Case Studies of BPS Retrofits

An important consideration for Building Performance Standards is cost-effectiveness for property owners over time. While BPS require investments in energy efficiency measures, electrification, and ongoing reporting, experience from jurisdictions with similar policies and supporting case studies indicate that proactive performance improvements can yield net economic benefits over the life of a building. Benchmarking and energy modeling platforms enable owners to identify the most cost-effective opportunities for reducing energy use or emissions, allowing improvements to be prioritized based on return on investment.

Santa Ana, CA: Linc Housing - City Gardens Apartments[1]

LINC Housing, the nonprofit owner of the City Gardens Apartments in Santa Ana, undertook a comprehensive energy and water efficiency retrofit for the 274-unit and 290,000 square feet affordable housing property that was originally constructed in 1969, leveraging a Fannie Mae Green Refinance Plus loan and utility incentives to finance the work. The retrofit cost $715,000 and included lighting upgrades, solar domestic hot water, variable-speed pool pumps, occupancy sensors, weatherization, low-flow fixtures, and other measures identified through a Green Physical Needs Assessment, with much of the cost covered by rebates and financing tied to projected utility savings. As a result of these improvements, LINC has significantly reduced operating costs and utility consumption, with residents seeing about 11 % ($22,876) annual average savings on electricity use and lower energy and water expenses—benefits that enhance the property's long-term financial viability and reduce energy burden for both the owner and residents.

Carson, CA: California State University Dominguez Hills - James L. Welch Hall[2]

James L. Welch Hall is a four-story, approximately 183,000 square-foot office building on the California State University Dominguez Hills campus in Carson, California. Originally constructed in 2001, the building houses administrative offices, classrooms, and key campus operations. The university retrofitted the administrative building in 2020 by replacing 2,000 lighting fixtures and over 400 windows within two months. The retrofit project was part of the Integrated Technologies for Energy-Efficient Retrofits (INTER) research under the Leading in Los Angeles (LiLA) initiative, with the goal of reducing energy use by at least 20 % while improving occupant comfort and modernizing building systems.

The retrofit integrated advanced LED lighting with wireless luminaire-level lighting controls (LLLC), automated photovoltaic-powered window shading systems, and light HVAC retro-commissioning to optimize existing equipment. These technologies were selected to harvest daylight, reduce electric lighting loads, and coordinate with HVAC systems. The overall installed retrofit measures cost about $11 per square foot of building

[1] https://betterbuildingssolutioncenter.energy.gov/showcase-projects/linc-housing-city-gardens-apartments
[2] https://filesnewbuilding.s3.amazonaws.com/wp-content/uploads/2021/05/Retrofit-Tech-Case-Study_CSU_FINALv5.pdf

area—this includes the lighting and controls, automated shades, and commissioning adjustments.

Post-retrofit monitoring showed significant energy performance improvements. Whole-building energy use dropped by approximately 26%, with 35% savings in lighting energy and 29% savings in HVAC energy compared to pre-retrofit consumption. These reductions translate into reduced operating costs for the owner and a modernization of the facility that decreases maintenance (e.g., longer-lasting LED lamps) and enhances occupant comfort and satisfaction through personalized lighting and better daylighting control. The retrofit was funded through research and incentive programs including the CEC EPIC program and Southern California Edison partnerships, which helped support the technology demonstration and installation.

Santa Ana, CA: Santa Ana City Hall[3]

The retrofit project took place at Santa Ana City Hall Tower, an eight-story, approximately 127,000 square-foot office building located at 20 Civic Center Plaza in Santa Ana, California, originally built in 1972 and housing City administrative departments. It was selected as a field demonstration site under the Leading in Los Angeles (LiLA) research project to test an integrated set of energy efficiency technologies with the objective of reducing whole-building energy use by 20% and improving occupant comfort. The project was led by the New Buildings Institute (NBI) with support from the California Energy Commission's Electric Program Investment Charge (EPIC) and Southern California Edison.

The integrated retrofit included upgrading nearly all of the building's 2,422 lighting fixtures to high-efficiency LEDs paired with Daintree wireless lighting controls and installing automated daylight-harvesting window shades (with photovoltaic-powered motors on most windows). It also incorporated minor HVAC retro-commissioning to optimize existing systems and better integrate operations with the new lighting and shading controls. Typical installed costs for a retrofit package like this—including lighting, controls, automated shades, and HVAC commissioning—are estimated at roughly $14 per square foot.

Post-retrofit monitoring demonstrated meaningful energy performance improvements. Santa Ana City Hall achieved about 42% lighting energy savings, contributing to an overall 15–19% reduction in site energy use compared to pre-retrofit levels; HVAC energy use dropped by around 6%. When including unmetered energy uses like steam, the project team estimates it likely met or exceeded the 20% whole-building savings target. These energy reductions translated into lower operating costs for the City and reduced maintenance demands (e.g., longer-life LEDs and modern controls), as well as enhanced occupant comfort through better daylighting, glare control, and localized lighting control.

[3] https://filesnewbuilding.s3.amazonaws.com/wp-content/uploads/2021/05/Retrofit-Tech-Case-Study_Santa-Ana_FINALv3.pdf

Santa Clara County: Santa Clara Valley Water District High-Efficiency Toilet Retrofit Project[4]

The SCVWD implemented a large-scale retrofit program between 2007 and 2011 that focused on replacing aging, high-volume toilets in 80 multifamily residential and non-residential properties across Santa Clara County. In total, 4,954 toilets rated at 3.5 or 5.0 gallons per flush (gpf) were replaced with WaterSense-certified High-Efficiency Toilets (HETs) flushing at 1.28 gpf or less, primarily dual-flush gravity-fed models. The participating properties included 44 multifamily residential sites and 36 commercial properties, such as offices, medical facilities, and hospitality uses. The retrofit work was carried out by licensed plumbers under a direct-install program administered by SCVWD, meaning property owners did not bear the upfront capital costs of purchasing or installing the new fixtures however Santa Clara Valley Water did spend on average $135 - $269 per toilet.

Measured water savings were substantial. Across all properties, the program achieved average savings of approximately 38 gallons per toilet per day, driven by both reduced flush volumes and the elimination of leakage common in older fixtures. Multifamily residential properties showed especially strong results, reflecting the high usage rates and poor condition of many pre-1990 toilets. Non-residential properties—including offices and hospitality buildings—also realized meaningful water reductions. These savings translated directly into immediate savings on water and wastewater utility bills, with a savings of $195 - $489 cost per acre-foot conserved creating ongoing operational cost reductions for property owners without requiring behavioral changes from occupants. Beyond water bill savings, property owners benefited from reduced maintenance needs, as new HETs eliminated chronic leaks and frequent repairs associated with aging toilets. The program also improved fixture reliability and user satisfaction.

Conclusion

In many cases, energy savings achieved through performance improvements offset initial upgrade costs over time, particularly when combined with utility rebates, state and federal incentives, and financing tools such as on-bill financing or low-interest loans. Phased compliance schedules and flexible pathways further reduce financial risk by allowing owners to spread investments across multiple years while maintaining compliance. Property owners who use benchmarking data to plan and sequence improvements—such as implementing efficiency upgrades first, followed by electrification when systems reach end-of-life—can minimize upfront costs while achieving sustained performance gains.

Overall, BPS policies are structured to encourage smart, data-driven investment rather than immediate or costly retrofits, supporting both economic feasibility for property owners and long-term emissions reduction goals for the community.

[4] https://map-testing.com/wp-content/uploads/2022/11/2012-october-scvwd-cuwcc-final-report.pdf