



HIGH-PERFORMANCE HVAC FOR ADAPTIVE REUSE PROJECTS

SUBJECT PROPERTY

- Location:** Troy, NY
- Construction Type:** Adaptive reuse gut renovation
- Building Size:** 7 Floors, 67 Units, 228 rooms, 54,700 gross sqft
- Metering Configuration:** Owner paid heat, hot water, water & sewer
- Envelope:** Moderate values; walls (R-19) and roof (R-42.9), double-pane windows (.42 U-value)

Additional Information:

Completed Enterprise Green Communities Certification, incorporation of a green-roof and rain water harvesting

COMPARABLE PROPERTY

- Location:** Troy, NY
- Building Size:** 7 Floors, 89 Units, 254 Rooms, 73,066 gross sqft
- Metering Configuration:** Owner paid heat, hot water, water & sewer
- High-Performance Building Elements:**
 - Similar Heating, Ventilation, and Air Conditioning (HVAC) design
 - Built incorporating Passive House design principles, not certified

High Performance Building Elements:

- Heating and Cooling:** Geothermal heat pump
- Ventilation:** Centralized with heat recovery ventilation (HRV)
- Domestic Hot Water:** High-efficiency gas-fired condensing boiler
- Incentives:** NYSERDA Multifamily Performance Program (MPP)

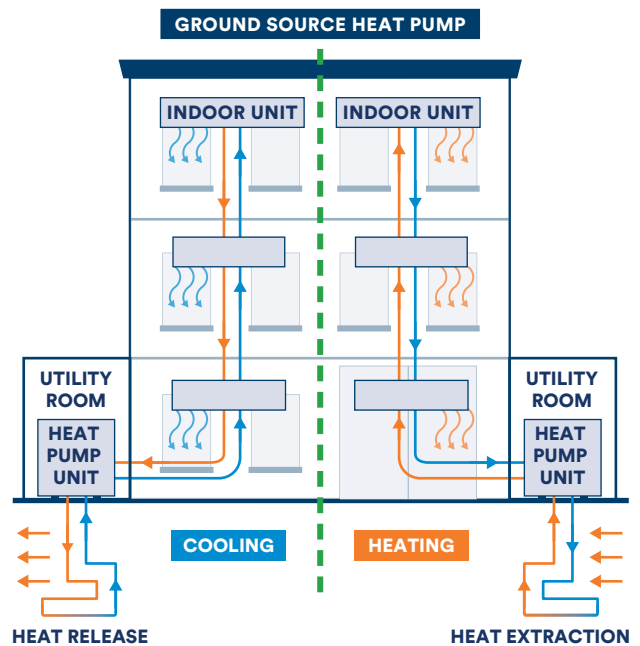


Diagram A: Ground-source (Geothermal) Heat Pump uses the constant temperature of the earth as the exchange medium. An indoor unit and heat exchanging ground loops, installed below the frost line, transfer thermal energy to extract or release heat before further conditioning with refrigerants. This system can cool and heat depending on the season.

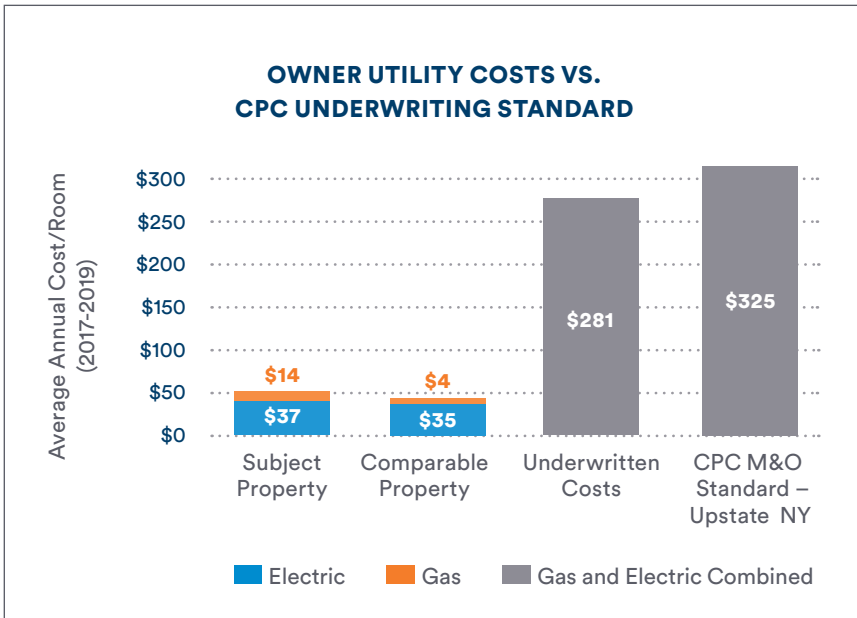


Chart A: Owner utility costs broken out by electric and gas for both the Subject and Comparable properties. Both buildings are compared to the Subject Property’s underwritten costs at permanent financing and the CPC underwriting standard for Upstate NY. The Subject property’s performance, taken as an average of recorded costs from utility bills for four stabilized years, exhibits an 84% reduction when compared to the underwriting standard, and an 81% reduction when compared to the underwritten costs.

One way lenders seek to understand the economic advantages of different building systems is through developer comps. If the developer has installed a similar HVAC design in another building and can demonstrate lower expenses, lenders are more likely to take the owner’s projected utility expenses into account.

The Subject Property is an adaptive reuse, low income housing tax credit (LIHTC) development serving tenants making between 50% and 90% area median income (AMI). This is the developer’s second project incorporating geothermal heat pumps (GHP) for heating and cooling as well as heat recovery ventilators (HRV) for mechanical ventilation.

GHPs drastically reduce heating and cooling costs by taking advantage of the relatively constant temperature of the earth—cooler than the outside air in summer and warmer than the outside air in winter—as the energy exchange medium giving the system a head start before employing refrigerants to condition indoor spaces.

GHPs are quieter, last longer, and require less maintenance than most other gas-fired or heat pump systems and they do not depend on the temperature of the outside air for heat absorption. They do, however, require specific soil conditions and the space on-site to run the underground exchange loops.

Utilizing three years of operating expenses from gas and electric utility bills for both the Subject and the Comparable Property, it is clear that both buildings are performing far better than the baseline used in CPC’s underwriting standard – CPC’s estimate of “typical expenses” based on income and expense reporting from buildings in the lending portfolio.

The use of electric heating, cooling, and ventilation—HRVs and the GHP system—is assumed to be slightly costlier than a typical high-efficiency gas-fired system in this underwriting scenario. The electricity line item, in this case, was increased slightly from \$175 to \$216 per room per year to cover that assumed additional cost, while the gas line item was decreased to reflect the reduction in consumption for DHW.

The expenses projected at conversion were underwritten as a 13.5% discount off of CPC’s underwriting standard for employing energy efficiency measures. Analysis of the three years of stabilized energy costs shows that the Subject Property has performed 84% better than the underwriting standard for “typical” buildings.