Building	761	761
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						
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.						

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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.						
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.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
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.						
0670	141345	SR-90 Pilot Ground Water Treatment	G - Metered intensive loads	Building	1,507	1,507
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						
0516	141346	Ground Water Pumping Station	G - Metered intensive loads	Building	267	267
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						

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Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded Facilities (GSF)
0517	141347	Ground Water Treatment Facility	G - Metered intensive loads	Building	196	196
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						
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.						
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						

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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.						
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 Bldg	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.						

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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	Phenix Gas Mixing House	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.						
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.						
0486	132328	Site Resources Fabrication Shop Storage	D - Essentially only lighting	Building	304	304
Building consumes essentially only lighting energy. Lighting can be no more efficient in a lifecycle cost effective manner						
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.						

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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.						
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.						

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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.						
0412	124335	Site Resources Storage 5	D - Essentially only lighting	Building	2,031	2,031
Building consumes essentially only lighting energy. Lighting can be no more efficient in a lifecycle cost effective manner						
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.						
OS-4	143148	Airport Treatment System	G - Metered intensive loads	Building	1,912	1,912
Building is metered separately - Energy usage is operational driven and not influenced by conventional building energy conservation measures.						

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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 Facilities (GSF)
OS-2	143150	Industrial Park Treatment System East	G - Metered intensive loads	Building	572	572
Building is metered separately - Energy usage is operational driven and not influenced by conventional building energy conservation measures.						
OS-5	143151	North Street Treatment System 1	G - Metered intensive loads	Building	1,867	1,867
Building is metered separately - Energy usage is operational driven and not influenced by conventional building energy conservation measures.						
OS-6	143152	OU VI - (EDB) Plume Treatment System	G - Metered intensive loads	Building	704	704
Building is metered separately - Energy usage is operational driven and not influenced by conventional building energy conservation measures.						
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	Center for Accelerator Science & Educat.	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.						

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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 Facilities (GSF)
0130	124568	Energy Sciences & Technology Department	E - Skewed energy usage	Building	19,649	19,649
Downscaled, awaiting disposition						
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.						
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.						
0518	132159	Ground Water Treatment Facility	G - Metered intensive loads	Building	196	196
ENVIR. RESTORATION. Energy usage is driven by DOE requirements for environmental restoration which are significantly different from conventional building requirements.						
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.						

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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 Facilities (GSF)
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.						
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.						

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U.S. Department of Energy
Facilities Information Management System
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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 Facilities (GSF)
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.						
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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APPENDIX B: POLICY AND PROGRAM STATUS TABLE

The table below is intended to track policies and programs implemented at the site level.

SSPP Goal – Policy/Program	In Place (Y/N)	Last Update (MM/YY)	Additional Information
Goal 1: Greenhouse Gas Reduction			
Program: Sulfur hexafluoride (SF6) capture	Y	09/2014	To more accurately account for and effectively manage leaks of sulfur hexafluoride (SF_6) associated with gaseous dielectric used in its high voltage electric equipment, BNL finalized a High Energy Equipment Management Plan that the Energy & Utilities (EU) Division's Electric Distributions Group will follow in FY 2015.
Plan: Commuter reduction	Y	Ongoing	Commuter Choice / RideShare Program
Policy: Teleworking and/or alternative work schedule	Y	09/2014	Flexible Work Arrangements Subject Area
Goal 2: Sustainable Buildings			
Policy: Space management	Y	06/2014	Space Management Subject Area
Policy: Cool roof installation	Y	---	The BNL Modernization Project Office (MPO) designs all new roofs to meet the cool roof requirements. Requirements are documented in MPO's Standard specifications and in the Design Manual provided to A/E firms working for MPO.
Policy: Design new Federal buildings to achieve net-zero energy by FY 2030	N	11/2014	NSERC facility operational. Expect to meet net-zero criteria in 2015. There are no new Federal buildings currently planned, as detailed in BNL SC Lab Plan.
Program: Participation in critical local and regional efforts and initiatives **Plan:** Update agency/site policy and guidance (EIS's and EA's)	Y	11/2014	BNL has been participating since the 1980's.
Policy: Dispose and consolidate excess and underutilized property	Y	6/2014	BNL SC Lab Plan outlines planned efforts to consolidate staff and right-size the footprint. The results

