colorado affordable housing

Willoughby Corner, Phase 1 Case Study | Lafayette, Colorado

Project data

Project Type	**55+ (Older Adult living)**	**Family**
Project Location	Lafayette	
IECC Climate Zone	5	
HTC Deal Type	Federal 9 percent Housing Tax Credits	Federal 4 percent Housing Tax Credits
Completed	Projected 2024	
Size (sf)	64,534	140,839
Levels (#)	3	4
Units (#)	63 units (50 one-bedroom, 13 two-bedroom)	129 units (87 one-bedroom, 30 two-bedroom, 12 three-bedroom)
Buildings (#)	1	4 residential; 1 community building
Construction Type	New construction	
Fuel Type	All-electric	
Green Building Certifications	Zero Energy Ready Homes Program, Enterprise Green Communities	
Total Development Cost	$106,400,121 (2024)	
Operational Cost (PUPA)	$7,500	

Overview

Willoughby Corner is a master-planned greenfield project born of an intergovernmental agreement between Boulder County Housing Authority (BCHA), Boulder County, and the City of Lafayette. The development is all-electric and, when fully built-out, will offer 400 below-market-rate rental and permanently affordable for-sale homes across several apartment buildings, duplexes, and townhomes. The development also includes nearly $14 million of public improvement infrastructure. Phase 1 of the development will be completed in December 2024 and includes one 63-unit apartment building for 55-and-over residents, four buildings with 129 units serving families, and one community center. BCHA expects to finish construction on Phase 1 by the end of 2024.

Planning and design approach

The vision for Willoughby Corner was to develop an all-electric community, while also enhancing the eastern part of Lafayette with significant public infrastructure improvements such as upgraded roads and utilities. BCHA strives to be on the cutting edge of sustainable affordable housing development, noting that they have previously worked with partners such as the National Renewable Energy Laboratory to pilot innovative electrification strategies. BCHA relies heavily on input from their in-house maintenance team during the design stage, as they are able to provide recommendations based on real experience operating other properties employing a range of electrification strategies. Through this, BCHA also ensures maintenance staff are familiar with building systems after the design stage and know how to operate the building effectively and efficiently.

Electrification strategies and features

Water Heating

Central electric resistance water heater with desuperheaters connected to each in-unit air handler

Space Heating & Cooling

Central ground source heat pump

Ventilation

Supply-only ventilation from a central dedicated outdoor air source

Cooking

Electric resistance stoves

As Boulder County aspires to be a leader in sustainability, BCHA's decision to pursue all-electric development at Willoughby Corner was a natural one. When it came to system selection, BCHA relied on the expertise of their design team to help analyze the trade-off between increased up-front costs for higher efficiency systems with lower operating costs versus lower up-front costs for less efficient systems with higher operating costs. Ultimately, BCHA decided to invest up-front to make Willoughby Corner a highly energy-efficient community, a decision driven in part by BCHA's policy of covering the costs of utilities for residents in their developments and their focus on keeping operating costs low.

Willoughby Corner employs a central ground source heat pump to provide space heating and cooling to units, a system type not typically seen in affordable housing due to the relatively high up-front cost of the equipment and installation. BCHA is well-positioned to use a central system such as this due to their existing utility billing structure, while other owners/operators may not be willing or able to take on the responsibility of paying the utility costs associated with a central system.

To learn more about electric space heating and cooling, visit our technical roadmap

For water heating, BCHA selected electric resistance water heaters, a code minimum efficiency option, paired with desuperheaters which harness excess energy from the ground-source heat pump's refrigerant cycle to pre-heat the incoming water. This strategy reduces the energy required to fully heat the water, compensating for the lower efficiency of the system. This strategy is only compatible with the ground source heat pump system.

To learn more about electric water heating, visit our technical roadmap

The ventilation system used at Willoughby Corner provides filtered, pre-conditioned air to each unit from a dedicated outdoor air source (DOAS). This form of supply-based ventilation leverages the efficiency of a central system to provide ventilation to both units and common spaces throughout the building.

