2023 Summary Benchmarking Report



In June 2018, City Council unanimously passed the Sustainable and Resilient Charlotte by 2050 resolution that, among other items, calls for the City of Charlotte to strive to fuel the city's fleet and buildings by 100% zero-carbon sources by 2030. Since, the City Council has approved the Strategic Energy Action Plan (SEAP) and Sustainable Facilities Policy (SFP) to provide a framework for achieving the Sustainable and Resilient Charlotte by 2050 resolution's ambitious goals. In particular, the SFP directs city departments to design, construct and operate city buildings in a manner aligned with the 2030 SEAP goals. A major focus of this policy is on energy usage in existing buildings and includes a requirement to benchmark and disclose building energy performance. In 2022, the city published its first building energy performance benchmarking report with this report being the city's third annual benchmarking report. In 2023, the city launched Power Down the Crown, a voluntary building energy benchmarking program to encourage private and nonprofit building owners to join the city in publicly benchmarking their buildings' energy use with a goal of increasing the energy efficiency of their buildings.

Background

Energy Benchmarking Basics

At its core, energy performance benchmarking is the process of tracking and analyzing a building's energy use and comparing the results to buildings of the same type and itself over time.

This is done using an efficiency metric called energy use intensity, or EUI, which is calculated by dividing the building's energy use in kBtu over a 12-month period by the building's square footage. The smaller the EUI, the less energy a building uses per square foot and the more efficiently it is operated.

Building energy performance benchmarking provides property owners with data that can be used to inform energy efficiency investments. In fact, a study by the EPA found that consistently benchmarked buildings achieved an annual average energy savings of *2.4%.

Power Down The Crown

Power Down the Crown launched on Earth Day 2023 – April 22 – and was joined by 12 partners in the program's first year. Those partners are Central Piedmont Community College; Coca-Cola Consolidated; Grubb Properties; Honeywell; Kimco Realty; IKEA Charlotte; Novant Health; Nucor; St. Peter's Episcopal Church; Trane Technologies; UNC Charlotte; and Unitarian Universalist Community of Charlotte. Through their partnership, these organizations have demonstrated their commitment to increasing the energy efficiency of their buildings and, as a result, building a healthier and more sustainable community.

*This number does not include two buildings that were benchmarked last year for which the data was not yet available at the time of this report.

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2023 City Benchmarking Data

This year's benchmarking narrative reflects ongoing successes alongside the evolving landscape of workplace reintegration. When looking at the 2022 EUI data against that of 2023, the trend reveals a noteworthy decline in EUI across the majority of last year's benchmarked facilities — 52 buildings. Among them, 13 buildings achieved a considerable reduction in EUI exceeding 10%. The collective EUI of facilities benchmarked in the previous year decreased by 8.2% from 2022 to 2023.

A total of 98 properties were benchmarked this year.

The following tables provide a breakdown of the number of buildings and the square footage of buildings by building type.



Number of Benchmarked Properties by Type

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As depicted in the chart below, three building types (Police Stations, Cultural and CRVA Facilities, and Parking Garages) increased how efficiently they used energy. While the other four building types had increases, most of those were modest. Additionally, the increase depicted in the Office category is largely a result of continued return to the workplace. However, despite the majority of building types having increased their EUI, portfolio-wide EUI experienced an 8.2% decrease to 68.6 kBtu/ft² in 2023.



Energy Use Intensity (EUI) by Building Type

■ 2021 EUI ■ 2022 EUI ■ 2023 EUI



A Deep Dive into CRVA and Cultural Facilities

CRVA and Cultural Facilities showcased remarkable performance, with six out of eight facilities successfully reducing their EUI. Overall, the EUI for these benchmarked facilities dropped by 7.6% compared to the previous year. This accomplishment is significant as these facilities represent 52.2% of the total square footage of benchmarked facilities. These savings were achieved through various strategies, including the installation of new HVAC equipment, optimization of building controls for HVAC and lighting, ongoing transition to LED lighting, continual monitoring and adjustments via building automation systems to ensure energy efficiency, and employee education. The following table illustrates the year-over-year changes at the CRVA and Cultural Facilities.



