The central campus of Brookhaven National Laboratory on Long Island. The lab conducts research in the physical, biological, and environmental sciences, as well as in energy technologies and national security. PHOTOS COURTESY BROOKHAVEN NATIONAL LABORATORY

Brookhaven National Laboratory

Becoming a Federal Leader in Energy and Sustainability

Implementation of a utility energy service contract enabled significant infrastructure upgrades at Brookhaven National Laboratory that substantially reduced the campus' energy costs and greenhouse gas emissions.

By John Drzymkowski, CEM, LEED AP, and Jason Cartozian, M.SAME

Located on Long Island, in Upton, N.Y., Brookhaven National Laboratory (BNL) conducts research in the physical, biological, and environmental sciences, as well as in energy technologies and national security. It also builds and operates major scientific facilities available to university, industry, and government researchers. It is one of 10 National Laboratories overseen and primarily funded by the Office of Science of the Department of Energy (DOE) and managed by Brookhaven Science Associates.

In 2013, DOE and local electric provider, National Grid, entered into a utility energy service contract (UESC) for significant infrastructure upgrades designed to substantially reduce BNL's energy costs and greenhouse gas emissions. Siemens served as the Energy Services Company subcontractor, along with BNL's Modernization Project Office team, which managed the project. The

STARTING THE JOURNEY

BNL evaluated various methods for financing energy conservation projects. After a careful analysis of overall costs, processes for implementation, and lessons learned from other facilities, the lab determined that a UESC would provide a lower overall cost and simpler implementation. Further, it allowed BNL to define a project scope that was both smaller and easier to manage than a typical energy savings performance contract. The intent was to become familiar with the third-party financing for energy projects on a smaller scale in order to be better educated for potential future projects.UESCs are one of the government's preferred contract vehicles for implementing energy conservation and cost-savings projects at federal facilities. Under the contract, the local utility—in this case, National Grid—facilitates the design, finance, and construction of the project over a contract term of 10 years. BNL's project is the first DOE UESC in more than 15 years, and is expected to serve as a model for other DOE facilities nationwide.

COMMUNITY CONNECTION

At the onset of the project, National Grid's former president cited the work as being an important part of his company's commitment to sustainability and to

improving the quality of life in the Long Island communities where the utility's employees work and live. In addition, the UESC also helps strengthen a natural bond between the utility and the government. Under the UESC, Siemens worked with DOE and BNL to upgrade lighting systems in 19 buildings. They replaced and enhanced energy management controls in nine buildings, and installed a new high efficiency 1,250-T water chiller and related components at the Central Chilled Water Facility, which provides cooling water for lab processes and buildings. Lighting upgrades included installing new fixtures and retrofitting existing fixtures, replacing existing lamps and ballasts with more efficient ones, and installing occupancy sensors and timers.

The enhancements to BNL were designed to substantially reduce its annual energy intensity by 11 percent and reduce greenhouse gas emissions by more than 7,000-T. The savings from the UESC, combined with other sustainability efforts, helped the lab meet its 30 percent energy intensity reduction goal by 2015 from a 2003 baseline. These will be instrumental in helping BNL meet its greenhouse gas reduction goal of 28 percent as compared to 2008 by the end of 2020. These goals have since been revised to a 25 percent energy intensity reduction from 2015 by 2025, and a 50 percent greenhouse gas reduction by 2030, compared to the 2008 baseline.

The contract allow BNL to leverage its operating funds to reinvest in much-needed infrastructure improvements, many of which would have been delayed or not funded without this type of arrangement in place.

The infrastructure upgrade project was funded through approximately $12.2 million in third-party financing. BNL will repay the loan using the savings generated by the upgrades, which are expected to total more than $1.3 million annually. In addition to direct cost savings, the energy-efficiency improvements will make BNL eligible for rebates and other financial incentives, amplifying the savings over time.

In May 2015, BNL received its first rebate/grant check from National Grid for $626,475. The check reflects new rebates and grants made possible by the UESC energy-efficiency upgrades

The Northeast Solar Energy Research Center on the Brookhaven National Laboratory campus, shown under construction in 2013, serves as a solar energy research and test facility for the solar industry.

TEAMWORK IS ESSENTIAL

To complete the project and monitor its ongoing success, DOE and BNL assembled an experienced, well-rounded team consisting of both internal and external members to address all areas of the project. The team focused on clear communication of scope, expectations, requirements, and changing circumstances, which helped keep the project on schedule and on budget.

Brookhaven's internal team included experienced personnel from both the Brookhaven Site Office and Brookhaven Science Associates, representing areas such as contracting, procurement, engineering, project management, and environmental, safety and health professionals. Brookhaven Science Associates, which manages the lab for DOE's Office of Science, is a limited-liability company founded by the Research Foundation for the State University of New York on behalf of Stony Brook University, the largest academic user of laboratory facilities, and Battelle, a nonprofit applied science and technology organization.

Before construction commenced, the extended Brookhaven team recognized that design-build projects such as UESCs could have variances between the original preliminary design and actual field conditions. As a result, the team anticipated changes and made provisions for accommodating them. This included pre-established values for numerous tasks, which allowed for Energy Conservation Measures to be swapped from one location to another. This proactive approach ensured that BNL was able to complete the project within the original construction schedule of May 2015.

The actual, verified first year energy and greenhouse gas savings were within a few percentage points of the original estimates. Ultimately, the continued success of the project has been based upon the dedication of a multi-disciplinary team of government, contractor, and subcontractor individuals who frequently communicated expectations and requirements in a streamlined, organized manner.

A SUSTAINABILITY LEADER

Last year, DOE's Sustainability Performance Office recognized BNL with a Sustainability Award for performance-based energy contracting that helped support *Executive Order 13693* (Planning for Federal Sustainability in the Next Decade).

The UESC efforts have advanced Brookhaven's sustainability while facilitating substantial infrastructure improvements in support of its science mission. It is a great example of how close collaboration among all stakeholders leads to success and establishes a model that organizations across the country can leverage to help meet energy efficiency goals.

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