

# Building Typology 4:

## High-Rise Multifamily (8+ Stories)

### with Steam or Hot Water (Hydronic) 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 or hydronic distribution and individual window A/C units	Individual packaged terminal heat pump (PTHP) units for heating and cooling	\$\$\$	<ul style="list-style-type: none"> <li>• Healthier indoor air</li> <li>• Tenants able to control temperature</li> <li>• More efficient cooling</li> </ul>
		Central heat pump plant	\$\$\$\$	
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.

- For central systems, a central heat pump plant has a higher first cost than replacing a central boiler plant and building-wide window A/C units.
- For individual systems, replacing Packaged Terminal Air Conditioning units with cold-climate Packaged Terminal Heat Pump (PTHPs) is first cost comparable.
- 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.



### 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 savings.

- Central or individual heat pumps are more efficient than the existing boiler and A/C units. 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.

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

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

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

## 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.*

**Central or individual heat pumps** will replace the heating and cooling systems.

- The type depends on your existing configuration—likely a central heat pump plant, also known as a variable refrigerant flow (VRF) or cold-climate packaged terminal heat pumps (PTHP). Work with an engineer or energy consultant to identify the most appropriate technology.
- If a central heat pump plant is installed, the outdoor components will likely be located on the roof. Coordinate installations with roof maintenance and plan for potential future equipment like solar to ensure sufficient space.
- 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 greater cooking precision and reduced fire risk, although 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— Heat pumps should be installed in the in the spring or fall.
- Electric stoves and PTHPs 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

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

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

### Ongoing Maintenance

*Heat pumps 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.



PACKAGED TERMINAL HEAT PUMP



CENTRAL HEAT PUMP PLANT



CENTRAL SPLIT HPWH PLANT