Comparison of EUI at CRVA and Cultural Facilities

2022 EUI 2023 EUI



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2023 Power Down the Crown Benchmarking Data

This year's Power Down the Crown benchmarking narratives reflects the launch of the program and partners getting started with benchmarking. In this inaugural year of the program, nine partners shared data from 25 buildings. The buildings span a wide range of types including educational, hospital, manufacturing, office, residence/dormitory, retail, and worship facilities. Over 4.7 million square feet of building space have initiated a benchmarking effort. The tables below provide a breakdown of the square footage and building types.



Number of Power Down the Crown Properties by Type



Table 2:Square Footageby Building Type





Facility Highlights Examples of Energy Efficiency Work in Action CMPD Independence

The HVAC control system at CMPD Independence had ceased to effectively enable Facility Operations' management of heating and cooling operations. In response, a comprehensive project was initiated to completely overhaul the controls. This endeavor enabled Facility Operations to restore visibility over the system and regain control, ensuring operations align with the parameters outlined in the Sustainable Facilities Policy. As a direct outcome of this initiative, CMPD Independence achieved a notable 4.8% reduction in EUI to 54.7 kBtu/ft².



Fire Station 35

Facility Operations identified several shortcomings in the heating and cooling system, as well as the controls, citing them as being outdated and having suboptimal functionality. In response, a comprehensive solution was implemented, involving the replacement of the building automation system, the addition of new controls, and the installation of a hybrid heat pump system to upgrade the HVAC equipment. This initiative significantly enhanced Facility Operations' oversight and management capabilities, enabling automated heating shutdown in the apparatus bay when bay doors are open, thus improving operational efficiency. Moreover, the adoption of heat pumps, known for their superior energy efficiency — some models boasting over four times the efficiency of traditional air conditioners and furnaces — further contributed to the project's success. As a result of these retrofits, Fire Station 35 realized a substantial increase in energy efficiency, evidenced by a notable 20.8% reduction in EUI from 76.3 kBtu/ft² in 2022 to 60.4 kBtu/ft² in 2023.



Power Down the Crown Partner Highlight Unitarian Universalist Community of Charlotte (UUCC)

In 2015, UUCC engaged Interfaith Power & Light for an energy audit of their facility, aiming to pinpoint areas for enhancement in line with their commitment to combating climate change. Subsequently, insights from the audit have guided UUCC's facility management, leading to recent initiatives such as completing the transition of all lighting to LED, upgrading the furnace for higher efficiency, and implementing measures to minimize energy waste, notably ensuring lights are off in unoccupied areas. Moreover, in an effort to further reduce carbon emissions, UUCC installed a 17-kW solar photovoltaic system in 2019. Its dedication has yielded tangible results, with a 32.9% drop in EUI observed in 2023 compared to 2022. Looking ahead, UUCC is poised to sustain its efficiency and decarbonization endeavors by seeking a refreshed energy audit to uncover further improvement opportunities.

Key Takeaways



The number of facilities benchmarked has increased to 98, bringing the total square footage of benchmarked facilities to 6,825,836 ft2.



55.3% of buildings benchmarked last year improved their energy performance.



Portfolio-wide EUI decreased by 8.2% in 2023 compared to 2022.



Strategic investments in city facilities such as building automation controls and equipment replacements coupled with informed building operations are resulting in buildings operating at higher efficiencies.



56.3% of Offices experienced an increase in EUI, which presents an opportunity to review for improvements.



The decline in EUI observed at the CRVA and Cultural Facilities during the first full year post-COVID highlights the potential for enhanced efficiencies within our Offices.



Power Down the Crown partners are working toward increasing their buildings' energy efficiency.

Conclusion

Charlotte is making progress toward its 2030 goal of powering its municipal buildings with zero-carbon sources, and Power Down the Crown partners are doing their part to help the community reach our 2050 goal of being a low-carbon community. Because buildings represent a significant amount of the city's municipal carbon footprint, there will continue to be opportunities to strategically invest in energy efficiency and renewable energy for buildings to advance carbon reduction goals. The benchmarking work enabled through the Sustainable Facilities Policy and subsequent actions taken for the lower energy performing buildings will continue to support yearly progress. Specifically, benchmarking is a critical input in the roadmap for energy efficiency work and optimizing future energy efficiency and renewable energy investments.

This report and data dashboard confirms that there are important energy conservation opportunities that remain within municipal buildings, and the city's strategy toward its decarbonization goals should continue to include energy efficiency in buildings.