

APPENDIX E: BNL SITE SUSTAINABILITY PLAN:  
STATUS SUMMARY FOR FISCAL YEAR 2018

New SSP Category	FY18 Performance Status	FY19 Planned Actions & Contributions
<b>Energy Management</b> This category focuses on all energy-related topics such as energy intensity, metering and benchmarking, Energy Independence & Security Act (EISA) §432 audits, non-fleet fuel use, and greenhouse gas (GHG) emissions.	<p><u>Energy Intensity</u>  BNL's energy intensity for FY18 was 231,564 Btu/gsf and was 4.7% lower than the relatively new base year of 2015.</p> <p>FY18 was the third full year with the results of the Utility Energy Service Contract (UESC) Phase I project. The energy savings were verified and contributed to the lower energy intensity value. The Temperature Setback Policy is continually communicated to the Laboratory via several methods, including Earth Day events and presentations to facility managers and Laboratory management.</p> <p><u>Metering</u>  Two-hundred ninety advanced electric meters were installed and captured over 98% of consumed electricity. Of the 159 buildings greater than 4,000 square feet, 151 (95%) advanced meters were installed.</p> <p><u>EISA Section 432 Evaluations</u>  Energy audits of HVAC systems, lighting, and office equipment will continue to be used to identify opportunities for energy conservation. Audits are performed in conjunction with ongoing condition assessment surveys to reduce additional costs and administrative oversight needs. All information has been placed in EPA's Portfolio Manager Program for benchmarking. Information from the energy and water audits is being taken into consideration with the development of BNL's UESC II project.</p>	<p><u>Energy Intensity</u>  One of the biggest challenges for BNL will be continuing goals of further energy intensity reductions. Previous reductions make it very difficult to identify new cost-effective projects.</p> <p>BNL has begun a UESC Phase II effort. If cost-effective projects can be identified for Phase II, BNL will be able to reduce energy intensity. All energy-related projects will be analyzed using Life-Cycle Analyses.</p> <p>BNL will continue all best practices currently in place, including HVAC setback, steam charge-back, and lighting upgrades.</p> <p><u>Metering</u>  Additional meters will be installed as opportunities become available.</p> <p><u>EISA Section 432 Evaluations</u>  BNL will continue with the cost-effective Energy Survey/Facility Condition Assessment approach in FY19 and beyond.</p>
<b>Water Management</b> This category focuses on activities undertaken to reduce potable and non-potable water consumption, comply with stormwater management requirements, and improve water efficiency.	Potable-water usage fell from 931 million gallons/year in FY 1999 (average of 2.55 million gallons per day) to about 393 million gallons/year in FY 2018 (average of 1.07 million gallons per day), a reduction of 62%.	<p>BNL will continue to implement BNL's Water Management Plan.</p> <p>BNL will continue to utilize water-efficient processes and plumbing fixtures to conserve water in new construction buildings and renovations.</p>
<b>Waste Management</b> This category focuses on waste management, pollution prevention, (source reduction) and recycling measures, and construction and demolition waste reduction.	<p>During FY18, the recycling rate (annual diversion rate for non-hazardous solid waste) was approximately 71%.</p> <p>There were no significant building cleanouts during 2018 where materials were repurposed. There were two small demolition projects during the year: Biology Greenhouses and Fleming House. The small volume of recyclable materials recovered were captured in this year's overall recycling rate.</p>	<p>BNL's waste diversion program is expected to remain intact in future years and may grow with the addition of food waste composting pending the start-up of a commercial food waste composter in relatively close proximity to the Lab.</p> <p>Plans are in place to continue demolition of World War II structures in 2019, beginning with the demolition of Building 134 in the first quarter. Concrete from the demolition will be crushed on site and converted to Recycled Concrete Aggregate (RCA) for use as a road base on firebreak roads or as underlay in parking areas. Wood and metal debris will also be segregated and sent for recycling.</p>