SSPP Goal – Policy/Program	In Place (Y/N)	Last Update (MM/YY)	Additional Information
			of the evaluation of the building utilization are documented in FIMS.
Policy: Reduce need for new building and field office space	N	---	---
Policy: Conserve, rehabilitate, and reuse historic Federal properties	Y	05/2013	Cultural (Historical) Resource Management Plan
Policy: Incorporate sustainable practices into new/renew leases	N/A	N/A	BNL does not have any nor is planning any new leases at this time
Plan: Green buildings roadmap	N	---	---
Program: Sustainable landscape	N	---	---
Plan: Metering	Y	11/2014	Robust metering for all energy streams
Goal 3: Fleet Management			
Program: Fleet Optimization/Vehicle Allocation Methodology (VAM)	Y	06/2012	The Government Vehicle Subject Area addresses this topic. Vehicles are selected to best accomplish the user's mission with the most energy efficient vehicles.
Program: Sustainable transportation options	Y	05/2014	Commuter Choice / RideShare Program
Program: Vehicle sharing/pooling	Y	05/2014	Commuter Choice / RideShare Program
Goal 4: Water Use Efficiency and Management			
Policy: Storm water management	Y	01/2014	Storm water at BNL is managed by collecting runoff form paved surfaces, roofs, and other impermeable surfaces and directing it to recharge basins via underground piping and above-grade vegetated swales (2013 Site Environmental Report). In 2014, BNL performed a Storm Water Study.
Policy: Water reuse	Y	---	Over 80% of BNL's water consumption is recharged back to the ground.
Plan: Water	Y	---	BNL Water Management Plan
Goal 5: Pollution Prevention and Waste Reduction			
Program: Reduce and minimize hazardous chemicals and materials	Y	---	Protocols and contracts established by the Procurement and Property Management Division have led to a

SSPP Goal – Policy/Program	In Place (Y/N)	Last Update (MM/YY)	Additional Information
			streamlined, just-in-time method for ordering chemicals, which has minimized the Laboratory's footprint of on-site chemicals.
Policy: Integrated pest management and landscape management	Y	---	Integrated Pest Management Program
Policy: Increase use of acceptable alternative chemicals and processes	Y	---	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.
Policy: Report per Sections (301-313) of EPCRA of 1986	Y	---	BNL submits an annual EPCRA report
Policy: Duplex printing and paper containing at least 30% post- consumer fiber	Y	---	Approximately 99% of the Laboratory's paper has a minimum content of 30% post-consumer fiber. Duplex printing is at the discretion of departments; however, printing in duplex mode is strongly encouraged across the Laboratory.
Program: Composting	Y	---	BNL has two programs for diverting compostable materials—(1) animal bedding used by the Medical Department is mixed in with wood-composted debris to form mulch or soil conditioner, and (2) food prep waste from the on-site Cafeteria is deposited into an inlet of the Sewage Treatment Plant to supplement the existing food levels for the system's biological processes to achieve maximum efficiency.
Goal 6: Sustainable Acquisition			
Policy: Inclusion of FAR sustainability clause	Y	---	The requirements for Sustainable Acquisition are incorporated into all of BNL's Terms and Conditions issued by the PPM Division.
Policy: Inclusion of biobased products	Y	---	The requirements for bio-based products are incorporated into all of BNL's Terms and Conditions

SSPP Goal – Policy/Program	In Place (Y/N)	Last Update (MM/YY)	Additional Information
			issued by the PPM Division.
Policy: Inclusion of energy efficient products (e.g. Energy Star, FEMP-designated)	Y	---	When purchasing desktop or laptop computers, BNL selects 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.
Policy: Inclusion of recycled content products	Y	---	Approximately 99% of the paper purchased in FY14 had a minimum content of 30% post-consumer fiber, which meets the recycled content requirements of the EPA's Comprehensive Procurement Guidelines. In addition, Recycled Content Criteria have been added to the Lab's online purchasing program.
Policy: Inclusion of water efficient products (e.g. WaterSense) Policy: Inclusion of environmentally preferable products/services (excluding EPEAT)	Y	---	BNL specifies low-flow, WaterSense faucets and showerheads for new constructions, renovations, and maintenance.
Plan: Environmentally preferable purchasing	Y	---	Increasing Environmentally preferable purchasing is a major goal of the Property Management Divisions revamping of the online purchasing program
Goal 7: Electronic Stewardship and Data Centers			
Policy: Power management	Y	11/2014	All systems in the BNL domain that are capable of power management have the setting enabled.
Policy: Data center consolidation	Y	11/2014	Working towards additional consolidation.
Goal 8: Renewable Energy			
Policy: Prioritization of on-site renewable	Y	11/2014	NSERC facility operational.
Policy: Purchase renewable energy from sources on tribal land	N	---	---
Goal 9: Climate Change Resilience			
Plan: Update all appropriate plans to	N	---	---

