Low Income Multifamily
Explainer

Figure 1: A typical 1970s multifamily apartment complex in the Bay Area.

Figure 2: Packaged Terminal Heat Pump installation in an apartment.

Characteristics
Built before 1980
Poor insulation
Small electrical Panels
Space constraints

Energy Conservation Measures
Solar PV
Central HPWH
Low Power Packaged Terminal Heat Pumps
Light touch envelope improvements

This report examines the characteristics and retrofit considerations that are specific to multifamily residential properties in urban settings. According to building stock analysis data, more than half of all multifamily buildings were constructed prior to 1980, with approximately 25% dating to pre-1960 construction periods. Buildings containing between 5-19 residential units represent the most prevalent multifamily configuration, with the highest concentration of these properties having been developed during the 1960-1979 timeframe. These mid-sized multifamily properties predominantly operate as rental housing and are disproportionately represented within disadvantaged communities.

Common multifamily buildings are characterized by wood-framed construction, absence of central cooling systems, substandard thermal envelope performance (characterized by minimal insulation values and single-glazed window assemblies), and centralized domestic hot water distribution. Many multifamily buildings have limited electrical service capacity with undersized distribution panels and significant spatial constraints that complicate replacement of heating equipment, plumbing infrastructure, and HVAC system components.

Building Envelope Considerations
The thermal performance characteristics of 1970s-era multifamily buildings present substantial opportunities for energy efficiency improvements through strategic envelope interventions. These structures typically demonstrate high infiltration rates due to substantial air leakage occurring at window perimeters, electrical penetrations, door frames, and baseboard intersections. Implementation of comprehensive air-sealing measures represents a highly cost-effective approach to improving thermal performance without requiring substantial modification to existing building systems.

Beyond air-sealing strategies, thermal insulation improvements should follow a tiered approach, first targeting attic spaces where installation complexity is minimal and energy performance benefits are maximized. Insulation upgrades for below-floor assemblies can be effectively addressed through either rigid foam panel installation at crawlspace perimeters or blown cellulose approaches depending on access conditions. Wall assembly insulation retrofit approaches typically utilize drill-and-fill methodologies employing either expanding foam products or dense-packed cellulose materials. Interior access is strongly preferred to ensure that the envelope is not damaged and remains resilient to water penetration.

Electrical Service Capacity
When implementing 100% electrification in multifamily contexts, the existing electrical infrastructure often imposes significant constraints on system design and equipment selection. Employing strategic load calculation methodologies as outlined in the National Electrical Code provides a structured approach to maximizing available capacity while minimizing costly service upgrades. This "Watt Diet" approach involves comprehensive analysis of building electrical requirements and equipment selection based on systematic power-usage tradeoffs.

Figure 3: (Above) Ephoca wall mounted, packed heat pump.[1]

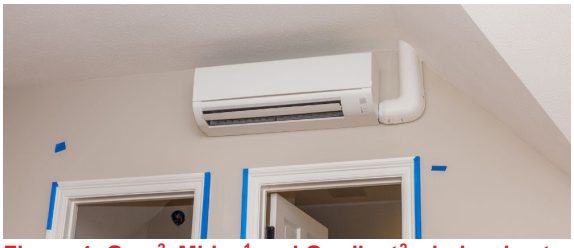
Figure 4: Gree[2], Midea[1] and Gradient[2] window heat pumps.


Figure 5: Rheem[3], pictured is one of many manufacturers offering easy-install, 120V heat pump water heaters for apartments.

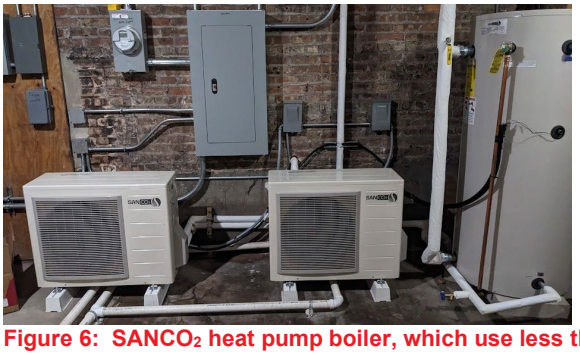
Figure 6: SANCO$_2$ heat pump boiler, which use less than half as much power and energy as heat pumps using other refrigerants than CO$_2$.[4]

[1] Image Credit: Sean Armstrong (2025) at AHR Expo.
[2] Image Credit: Gradient (2025) https://www.gradientcomfort.com/products/gradient-all-weather-120v-window-heat-pump
[3] Image credit: Rheem (2022) https://www.rheem.com/water-heating/articles/rheem-proterra-plug-in-heat-pump-water-heaters-designed-for-easy-gas-unit-replacement-2/
[4] Image credit: CleanTechnia (2024) https://cleantechnica.com/2024/09/25/this-central-heat-pump-water-

Utilization of 120-volt equipment systems presents particularly valuable opportunities within capacity-constrained multifamily applications. These lower-power alternatives typically operate within existing circuit capacities, thereby eliminating the need to modify panels or install additional circuits. Contemporary manufacturers now offer 120-volt solutions across all essential residential systems, including space conditioning heat pumps, domestic hot water equipment, clothes drying appliances, and induction cooking technologies, enabling comprehensive electrification within existing service constraints.

Figure 7: An XL (47 quart) countertop oven.[5]

Space Utilization Challenges

The physical configuration of 1970s multifamily construction presents substantial challenges regarding equipment placement and distribution routing. Shared wall assemblies complicate new ductwork installation or refrigerant line routing. Alternative approaches such as packaged terminal heat pump systems offer practical solutions through window-mount or through-wall installations, which do not require distribution. Mini-split heat pump systems provide another viable alternative through surface mounting of refrigerant lines within conduit.

Renewable Energy Integration

Installation of renewable energy generation capabilities through rooftop solar PV systems represents an essential component of successful multifamily electrification initiatives, particularly for properties serving economically vulnerable populations. By offsetting grid electricity draw, these systems can substantially lower utility cost impacts associated with fuel switching while simultaneously reducing environmental impacts. Integration of solar generation capacity should be considered a fundamental element in ensuring electrification remains financially accessible for tenants while supporting broader decarbonization objectives.

heater-in-chicago-was-one-of-the-first-to-be-installed-in-a-cold-climate/

[5] Image Credit: Oster (2025) https://www.oster.com/cooking-appliances/countertop-ovens/