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<b>Fleet Management</b> This category focuses on the site's approach and vision for addressing fleet optimization, and strategies used to reduce petroleum use and increase alternative fuel use.	Facilities and Operations completed a major restructuring in FY18 which consolidated personnel, stock areas, and central reporting locations. This restructuring resulted in fewer miles traveled by all trades vehicles, thus reducing the need to drive unnecessarily. This reduction will help achieve goals surrounding the reduction of greenhouse gas emissions.	<p>BNL will continue to work with the U.S. General Services Administration to order alternative-fueled and newer, more fuel-efficient vehicles during every replacement cycle.</p> <p>Fleet Management will continue to utilize E-85 fueling station on-site.</p> <p>Idle time information will be monitored using Telematics units and conveyed to management to curb excessive idling of fleet vehicles.</p>
<b>Renewable Energy</b> This category focuses on site efforts towards utilizing renewable energy resources.	<p>BNL purchased 62,600,000 kilowatt hours (kWh) of renewable energy certificates (REC) for 2018 to meet prior "Clean and Renewable Energy" requirements. All of BNL's RECs have been and will continue to be purchased through a competitive solicitation process.</p> <p>In 2018, the Northeast Solar Energy Research Center (NSERC) facility produced 1,095,083 kWh on site. No RECs from NSERC were sold in 2018. The NSERC facility was expanded by 324 kW to 816 kW in 2016 with the help of Sustainability Performance Office (SPO) funding.</p>	<p>BNL will continue to operate the NSERC facility and provide for further expansion when sufficient funds are identified. REC purchases will continue in order to meet applicable renewable energy and clean energy goals.</p> <p>Renewable energy systems, especially solar hot water, will continue to be considered in all new construction projects and major building renovations (including the Science and User Support Center [SUSC]).</p> <p>BNL continues to pursue opportunities to implement a true microgrid on site and has commenced preliminary discussions with energy storage providers and various governmental agencies to explore options.</p>
<b>Green Buildings</b> This category focuses on green building initiatives such as High Performance Sustainable Building (HPSB) and building inventory changes.	<p><b>Green Buildings</b>  <u>HPSB Guiding Principles</u>  Currently 9% of non-excluded buildings have achieved 100% of the Guiding Principles and an additional 6% are at 90% or higher. As BNL constructs new buildings and demolishes old non-compliant buildings, this percentage will increase.</p> <p><u>New Building Design</u>  All buildings designed from 2007 were designed to meet the NYS Energy Code.</p> <p>The new buildings that were designed during FY18 were the Building 742 HEX Beamline Satellite Building and Building 748.</p> <p><u>Net Zero Buildings</u>  BNL has the option of applying the output of the NSERC to make it net-zero. The determination will be made in concert with the Brookhaven Site Office (BSO).</p> <p>Discussions continue with staff of the Long Island Railroad for a proposed railroad station at Discovery Park.</p>	<p><b>Green Buildings</b>  <u>HPSB Guiding Principles/New Building Design</u>  Projects currently in various stages of planning such as the SUSC building, the CFR major renovation of Building 725, and the Building 906 renovation will be designed to meet the Guiding Principles.</p> <p><u>Net Zero Buildings</u>  BNL will continue to engage the national lab community on techniques to economically meet the net zero requirements.</p> <p>Starting in 2020, where economically viable, BNL will ensure net-zero requirements are included in future designs.</p> <p>BNL will consider net-zero concepts in the preliminary design of the SUSC but discussions with staff in the Science Laboratory Infrastructure program indicate the current funding constraints will make it difficult to justify additional costs associated with achieving net zero.</p>

