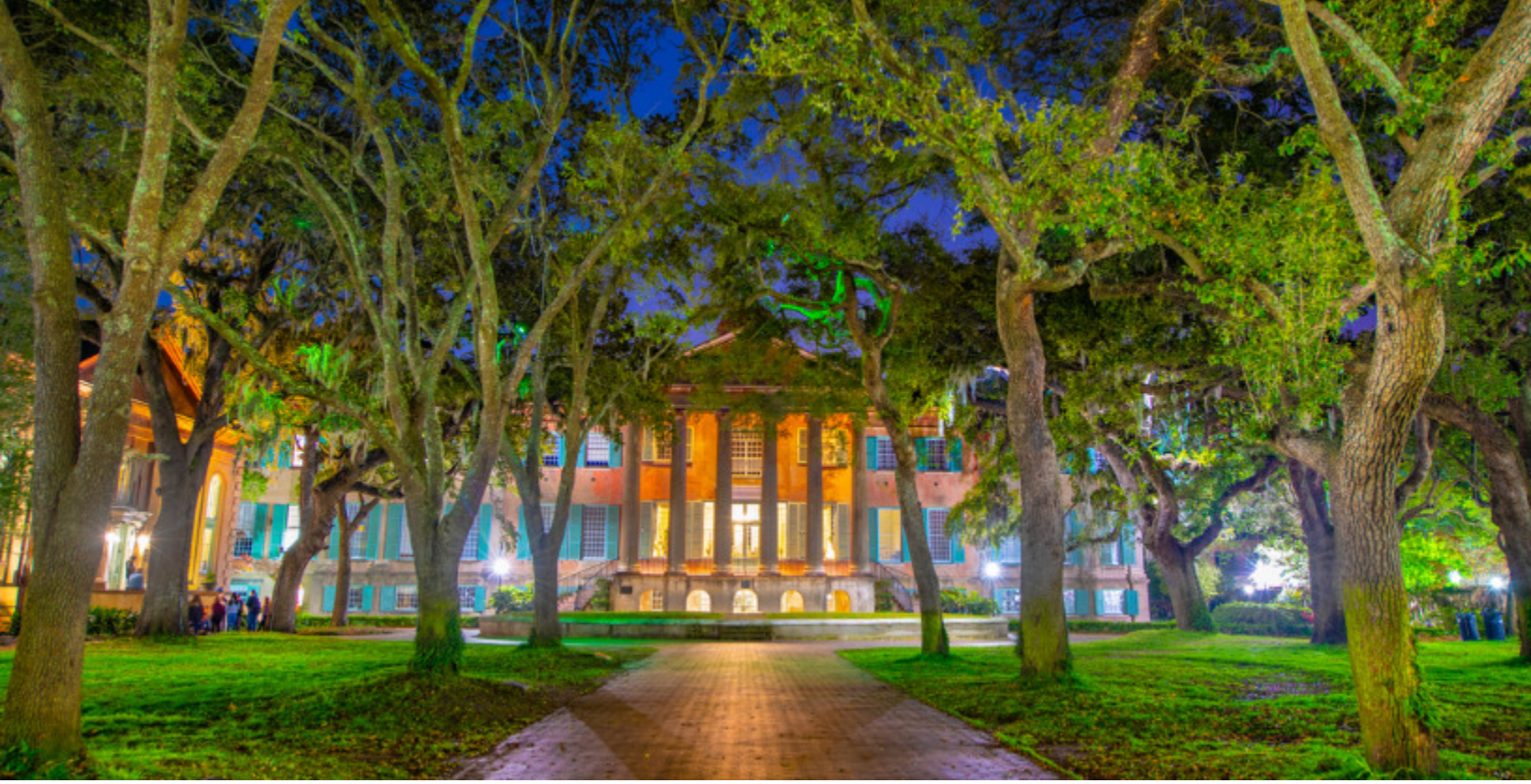

Mitigate climate change

Improve resiliency

SMART CAMPUS

College of Charleston **reduces energy consumption by $1.8M annually**

College wins South Carolina's "Energy Project of the Year" award by setting the foundation for a Smart Campus.

