

Fort Collins Building Performance Standards Case Studies

Contents

- City Buildings 2
 - Fossil Creek Park Shop, 5833 S. Lemay Ave. (FC2975) 3
 - Traffic Operations, 626 Linden St. (FC1313) 5
 - Building Services, 281 N. College Ave. (FC2660)..... 7
- Community Buildings: Efficiency Works Business Program Participants 8
 - Local House of Worship..... 9
 - Local Small Grocer 11
 - Local Retail..... 12
 - Local Restaurant..... 13
 - Local Strip Mall 14
- Glossary of Terms 15
- Historic Examples..... 17

City Buildings

As established in 2022, buildings owned by the City of Fort Collins are required to comply with performance standards (§ 12-203 (c) of the Municipal Code). The code states that by 2026, City-owned buildings must define a standard percentage reduction to be met by City-owned buildings.

Building on the code's impact, City staff collaborated with community experts to define achievable recommendations for citywide Building Performance Standards (BPS) that can be applied to commercial and multi-family buildings within Fort Collins.

The City strives to lead by example, and staff received strong support from City Council to alter targets for City buildings to align with targets set for community buildings should City Council adopt BPS requirements for privately-owned buildings.

A September 2024 [memo](#) submitted to City Council outlined specific requirements for City buildings to come into compliance, including an analysis of overall costs for those buildings that will need to take action to reach proposed BPS targets.

In addition to regular maintenance, efforts continue to improve City-owned buildings so they can achieve proposed BPS targets and to advance Council's electrification priority. The following case studies demonstrate ongoing and recent efforts in three City buildings and the results of those efforts, both expected¹ and realized.

¹ Program savings are based on the calculated difference in efficiency from existing to installed equipment and are customized accounting for building use specifics (e.g., lighting savings factor wattage differences between new and existing bulbs and actual hours of use). Calculated savings may not align exactly with reductions in consumption due to the range of other variables impacting electric use, however savings can accurately be viewed as usage that would exist without upgrades.

Fossil Creek Park Shop, 5833 S. Lemay Ave. (FC2975)



The Fossil Creek Park Shop is a 6,550 square foot shop built in 2000. The building's 2024 reported Energy Use Intensity (EUI) was 118.4 kBtu / square foot, 34% over the proposed Fort Collins BPS EUI target for the property use type (Other- Public Services) of 84 kBtu / square foot. As part of the proposed BPS policy, staff recommend buildings of this size not be required to exceed a 15% reduction from their reported energy use. This "maximum reduction cap" means that this building will have a modified target by its 2035 timeline, and instead of the 84 kBtu / square foot, it will need to achieve an annual reported target of 100.6 kBtu / square foot.

The building's total electric use in 2022 was 87,360 kilowatt-hours (kWh), and in 2023 was 77,840 kWh. A lighting retrofit in 2023 had some impact on 2023 annual energy use and will have more in 2024. The building's 2025 reported EUI will therefore reflect the reduction in EUI. Similarly, a roof top unit (RTU) retrofit and the installation of a building automation system were completed in fall of 2024. Those will impact 2025 usage and appear in the building's 2026 reported EUI.

The sum of savings below is estimated to be 36,943 kWh, accounting for approximately 38% electric use reduction. The City also expects to see major reductions in gas use associated with a heating, ventilation and cooling conversion.

2023 interior lighting retrofit

- Cost: \$14,005
- Utility rebate: \$11,194
- Total project cost after rebate: \$2,811
- Simple payback: 3.8 years
- Annual estimated kWh savings: 9,403

2024 heat pump RTU retrofit

- Cost: \$42,835
- No direct Utility rebates are available for HVAC rooftop units. HVAC rebates are provided to distributors to provide access to high efficiency HVAC equipment
- Simple payback: 10.0 years
- Annual estimated kWh savings: 15,340
- RTU conversion to dual fuel heat pump technology (electrification)

2024 building automation system

- Cost: \$49,500
- No direct Utility rebate available
- Simple payback: 12.0 years
- Annual estimated kWh savings: 12,200

Traffic Operations, 626 Linden St. (FC1313)



Traffic Operations building is a 9,500 square foot office building built in 2000 located at 626 Linden St. The building's 2024 reported EUI was 73.9 kBtu / square foot.

