USDA and Florida Power & Light Company successfully save $85K/year with UESC collaboration

A set of conservation measures is saving the Miami Subtropical Horticulture Research Station (SHRS) $85,000 per year and dramatically reducing the site's energy and water usage.

The SHRS site contains 42 buildings on approximately 212 acres that are fully owned by the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS). SHRS's mission is to support agricultural industries in southern areas of the United States by providing environmentally sound research. The grounds of the site have experimental plots of sugarcane and various tropical fruits.

Although the site is fully owned by USDA, 15 buildings on the site are occupied under revocable licenses by other tenants such as the USDA Animal and Plant Health Inspection Services, the U.S. Department of Homeland Security, and the state of Florida.

Why a Utility Energy Service Contract?

The ARS procurement team selected a Utility Energy Service Contract (UESC) because this vehicle provided the flexibility to correct several problems at the same time. UESCs also have flexibility in project size. The size of this project (approximately $1.5M) made a UESC the ideal choice. Before this project, SHRS annual utility costs were in the range of $270K to $280K. Built in 2007, Building 89, the largest building on-site at 37,702 square feet, accounted for 86% of site utility costs. The failing components at this facility included chillers, which had deteriorated because of the marine environment; obsolete T-12 lighting; and old plumbing fixtures. The buildings on the site were built over an 80-year period, with some dating as far back as 1927. As a result, many roofs needed replacement with new or added insulation. The last time many of the roofs were replaced was in 1992, following Hurricane Andrew.

Choosing Energy Conservation Measures

The initial challenge was to validate the rent ARS was charging the tenant agencies by examining utility costs, as well as operations and maintenance costs. Before this project, it was extremely difficult to get a handle on utility usage and expenditures because of the large number of dispersed buildings, electric meters, electric rates, staff turnover, and a change in USDA's utility payment system. However, Florida Power & Light Company (FPL) was instrumental in helping associate each electrical account with the proper building to accurately assess costs and consumption history.

Building 89. *Photo Credit Sandy Morgan – USDA Agricultural Research Service*

In addition, the highly complex main lab building had never performed efficiently since it was built and was in dire need of recommissioning. In many cases, tweaking the equipment, in an effort to improve it, only made things worse. This task was complicated by the need for repeated chiller repairs.

Once FPL understood the challenges, the next step was to identify opportunities for improvements that could be completed under a UESC. Because of the many issues at this site, it was critical to determine which energy conservation measures (ECMs) would prove most beneficial in reaching the site's goals to

- Reduce the energy intensity of the campus (carbon footprint)
- Reduce the risk to the work and mission of the site from failing critical equipment
- Minimize the excessive costs and distractions from failing and aged infrastructure.

FPL conducted an investment-grade audit to determine which ECMs best fit the needs and goals of the site. The audit began with a detailed analysis of existing conditions, backup/redundancy requirements, and baseline savings and costs. Several potential ECMs were identified and considered. Ultimately, USDA selected five ECMs that most economically fulfilled the outlined goals:

- Lighting/controls
- Water conservation
- Heating, ventilation, and air-conditioning (HVAC)/controls
- Building envelope
- Rate change

The selected ECMs repaired and upgraded failed (or nearly failing) building components and infrastructure and ensured reliable air-conditioning in the main laboratory so research would not be interrupted. Two 160-ton chillers were replaced with high-efficiency, magnetic-bearing chillers; HVAC controls were fixed and recommissioned; direct expansion

air-conditioning units were replaced in several buildings; and high-efficiency motors and drives were retrofitted. The project updated and standardized lighting technologies and hardware, eliminated discontinued lights, simplified repair and replacement, and reduced storage/stock requirements. Building envelope improvements included the installation of cool (reflective) roofs and insulation.

Finally, FPL took extra steps to provide an electrical safety survey of the site to identify the locations of electrical panels that required attention. Recommissioning was protracted; FPL engaged the services of an engineering firm to reengineer some of the HVAC components and parameters to properly complete the recommissioning. FPL also carefully analyzed issues with the high-efficiency chillers to ensure that controls and power quality did not affect their reliable performance.

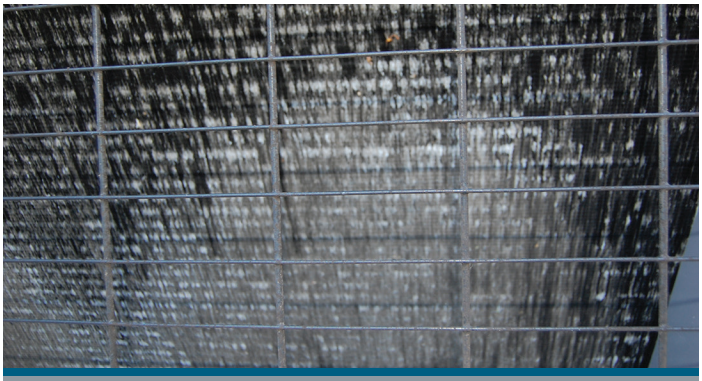
Project Outcomes

UESCs can be funded through appropriations or financing. USDA originally anticipated financing this project; however, the award occurred at year-end when enough appropriated funds became available to pay for the entire project.

The installed ECMs included the following:

- **Lighting/controls:** replaced and upgraded the lighting systems
- **HVAC:** replaced aged direct-expansion systems and two air-cooled chillers and upgraded the existing chilled water system. Also provided retro-commissioning of Building 89 HVAC controls
- **Building envelope:** installed highly reflective, standing-seam metal roofing systems and roof insulation
- **Water conservation:** installed new low-flow and ultra-low flow plumbing fixtures
- **Rate adjustment:** achieved a 3% reduction in cost by switching from FPL's General Service Demand rate to the General Service Time-of-Use Demand rate.

The time frame from implementation to completion was approximately 15 months. The total utility savings after installation is $85,000 per year, and the total payback period is expected to be 15 years. In addition, annual reductions achieved by the five ECMs totaled



Corroded coil on existing chiller. *Photo Credit Sandy Morgan – USDA Agricultural Research Service*

New chillers. *Photo Credit Robert Palahunik – Florida Power and Light*

- 82 kW in electric demand
- 844,410 kWh in electricity consumption
- 161 kgal of water
- $10,564 in other savings.

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