SIEMENS

TRANSFORMING INFRASTRUCTURE

Reduce energy use, improve resiliency

Campus-wide measures reduce consumption, protect resources, and create the Smart Campus foundation.

The College of Charleston is dedicated to sustainability and environmental stewardship. With a steadfast commitment to reducing energy consumption and carbon emissions, preserving natural resources, and updating campus infrastructure, the institution exemplifies a forward-thinking, innovative approach to higher education that prioritizes academic excellence and environmental responsibility.

Aggressive action to mitigate the effects of climate change

To begin mitigating climate change and become a climate leader in the South Carolina Lowcountry, which faces immediate effects from climate change, the College of Charleston is taking aggressive action. The college engaged with Siemens in strategic planning to address a mounting backlog of deferred maintenance while also seeking to modernize its campus; deliver energy, water, and greenhouse gas (GHG) savings; and create more comfortable learning and living environments that would be easier to operate and maintain.

Thus, Siemens and the College of Charleston undertook a comprehensive, campus-wide planning and project development approach to identify potential improvement opportunities with campus buildings and utility systems. The resulting project was designed to deliver on the college's objectives while fully funding the finance project over a 15-year period.

Ultimately, the college's actions would encompass campus-wide measures to reduce energy consumption, water use, and carbon emissions and to improve the campus's resilience to climate risks.

Energy conservation measures

Starting in July 2021, the College of Charleston and Siemens have been identifying and implementing campus-wide energy conservation measures that also have positive impacts on the college's utility costs, carbon emissions, and living and learning experiences. Implemented through a 15-year energy savings performance contract, the college's energy conservation measures have included:

- **Building automation system** – Upgraded to the latest Desigo CC platform to create the Smart Campus foundation and enable energy savings improvements including HVAC equipment scheduling, space temperature setbacks, Variable Air Volume (VAV) static pressure resets, reduced reheat, pump differential pressure reset, hot water loop temperature reset, single-zone VAV control, and exhaust system setback based on demand. Siemens also upgraded building controls systems at 68 buildings across campus.
- **Water conservation** – Installed water-saving devices in 89 campus buildings; solution included retrofitting faucets and sinks with tamper-resistant flow restrictors, urinals and toilets with devices to reduce gallons per flush, showers with low-flow showerheads, and ice machines with heat exchangers to further reduce energy consumption by delivering pre-cooled water for ice.
- **Lighting retrofits** – Implemented energy-efficient LED lighting at 111 campus buildings, along with occupancy sensors, energy-saving Vending Misers for vending machines, and streetlamp retrofits that also create a brighter and safer campus at night.
- **Building weatherization** – Improved weatherization in 37 buildings by applying spray foam insulation, window film, and door sweep replacements; adding insulation for attics and roofs; and sealing exterior gaps.

Smart Campus foundation

The Desigo CC upgrade was central to creating the Smart Campus foundation for the College of Charleston. The software integrates all building systems for a centralized command and control platform to transform campus infrastructure so that it's smarter, safer, more sustainable, and more resilient.

In fact, the Desigo CC upgrade contributes at least $500,000 in energy savings annually—meaning that the College could pay for its Smart Campus foundation through the energy savings it created.

Additionally, Siemens implemented the **Enlighted IoT** solution in one campus building to provide real-time lighting and cooling controls only when the individual spaces are needed or in use. This innovative, Smart Campus solution was selected for its ability to optimize space utilization and enhance energy management, aligning perfectly with the college's mission to reduce carbon emissions and modernize its campus infrastructure while providing a sustainable and efficient learning environment.