As part of the proposed BPS policy, staff recommend buildings of this size not needing to exceed a 15% reduction from their reported energy use. This maximum reduction cap means that the City Traffic Operations building will have a modified target to achieve by the 2035 deadline; therefore, instead of the 56 kBtu / square foot target proposed for office buildings, it will need to achieve a reported EUI of 62.8 kBtu / square foot.

The building's electric use in 2022 was 109,560 kWh and in 2023 was 108,240 kWh. The RTU and building automation system projects are scheduled to be completed Nov. 19, 2024. Those will impact 2025 usage and will appear in the building's 2026 reported EUI. Projects outlined below and associated usage reductions will lower the building's electric use by a projected 39%. The City also expects to see major reductions in gas use associated with a heating, ventilation and cooling conversion.

2024 heat pump RTU retrofit

- Cost: \$557,836
- There is no direct Utility rebates available for HVAC rooftop units. HVAC rebates are provided to distributors to provide access to high efficiency HVAC equipment.
- Simple payback: 10.0 years
- Annual estimated kWh savings: 27,060
- Eliminated one RTU by combining heating and cooling zones in the building
- RTU conversion to dual fuel heat pump technology (electrification)

2024 building automation system

- Cost: \$81,200
- No rebate available
- Simple payback: 12.0 years
- Annual estimated kWh savings: 25,000

Building Services, 281 N. College Ave. (FC2660)



Building Services is a 37,603 square foot office building built in 1970.

The 2023 reported EUI was 63 kBtu / square foot. The building is required to meet the proposed BPS office target of 56, or would need to reduce its overall energy use by approximately 11.7% to hit the target.

Based on a desktop audit, opportunities were isolated for reductions from lighting upgrades and HVAC controls. Costs were estimated at \$107,145 before rebates, or \$2.85/square foot. The desktop audit did not include opportunities from retrocommissioning, noting that City staff ensure equipment is maintained and calibrated on a routine basis, and the heating and cooling system is tested and balanced periodically.

After the case study, heating and cooling technicians performed semi-annual maintenance on the existing RTUs, taking extra time to do more extensive cleaning of the coils and filters (which build up with dust, dirt, and cottonwood seeds). Based solely on this effort, at no cost, the RTU performance and energy performance improved to the degree that the building is now meeting proposed EUI targets. As the City Assistant Energy Manager stated, "Clean coils and filters equal improved energy and comfort performance."

Community Buildings: Efficiency Works Business Program Participants

Fort Collins Utilities has offered rebate programs to commercial customers for over 20 years, accounting for about 60% of Utilities historic program savings². Efficiency Works Business (EWB) rebates and incentives accounted for 5,823 megawatt-hours (MWh) reduced electricity use in 2023, down from 11,492 MWh in 2022. EWB has resulted in a total of nearly 200,000 MWh electricity saved since the program was initiated, which is more than 27,000 homes use in a year. A significant amount of EWB program participation has been in lighting upgrades, however many properties benefit from several other rebates and incentives, from grocery, RTU controls, envelope, variable frequency drives (VFDs), custom rebates on virtually any other upgrade that save energy, and more.

In recent years, participation in incentive-based programs has waned; Utilities spent half the money on commercial rebates and incentives in 2023 that were spent in 2022. This may reflect reduced opportunity in high-impact, low-cost projects with engaged building representatives. However, engaged building owners have significantly reduced their energy consumption via participation in EWB offerings, reducing electric use up to 75% below pre-participation usage.

The following case studies represent a subset of local commercial buildings that have participated in EWB program offerings multiple times over the last decade, including total out-of-pocket costs, rebate amounts, and electricity saved. While these studies only reflect a small fraction of the buildings that have engaged with EWB since program inception, these properties demonstrate significant savings and a range of efficiency projects.