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<b>Acquisitions and Procurement</b> This category focuses on sustainable acquisitions and GHG supply chain emissions.	<p>BNL has incorporated contract clauses within its vendor contracts that designate environmentally preferred products (EPP), services, and equipment.</p> <p>BNL completed implementation of its online purchasing system—the Vinimaya system (“E-Buy”).</p> <p>Challenges remain as vendor information regarding recycled content for all categories is lacking, making conformance time-intensive and difficult for purchasers.</p> <p>In 2017, BNL established EMS objectives to improve EPP purchasing performance for the Electronic Product Environmental Assessment Tool (EPEAT) electronics and office products. BNL received the Green Electronics Council's 2018 EPEAT Purchaser Award.</p> <p>BNL also promoted the EPP program during this past year's Earth Day activities.</p>	<p>During 2019, BNL will continue to develop the Commonly Ordered Items page, provide E-Buy training specific to EPP purchasing requirements, and provide support to requisitioners with questions.</p> <p>BNL will also write new Environmental Management System (EMS) objectives to promote that program and drive improvement.</p>
<b>Measures, Funding, and Training</b> This category focuses on efforts to implement identified Efficiency & Conservation Measures (ECM) via appropriations, performance contracts, or other funding mechanisms, as well as provide sustainability-related training or education for employees.	<p>Internally funded energy conservation and sustainability-related initiatives include a continuation of various best practices, such as temperature setback and small lighting and water conservation projects.</p> <p>Because of a budget-constrained environment, BNL, like other DOE sites, has been increasingly using third-party financing options that utilize cost savings to pay for projects. BNL has low energy rates to operate its research programs, which makes it difficult to find cost-effective projects</p> <p>BNL completed its first UESC in 2015, which is performing well and meeting the original energy savings estimates. A second UESC project is planned and will incorporate lessons learned.</p> <p>The manager of Energy Management at BNL is a Certified Energy Manager. All BNL Facility Complex Managers have the Certified Facility Manager recognition from the International Facilities Management Association.</p>	<p>BNL is developing a UESC Phase II project that will likely include various energy conservation measures, such as lighting, HVAC controls, solar preheating, energy (chilled water) storage, efficient boilers, and other options. While it is not possible to estimate energy savings at this early stage, savings are anticipated to be equal to or greater than the recent UESC Phase I project.</p> <p>An Investment Grade Audit (IGA) for a base project of energy-efficient lighting and HVAC upgrades is in process and is expected to be completed by early summer 2019. The UESC II effort also included Preliminary Assessments (PA's) for a number of additional potential energy conservation projects. If cost-effective projects are identified, they may be included and financed in the UESC II project.</p>

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<b>Travel and Commute</b> This category focuses on travel and commute data, including participation in regional and local planning.	<p>Overall Scope 3 GHG emissions are down 26.1% from FY 2016 (6,023 MtCO<sub>2</sub>e), and 14.5% lower than the FY 2008 baseline value.</p> <p>A decrease in Scope 3 GHG emissions from FY 2017 occurred and is mostly due to a 453 MtCO<sub>2</sub>e drop in GHG emissions from purchased electricity transmission &amp; distribution (T&amp;D) losses and a 237 MtCO<sub>2</sub>e decrease in commuting GHGs.</p> <p>The T&amp;D loss and GHG emission reduction was primarily due to 10% and 9.8 % drops in the respective e-Grid Distribution Loss Adjustment Factors that were used to calculate T&amp;D losses from electricity purchased from a local Long Island sub-region and losses from hydroelectricity purchased from the New York upstate sub-region.</p> <p>The decrease in commuting GHG emissions was mostly due to a reduction in workforce--from 2,570 employees in FY 2017 to 2,411 in FY18--that caused the number of BNL commuters to decline 6.2%.</p>	<p>BNL will continue to strive to reduce Scope 3 GHG emissions.</p> <p>The Environmental Protection Division (EPD) will continue to work with BHSO to advocate for the SPO to update its Dashboard and enable BNL to use the alternative methodology for estimating commuting GHG emissions that was proposed in September.</p> <p>EPD and the Information Technology Division (ITD) will conduct a survey of recent Blue Jeans videoconference service users.</p> <p>EPD will reach out to Human Resources to jointly explore how the resources and recommendations in the Sustainable Commuting U.S. DOE National Laboratories Report &amp; Toolkit can be used to engage employees and managers on the benefits of ridesharing, telework, and alternative work schedules.</p>
<b>Fugitives and Refrigerants</b> This category focuses on the emissions of fugitive gases and refrigerants.	<p>The bulk of BNL's process and fugitive GHG emissions (besides those from insulating gas leaks of SF<sub>6</sub> from the Tandem Van de Graaff accelerator vessels) were due to periodic purging of carrier gases used in STAR detector subsystems during the FY18 RHIC experimental run. The recirculation system on the STAR multi-gap resistive plate TOF subsystem reduced purged gas releases of HFC-134a by 86.5% throughout the experimental run.</p> <p>A refresher training for A/C Engineers on Refrigerant Compliance Management was held on May 4 to ensure that refrigeration and air conditioning equipment were being effectively serviced to minimize refrigerant emission leaks.</p> <p>Preventative maintenance inspections of eight 2.4 kilovolt (kV) and 19 13.8 kV sulfur hexafluoride (SF<sub>6</sub>) gas-insulated switches, plus eight 69 kV SF<sub>6</sub> gas-insulated circuit breakers, were conducted in September.</p>	<p>Job plans for the next scheduled preventative maintenance inspections of SF<sub>6</sub> gas-insulated switches and circuit breakers will be released on April 1, 2019. Annual preventative maintenance inspections will also be released on April 1, in concurrence with the job plans.</p>