Utility system modernization enhances long-term resilience

The College of Charleston has long relied on a centralized, underground steam system, sometimes referred to as a district energy system. These systems are commonly used to heat large institutions and other campuses to create steam or hot water, which is then transported through insulated, underground pipes to provide space heating and hot water. Although these systems are generally recognized for their energy efficiency and environmental benefits, they can face challenges like water damage, deterioration, and corrosion in low-lying, flood-prone coastal areas like Charleston.

Looking ahead, the college recognized that its underground steam system could be even more vulnerable due to climate change (rising sea levels, more frequent and severe weather events, temperature fluctuations, and so on).

Through this project, Siemens was able to eliminate approximately 80% of the college's underground steam piping and replace the system with new, more efficient condensing boilers in a decentralized system. Not only did this portion of the project improve energy efficiency and reliability, but the system also now requires less maintenance. Moreover, the college was able to avoid a $10 million capital outlay because they did not have to upgrade the old steam distribution piping.

Additional utility system modernization projects included:

- **HVAC upgrades** – Siemens installed a new, high-efficiency mechanical air handler for building 30.
- **Chiller replacements** – In the central plant, Siemens replaced an existing 1,500-ton chiller with a new, high-efficiency model. An existing 110-ton chiller in the School of Education building was also replaced.
- **Boiler replacements** – In two buildings, high-efficiency condensing boilers were installed to replace aging equipment.
- **Central energy plant upgrades** – Siemens installed three new 410-ton air-cooled chillers, three new high-efficiency condensing boilers, and associated pumps to enable greater efficiency and reliability in the central energy plant.

The College of Charleston will realize at least $28.1 million in energy and operational savings over its 15-year agreement with Siemens.

In addition to implementing these campus-wide improvements, the college's ongoing work with Siemens involves Climate Action Planning, which encompasses:

- Student and industry engagement
- Campus Waste Characterization study, funded by Siemens Empower+
- Student Capstone project collaboration with Siemens Digital Industry Software (DISW), including software donations and Adopt-a-University alignment
- Academic collaboration based on the planned integration of Siemens Cooperates with Education (SCE) PLC training program
- Siemens Mechatronics Systems Certification Program
- Siemens DISW with newly-established College of Charleston engineering degrees
- Student career recruiting

Guaranteed energy savings amount to more than $28.1M over 15 years

Through the combination of energy conservation measures, Smart Campus and building automation system improvements, and utility system modernization, the College of Charleston will realize at least $28.1 million in energy and operational savings over its 15-year agreement with Siemens.

Because these improvements have been implemented through an energy savings performance contract, the college's energy savings are guaranteed and subject to annual measurement and verification by energy engineers.

Annual savings in units of energy

Electric energy	Electric demand	Natural gas	Fuel oil	Water	Sewer
13,048,197 kWh/yr	14,047 kW/yr	48,136 therms/yr	21,403 gallons/yr	13,419 kgal/yr	13,052 kgal/yr

The above energy savings reduce the College's annual greenhouse gas (GHG) emissions by **30%**, amounting to **11,260** metric tons of CO_2e and are equivalent to removing more than **2,100** gas-powered cars from the road every year.

Conclusion

Through its efforts with Siemens, the College of Charleston has implemented a wide range of energy conservation measures, including building automation system upgrades, water and lighting retrofits, building weatherization, and utility system modernizations. The introduction of the Smart Campus foundation, powered by the Desigo CC platform and bolstered by Enlighted, has not only enhanced energy efficiency but also contributed substantial annual savings.

Overall, these initiatives are projected to generate more than $28.1 million in guaranteed energy savings over a 15-year period, showcasing the college's forward-thinking approach to both sustainability and fiscal responsibility.

For more information, visit **usa.siemens.com/SmartCampus**

Legal Manufacturer

Siemens Industry, Inc.
1000 Deerfield Parkway
Buffalo Grove, Illinois 60089
United States of America

Telephone: +1 (847) 215-1000
usa.siemens.com/SmartCampus

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