² Program savings are based on the calculated difference in efficiency from existing to installed equipment and are customized accounting for building use specifics. For example, lighting savings factor wattage differences between new and existing bulbs and actual hours of use. Calculated savings may not align exactly with reductions in consumption due to the range of other variables impacting electric use, however savings can accurately be viewed as usage that would exist without upgrades.

Local House of Worship

This house of worship is a 29,612 square foot church built in 1969. It also includes the additions of an administration area built in 1996 and a further expansion in 2022. The building houses a preschool and a sanctuary with a kitchen, commons and administrative areas. The church was estimated at just over 16,400 square foot before the 2022 expansion, which added 13,160 square foot. For the expansion, the church partnered with Fort Collins' Integrated Design Assistance Program (IDAP).

According to a 2018 facility assessment, there are typically two to eight employees who occupy the facility daily, however the facility can receive several hundred visitors during services and other events. Utilities provides electricity, water, wastewater and stormwater services.

Projects

In addition to several facility assessments, this house of worship completed five projects rebated through EWB, an IDAP expansion project, and benefited from a Midstream Cooling Program air conditioner. The building's electric use went down 27% through lighting projects (including interior lights, signs, classroom lights) and the installation of a high-efficiency air conditioner.

Five lighting projects were completed since 2014 at a total installed cost of almost \$19,800. Rebates paid through EWB covered just below \$13,000. Annual electric savings from these projects total 35,400 kWh / year. Using 2024 commercial electric rates, that's equivalent to \$3,330 in electric bill savings every year.

In 2023, this house of worship benefited from the EWB Midstream Cooling Program. EWB works directly with regional distributors to make sure customers have access to affordable high-efficiency air conditioning units. This program does not provide a rebate paid directly to the customer, but rather directs funding to distributors to lower costs of efficient equipment. The Midstream Cooling Program reduced the price of the air conditioning unit by \$2,900 and reduced electric use by 3,025 kWh per year over other comparably-priced units, saving an additional \$285 in annual electric bills.

Utilities' IDAP provides technical assistance and financial incentives to help architects, engineering professionals, and building owners optimize energy and demand savings and reduce operating costs in eligible new construction and existing building major renovation projects. Building owners receive a more integrated design process and overall, a more energy efficient building. This happens through engaging the expertise of an energy consultant early in the project to provide energy modeling services. Key program milestones, such as an early design charrette (energy workshop) and energy modeling reports help keep energy efficiency integrated in the design. An incentive of \$12,015 was paid to this house of worship as a part of their IDAP project, which focused on a 13,160 square foot project area and modeled reduction in energy use of 183,703 kWh annually.

Current energy use

As a result of the efficiency-focused projects taken on by staff, the church reduced its electric use by 27%. Their current EUI of 34.5 is below the proposed Fort Collins EUI target for worship facilities of 35.

Shared Vision

This house of worship invited 300 people to provide feedback on building upgrades prior to taking action, and shared with City staff that a big part of their congregation's shared vision was to incorporate energy efficiency and to be a sustainable example for the broader community. This house of worship is one of several in our community to uphold shared community values in leading by example.

Local Small Grocer

This grocer is a 7,500 square foot grocery store built in 1942. At the time of the most recent EWB assessment, the building was noted to be cinder block construction for the main space and wood frame for part of the back area. The building has a flat roof with black membrane. Utilities provides electricity, water, stormwater and wastewater. The facility was sold in 2022, however work preceding that sale can be compared to use at the time of sale as well as subsequent use to demonstrate savings associated with EWB projects. Multiple facility assessments before the sale isolated opportunities to save electricity.

Projects

A total of 12 EWB projects were completed over a 10-year period at this small grocer, with an additional lighting project in 2004. These projects upgraded the following elements:

- Lighting
- Refrigeration
- Gaskets
- Cooler lights
- Grocery
- Night covers and case lighting

Installation costs for the 2004 lighting project are not available, however total costs for subsequent upgrades were just under \$58,500. Incentives for all projects totaled just under \$28,000 (including \$1,750 for the 2004 project). Total electric savings for these projects equals 166,853 kWh of annual savings, or \$15,684 in annual electric utility savings based on 2024 commercial rates. This equals a 53% reduction in electric use as of 2021, just prior to the sale (a 58% reduction over today's use). The grocer is currently well under their projected EUI target as set by the proposed Fort Collins BPS (EUI 120, proposed target 148).