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<b>Electronic Stewardship</b> This category focuses on the acquisition, operations and management, and disposal techniques of all electronics reported, as well as data centers efficiency improvements.	<p><b>Acquisition/Operations</b>  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.</p> <p>All systems in the BNL domain that are capable of power management have the setting enabled.</p> <p>Most printers and copiers are not centrally managed. BNL has published Managed Printing guidelines, which recommend the use of network/department-wide printers configured for black ink only and duplex printing.</p> <p><b>End of Life</b>  Approximately 1,100 desktop computers, 380 laptops, 150 tablets, and 550 servers were reused internally by BNL personnel as well as numerous other small electronics in FY18.</p> <p>BNL held two employee household E-Waste collection days during the year.</p> <p><b>Data Centers</b>  BNL completed an evaluation of our existing data centers in response to the Data Center Optimization Initiative (DCOI) from the summer of 2016. Our internal assessment identified eight data centers that meet the new DCOI criteria. Additional resources will be needed to meet the goal of PUE &lt; 1.5.</p> <p>The Core Facility Revitalization (CFR) project is being designed to renovate Building 725. This project includes repurposing a significant portion of the building for use as a new computing facility with associated support space and new infrastructure. CD-1 was received in April 2017 and CD-2 was received in October 2018.</p>	<p><b>Acquisition/Operations</b>  The Laboratory will continue to require that all printers, laptops, and desktop computers ordered through the E-Pro system have an EPEAT "Gold" certification.</p> <p>BNL will continue to evaluate the feasibility of extending the desktop computer power management policy to other operating systems.</p> <p>BNL will continue to communicate the importance and benefits of duplex printing.</p> <p><b>End of Life</b>  BNL will continue to evaluate methods of increasing computer useful life and will continue to dispose of electronic waste in an environmentally sound manner through a certified responsible recycler.</p> <p><b>Data Centers</b>  Meeting the power usage effectiveness (PUE) of 1.5 for the existing data centers will require a significant investment. Further, four of the eight existing data centers will require the installation of new metering to determine their actual PUE.</p> <p>The data center associated with the CFR project is in the design phase and is targeting a PUE of &lt; 1.3 in accordance with the recent DCOI. The CFR project has received CD-2 approval and is estimated to start construction in June 2019, with a projected completion of 2023.</p>

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<p><b>Organizational Resilience</b> This category focuses on resilience-related topics. Organizational resilience is the ability of an agency to prepare for and withstand an extreme event, or quickly recover. Resilience efforts help sites manage risks to DOE assets, infrastructure, and operations.</p>	<p><b>Emergency Response and Local/Regional Coordination</b> BNL conducts all-hazard surveys every three years or when there are significant changes made to the Laboratory. BNL Office of Emergency Management (OEM) works with state and local emergency management organizations in assessing the risks that may occur in the local and regional area.</p> <p><b>Risk/Vulnerability Assessment</b> BNL has created a Threat Hazard Identification and Risk Assessment (THIRA) that discusses catastrophic incidents that could affect or occur at BNL and identifies the resource needs for a response and recovery. The hazards included in a THIRA are both synthetic and natural.</p> <p><b>Climate-Resilient Design of New or Newly Retrofitted Buildings</b> BNL does not currently have design guidelines specifically for climate-resilient design. As a standard practice, new facilities and retrofit projects are designed considering climate change and its projected impact on human health and safety.</p>	<p><b>Emergency Response and Local/Regional Coordination</b> During major weather events, OEM participates on the National Weather Service regional severe weather calls. BNL is also part of Suffolk County's Comprehensive Emergency Plan and a member of the State's Office of Emergency Management's Regional Planning Committee.</p> <p><b>Climate-Resilient Design of New or Newly Retrofitted Buildings</b> Climate design values in national building design codes have not been updated to reflect increases in regional climate loads. The Modernization Project Office has focused on reducing vulnerability to present climate variability by early integration of climate resilience consideration into the project delivery process. A cost benefit analysis is essential to ensure effective and cost-conscious design decision-making.</p>