SSPP Goal – Policy/Program	In Place (Y/N)	Last Update (MM/YY)	Additional Information
address climate change resiliency			
Program: Identify or establish and participate in regional climate	N	---	---
Goal 10: Energy Performance Contracts			
Policy: Utilize performance contracts	Y	11/2014	UESC Phase I nearly 50% complete
Other			
Program: Cost savings reinvestment	Y	11/2014	UESC to be paid for through energy savings

APPENDIX C: CONSOLIDATED ENERGY DATA REPORT (CEDR)

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

APPENDIX D: LIST OF ACRONYMS & ABBREVIATIONS

AEGIS	Advanced Electric Grid Innovation and Support
AFV	alternative fuel vehicle
ALD	Associate/Assistant Laboratory Director
BECS	Biological, Environmental and Climate Sciences
BHSO	Brookhaven Site Office
BMP	best management practice
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
Btu	British thermal unit
C&D	Construction & Demolition
CAFE	Corporate Average Fuel Economy
CBT	computer-based training
CEDR	Consolidated Energy Data Report
CFN	Center for Functional Nanomaterials
CHP	Combined Heat and Power
CNG	compressed natural gas
CURL	Consolidated Unfunded Requirements List
CVO	Contractor Vendor Orientation
D&D	Decontamination & Decommissioning
DOE	Department of Energy
EBNN	Environment, Biology, Nuclear Science, and Nonproliferation
EISA	Energy Independence and Security Act
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPD	Environmental Protection Division
EPEAT	Electronic Product Environmental Assessment Tool
EPP	Environmentally Preferable Purchasing
ESPC	Energy Savings Performance Contract
EU	Energy & Utilities
F&O	Facilities and Operations
FEMP	Federal Energy Management Program
FIMS	Federal Information Management System
FY	fiscal year
gal	gallons
GET	General Employee Training
GHG	Greenhouse Gas
GP	Guiding Principle
gpf	gallons per flush
GSA	General Services Administration
gsf	gross square feet
HFC-134a	1,1,1,2-tetratfluourethane
HEMSF	High-Energy Mission-Specific Facility
HPSB	High Performance Sustainable Buildings
HQ	Headquarters
HR	Human Resources

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
LEED	Leadership in Energy & Environmental Design
LI	Long Island
LIPA	Long Island Power Authority
LIRR	Long Island Railroad
LISF	Long Island Solar Farm
LOB	Laboratory/Office Building
LPD	Laboratory Protection Division
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
NHTSA	National Highway Traffic Safety Administration
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
NY	New York
NYBEST	New York Battery and Energy Storage Technology Consortium
NYC	New York City
NYPA	New York Power Authority
NYPD	New York Police Department
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
OEM	Office of Emergency Management
OEP	Office of Educational Programs
OSSP	Open Space Stewardship Program
P2	Pollution Prevention
PFC-14	perfluoromethane
PHENIX	Pioneering High Energy Nuclear Interaction Experiment
PM	preventative maintenance
PPM	Procurement and Property Management
PUE	power utilization effectiveness
PV	photovoltaic
R&D	Research and Development
RCA	recycled concrete aggregate
REC	Renewable Energy Credit
RHIC	Relativistic Heavy Ion Collider

RPC	resistive plate chamber
RSB	Research Support Building
RTU	remote terminal unit
SBMS	Standards-Based Management System
SBU	Stony Brook University
SC	Office of Science
SF_6	sulfur hexafluoride
SPO	Sustainability Performance Office
SSP	Site Sustainability Plan
SSPP	Strategic Sustainability Performance Plan
STAR	Solenoidal Tracker at RHIC
STEM	Science, Technology, Engineering and Mathematics
TOF	time of flight
UESC	Utility Energy Service Contract
UPS	uninterruptible power supply
USDA	United States Department of Agriculture
VAM	Vehicle Allocation Methodology