Local Retail

This retail store is a 46,070 square foot retail store built in 1991. As no assessment was done on this property, there is limited additional detail available, however the property benefitted from rebates.

In addition to a recent lighting project, they partnered EWB for a VFD upgrade. Their partnership saved them nearly \$47,000 in incentives paid toward a total of just under \$57,000 in work. EWB covered the entire cost of the lighting project and almost 30% of the cost of the VFD. The two projects saved a total of just under 183,000 kWh annually, totaling \$17,200 saved every year in avoided electric bills. This building is well below its proposed BPS EUI target, having reduced total use by 50% with two simple projects (EUI 23.6, proposed target for retail is 49).

Local Restaurant

This restaurant is a 6,200 square foot restaurant that opened in 2006. The building was constructed in 1999. The exterior surface area is estimated to be made up of 20% windows where a large portion faces east. That exposure brings a lot of daylight into the dining area, which led the owner to install indoor shading devices, according to an EWB facilities assessment. Utilities provides electricity, water, wastewater, and stormwater services.

Projects:

Within the last 10 years, this restaurant participated in three projects: gaskets, grocery, and sushi bar grocery. EWB provided just below \$6,000 in rebates for total project costs of \$6,630. These projects save 37,245 kWh annually. That equates to \$3,500 in electric costs avoided every year, using 2024 commercial electric rates. These projects reduced the restaurant's total use by 33%, and its current energy use is well under the proposed BPS EUI target (current EUI is 197, proposed EUI target for restaurants is 219).

Local Strip Mall

This 230,209 square foot strip mall houses large supermarkets, a liquor store, a gym, and various retail stores. Seven of the businesses within the building's footprint have participated in the EWB program, contributing to significant savings across the high-use building. While this building is covered by the State of Colorado's BPS policy, a case study is provided herein given the variety of projects.

To the north end of the building, 2 businesses have participated in 12 projects, including:

- Lighting and sign lighting
- Heater controls and electronically commutated motor (ECM) evaporator
- ECM in walk in and display cases
- LED cooler lights
- RTU controller
- VFD motors
- Gaskets (refrigeration)
- Display case doors (refrigeration)

Incentives paid for these projects total \$66,442, of \$197,608 total project costs before incentives. Annual electric savings from these projects are 525,096 kWh, or the equivalent of \$49,360 annual electric costs.

Toward the center of the building, 3 businesses completed six projects since 2017 focusing on food service and lighting, and one Midstream Cooling Program air conditioner. These projects received rebates of \$32,270 and achieved 163,131 kWh of annual savings, or the equivalent of \$15,334 in annual electric savings. While the cost of the air conditioner is unknown due to the nature of the Midstream Cooling Program, the installation cost of other rebated measures was \$57,387.

To the south end, one business participated in seven rebate offerings, while another business also benefited from the Midstream Cooling Program. The projects included cooler lights, gaskets, and lamps.

Total rebates equaled \$29,417 of a total installed cost of \$56,408 (minus the air conditioner as its sale price is unknown). Electric savings from these projects equal 382,284 kWh per year, or \$35,935 saved in electric bills annually (based on 2023 commercial electric rates).

In total, the whole building has saved 1,070,511 kWh, equal to over \$100,680 in annual bill savings. Total out-of-pocket costs after rebates was \$183,274 (excluding the unknown air conditioner costs). In total, the projects above reduced overall building electric use by about 17%. This building is meeting Fort Collins' proposed BPS target (current EUI is 101.8, proposed EUI target for strip malls is 103).

Glossary of Terms

ECM:

An ECM (electronically commutated motor) lowers the total electrical consumption of an air conditioner or furnace. It helps maintain proper air flow through the system by sensing its operational status and controls the speed of the evaporator fans.

