

Building Typology 3:

Mid-Rise Multifamily (4-7 Stories)

with Steam Heating



Converting from fossil fuel to efficient electric equipment improves health, safety, and comfort for residents. This document is intended to educate owners and managers on upgrades to achieve an all-electric building, including minimizing overall costs and disruption during the transition. For more detailed information, see the Retrofit Pages in Playbook 2.

Building System	Starting Point	Ending Point	First Cost*	Benefits
Heating and Cooling	Boiler with steam distribution, and individual window A/C units	Mini-split air source heat pump for heating and cooling	\$\$\$	<ul style="list-style-type: none"> • Single system to install and maintain • Healthier indoor air • Tenants able to control temperature • Cooling more efficient and less drafty compared to window A/Cs
Hot Water	Central hot water plant	Central split heat pump water heater	\$\$	Potential to bring in revenue when paired with utility demand-response programs
Cooking	Gas cooktop and oven	Electric cooktop and oven	\$	Healthier indoor air and reduced risk of respiratory disease
Electrical Upgrades	Electrical upgrades are likely needed to support new electrical loads from all upgrades		\$\$\$	Necessary in most buildings to complete other upgrades

**First cost is based on the total cost of the upgrades before incentives. Note that the incremental cost may be lower depending on the state of existing equipment. Incentives may further lower costs, but vary by region.*

First Cost Key	Cost per Apartment Unit
\$	under \$2,000
\$\$	\$2,000 to \$6,000
\$\$\$	\$6,000 to \$18,000
\$\$\$\$	\$18,000 to \$30,000+

PLANNING FOR UPGRADES



First Costs

Plan equipment upgrades around the end of equipment life.

- Mini-split air source heat pumps have a higher first cost than replacing a boiler and building-wide window A/C units.
- Heat pump water heaters (HPWH) and electric stoves typically have higher first costs than their fossil fuel counterparts.
- Pre-requisite electrical upgrades may be a significant cost for larger, older buildings though depends on the current state of electrical service. See [Electric Considerations for Electrification Upgrades](#) for more information.

Utilities and local governments often have heat pump and/or energy efficiency incentive programs.



Operating Costs

Electrification upgrades will lower overall energy usage but may increase operating costs as electricity is more expensive than gas. Energy efficiency and solar PV can help ensure operational savings.

- Mini-splits are more efficient than the existing boiler and window A/Cs. Lower cooling costs may offset higher heating costs.
- HPWHs and electric stoves are typically more expensive to operate.
- If tenants currently pay for electric and landlords pay for gas, there should be adjustments to metering or lease language to account for shifts in costs.
- Upgrades may also lead to a change in utility service classes and rates.

Local utility prices, metering configurations, and equipment efficiencies will highly impact overall project economics.



Electrical Service Upgrades

Review all potential electrical service needs at once, including additional capacity for electric vehicle charging and solar, to minimize costs and disruptions.

COORDINATION WITH CONTRACTORS



These upgrades can be complex and involve multiple trades. Work with a trusted engineer or energy consultant to coordinate across the trades and other parties.

- Communicate the overall goal of an all-electric building and the importance of a holistic approach.
- Pre-requisite electrical upgrades typically involve permitting and may require electricians to coordinate with the local utility for service upgrades.
- Require fair wages, benefits and women- and minority-owned business status of contractors or subcontractors.

CONSIDERATIONS AND CHALLENGES FOR INSTALLATION



Begin with electrical upgrades and create a master plan for equipment replacement before the current equipment fails.

Mini-splits will replace the heating system and window A/Cs.

- Outdoor units (see below) will likely be located on the roof, or perhaps at ground level if space permits. Outdoor units can also be mounted on exterior walls.
- Indoor units (see below) must be configured to deliver sufficient heating to each space. Work with an engineer or energy consultant to identify the most likely design
- Insulate, air seal and remediate mold and other health hazards ahead of installation.

A central split heat pump water heater (HPWH) plant will replace the current hot water plant.

- These plants have a different design compared to gas hot water plants and will require extensive planning and potentially building and tenant disruptions.

Electric stoves may be induction or electric resistance technology.

- Induction offers grater cooking precision and reduced fire risk, although they are more expensive.



Scheduling

Upgrades will require clear communication with tenants of access needs and equipment downtime.

- Upgrades will likely require rewiring, either within tenant spaces or in electrical rooms. Extending wiring to new equipment is often the most disruptive step, requiring wall access.
- Consider the weather too— mini-splits should be installed in the in the spring or fall.
- Electric stoves and mini-splits can be replaced during tenant turn over. Otherwise, coordinate installation with other planned renovation projects to minimize costs and disruption.

ONGOING MAINTENANCE AND RESPONSIBILITIES



Education and Training

Educate residents on efficient and comfortable operation of the new equipment.

- Mini-splits should not be turned up and down dramatically throughout the day. The most efficient operations is to “**set it and forget it.**”

Ongoing Maintenance

Mini-splits and HPWH regular maintenance includes changing or cleaning filters and keeping outdoor units clean and clear.

- Annual servicing of equipment is recommended, similar to typical heating systems.
- Consider and clearly communicate who is responsible, landlord or tenants, for these ongoing needs.

If in colder climates, it will be important to install “cold-climate” heat pumps.

Asbestos can significantly increase upgrades to walls and ceilings.



MINI-SPLIT OUTDOOR AND INDOOR HEAT PUMP COMPONENTS. EACH UNIT ON THE ROOF SERVES A DIFFERENT APARTMENT.



CENTRAL SPLIT HPWH PLANT