To learn more about ventilation, visit our technical roadmap

At the outset of this project, BCHA's ambition was to offset 100 percent of operating costs using on-site solar. However, the project team found that there was not enough rooftop surface to accommodate the amount of solar needed, and the cost of purchasing steel for ground-mounted solar panels was prohibitive. BCHA utilizes community solar subscriptions to offset operational costs at several of their properties, but due to high demand there were no remaining subscriptions left in Boulder County to implement this at Willoughby Corner. The project team estimates that the available rooftop solar array at Willoughby Corner will offset about 40 percent of energy use.

To learn more about solar, visit our technical roadmap

Financing and cost

The total development cost (TDC) of Phase 1 of Willoughby Corner was $106.4 million. The per unit per annum (PUPA) cost is $7,500 (2024). This is lower than the Boulder County average of $7,677 (**CHFA Per Unit Per Annum (PUPA) Reporting**).

BCHA noted that because Willoughby Corner is a master-planned community, they achieved an economy of scale while purchasing materials for the development. The project team felt that the efficiency achieved through the simultaneous development of two distinct types of housing saved them time and money compared to a scaled-down development strategy, despite the sometimes-increased administrative burden.

BCHA secured the 45L tax credit, which is available for eligible new or substantially reconstructed homes that meet applicable ENERGY STAR home program or DOE ZERH program requirements. Because Willoughby Corner is ZERH certified, BCHA was eligible for the higher credit associated with 45L and used this to help offset the up-front cost of the geothermal system.

This project was developed during a time of market volatility (COVID-19 pandemic, supply chain issues, etc.), so BCHA opted for rate locks on construction and permanent loans, to minimize uncertainty and lock in the terms of those funding sources.

To learn more about current funding, financing, and incentive opportunities that support all-electric development, visit our Resource Finder

Successes

BCHA attributes much of the success of Willoughby Corner Phase 1 to deciding early in the planning process to pursue all-electric development. Notably, they included this decision in all Request for Proposals (RFPs) and were able to find experienced professional consultants to help make the project a success.

Willoughby Corner Phase 1 employs a highly efficient and sophisticated heating, ventilation, and air conditioning (HVAC) system. The use of ground source heat pump (GSHP) technology proves that multifamily affordable housing is not only able to keep pace with market-rate developments but can be a leader in building electrification. This is further evidenced by BCHA's choice to pursue a 2021 IECC compliant building envelope—a major investment in energy efficiency at Willoughby Corner.

Further, even with the inclusion of paid utilities for all residents, Willoughby Corner has a PUPA cost that is slightly lower than the Boulder County average of $7,677, as reported by CHFA (2024). This demonstrates that all-electric developments are not always more costly to operate than their mixed-fuel counterparts.

Lessons learned

Learning from their challenges is a major piece of BCHA's development strategy, and they have identified several lessons from Phase 1 of Willoughby Corner's development.

A project of this size—five residential buildings and one community building—requires a large workforce to match. While this has not been a major challenge in this development, BCHA's partners have let them know that the rapid growth in demand for installers trained for all-electric development has pushed more individuals to enter the field recently and produced a younger, less experienced workforce. Naturally, newer installers will gain experience with time and practice, especially as the demand for this skilled labor continues to grow. In the near future, BCHA will consider these factors when planning timelines and phases for their larger projects.

Initially, BCHA had intended to use a central energy recovery ventilation (ERV) system at Willoughby Corner. ERV is a best-in-class system that pre-conditions a building's fresh air supply using a heat exchanger connected to exhaust air, reducing heating loads and contributing to lower operating costs. However, BCHA has become aware of the increasing use of methamphetamine in Boulder County communities and is concerned about the potential risk this can pose to indoor air quality. Rather than opting for a central system for ventilation which would potentially recirculate contaminants throughout the property, they decided to use a supply-only ventilation system which will not reduce operating costs as much as an ERV but will be safer for residents if contaminants were to ever be present.

Project team

Developer	Boulder County Housing Authority (BCHA)
Architect	RS&H / HB&A
General Contractor	Pinkard Construction
Master Planning & Landscape Design	Norris Design
Community Engagement	The Pachner Company
Transportation Engineer	Kimley-Horn
Financial Consultant	SB Clark
Civil Engineer	Drexel Barrell
Market Study Analyst	JRES
Mechanical, Electrical, and Plumbing (MEP) Engineer	Farnsworth Group
Structural Engineer	HCDA Engineering
Energy Engineer	Group14 Engineering
Legal Counsel	New Communities Law

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