ECM motors contain a microprocessor, which is the key component of what makes them able to provide better efficiency. This microprocessor controls the motor to regulate air flow. The motor's rotations per minute will either ramp up or down to keep air flow steady. This allows an air conditioner and heater to work at maximum efficiency. Rather than the motor running the fan at the same constant high rate, it modulates to adjust for conditions, sometimes running at lower speeds and using less power than full load. On top of this significant way to save energy, an ECM motor uses less wattage than a standard motor. Savings occur from full speed runtime hours reduction and waste heat reduction to the refrigeration system.

VFD:

A VFD (variable frequency drive) saves energy by helping motors operate at the most efficient speed for any given use. They extend equipment lifespan by decreasing wear and tear and reduce maintenance costs. Fans and pumps that are turned down just 10% can save up to 25% in energy costs. In most systems, reducing speed by 50% can cause a 75% drop in energy consumption. That equals big savings, which can be realized more easily and affordably by partnering with EWB for local rebates.

Gasket:

A gasket is a common term for any seal between two surfaces. A refrigeration gasket is a flexible, elastic strip that creates an airtight seal around the edges of a refrigerator or freezer door. Refrigeration gaskets are a very important part of a walk-in cooler or freezer's performance. Gaskets are responsible for sealing walk-in doors and panels to stop any air infiltration. When gaskets are not working properly, refrigeration units must work harder to keep their temperature – which in turn generates higher energy bills and wear and tear on equipment. Gaskets help maintain temperature and improve energy efficiency by reducing the amount of warm air that enters a cold area, and vice versa.

RTU controller:

A rooftop unit (RTU) controller is a retrofit technology that provides better functionality and energy savings opportunities for existing RTUs. The U.S. Department of Energy [estimates](#) anywhere from 15% to more than 50% energy savings can be achieved with a one to four year simple payback potential. There are several features of advanced RTU controllers that contribute to savings, mostly from the implementation of variable or multi-speed control of the supply air fan, demand controlled ventilation (which uses CO2 levels in the return air to adjust the outside air control), and improved economizer control. Some technologies allow for demand response, web-based remote monitoring, and automated fault detection and diagnostics.

LED lighting:

The most common EWB upgrade over the years has been lighting, given its short, simple payback, ease to upgrade, and aesthetic value. Light-emitting diode (LED) is an energy-efficient technology that lasts longer, is more durable, and offers comparable or better light quality than other types of lighting. The high efficiency and directional nature of LEDs makes them ideal for many industrial and commercial uses. LEDs emit very little heat, unlike incandescent bulbs which release 90% of their energy as heat, and CFLs which release about 80% of their energy as heat. LED lighting products also last much longer than other lighting types. A quality LED bulb can last three to five times longer than a CFL and 30 times longer than an incandescent bulb.

Historic Examples

Many case studies have been documented over the years to demonstrate savings along with other positive benefits resulting from efficiency projects. As a part of the City's efforts to outline achievable recommendations for a local BPS, Utilities completed modeled case studies for the most common property use types covered by the proposed Fort Collins BPS (office, multi-family, retail, and strip mall). Those case studies are available at ourcity.fcgov.com/bps.

EWB also publishes case studies from Fort Collins as well as the other partner jurisdictions (Estes Park, Longmont, and Loveland). These case studies demonstrate various property types that have participated with the program and benefited from rebates. Those case studies can be found online at efficiencyworks.org/resources/business-resources.

Utilities has also put together historic case studies, documenting further local partnerships with EWB. These short, concise studies provide further documentation of the historic success of EWB, and can be shared upon request.

Through decades of partnership with the community, Utilities has provided rebates and incentives directly to the community, financed technical support for on-site audits and energy advising, and direct to manufacturer benefits to reduce the cost of efficient technologies.

These programs have provided many examples of ways local buildings can improve their efficiency. However, the projected future impact of economic-based approaches to building efficiency are far short of the outcomes our community tasked the City to achieve in the [Our Climate Future](#) plan. Utilities strongly recommends BPS as a regulatory approach to meet Our Climate Future goals; indeed, such an approach is the only way OCF targets could be met.