



Energy Productivity Success Stories

North Carolina State University Creates Electricity at Renovated Utility Plant

SUMMARY

When North Carolina State University (NC State) faced the challenge of deferred maintenance on equipment in its central utility plants with no available capital funding, university leadership used a \$61 million energy performance contract to finance the addition of modern CHP technology. The new CHP facility enables NC State to generate some of its own electricity, and the money the university saves in avoided utility-provided energy costs pays back the loan that financed the CHP technology and boiler replacements.

COMPANY/ORGANIZATION BACKGROUND

Founded in 1887, NC State University has a campus community of more than 40,000 students, faculty, and staff in Raleigh. With an annual utility budget of approximately \$32 million, the university provides electricity, steam, chilled water, and domestic water to more than 15 million square feet of campus building space.

CHALLENGES

As do many higher education institutions, NC State faces the challenge of funding vital maintenance on aging buildings and infrastructure, such as utility systems. As several crucial campus boilers exceeded the end of useful life, the university had no capital funding available for the replacement of this equipment. The university also faced challenges related to air quality compliance, as the old boilers relied on #6 fuel oil. NC State needed funding for new, cleaner-burning natural gas boilers and related equipment.

SOLUTION

The University turned to an energy performance contract-funding model to finance replacement of critical boilers. A performance contract allows an owner to pay for a renovation through the energy savings generated by efficiency improvements. Using a performance contract, NC State was able to incorporate CHP technology on campus. The \$61-million performance contract, financed over 17 years, also allowed the addition of two natural gas fired 5.5-MW combustion gas turbine generators and two 50,000-pound-per-hour heat recovery steam generators to the existing Cates Utility Plant in 2012. The contract also financed replacement of aging boilers, utility interconnects, and auxiliary equipment at the nearby Yarbrough Steam Plant. CHP allows NC State to create its own electricity and converts “waste heat,” which would be unused in traditional power plants, into energy. By using this campus-generated energy, NC State buys less energy from local utility companies.

RESULTS & BENEFITS

In the CHP plant's first two years, more than \$10 million of energy costs were avoided and emissions associated with utility production on the university's central and north campuses dropped 24 percent. Educational benefits also resulted. Many NC State engineering students tour the facility to see CHP technology in action. The savings associated with the project have prompted the university to consider adding more CHP capacity at its nearby Centennial Campus utility plant.