

Building Typology 1:

Low-Rise Multifamily (1-3 Stories) with Gas Furnace and Central Cooling



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	Ducted furnace and central cooling	Ducted air source heat pump (ASHP) for heating and cooling (if existing ductwork can be used)	\$\$\$	<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
		Mini-split air source heat pump for heating and cooling (if existing ductwork cannot be used)		
Hot Water	In-unit or basement storage water heaters	Heat pump water heaters (HPWH) with storage tanks (could be either split or integrated system)	\$\$	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 electric hot water and cooking		\$\$ to \$\$\$	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.

- Air source heat pump (ASHP) are similar to the combined first costs of replacing the existing furnace and central cooling system.
- Heat pump water heaters (HPWH) and electric stoves are typically more expensive than their fossil fuel counterparts.
- Pre-requisite electrical upgrades range in cost depending on the current state of electrical service. Older systems may be more expensive to upgrade. 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.

- ASHPs are more efficient than the existing furnace and central cooling system. 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, rents, 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



Upgrades will involve multiple trades and utilities. Inform contractors of all planned electrification upgrades and prioritize contractors who have experience with heat pump equipment.

- ASHP and HPWH manufacturers have lists of contractors that often offer additional warranties.
- Pre-requisite electrical upgrades typically involve permitting and may require electricians to coordinate with the local utility for service upgrades.

CONSIDERATIONS AND CHALLENGES FOR INSTALLATION



Air source heat pumps (ASHP) will replace the furnace and central cooling system.

- Insulate, air seal, and replace windows if at end of useful life ahead of installation, and remediate mold and other health hazards. A blower door test can help identify leaks and correctly size the new ASHPs.
- Evaluate if ducts are in good condition to be used for ducted ASHPs. Otherwise, install ductless ASHPs, or “mini-splits”, which will require access to tenant living spaces.

Heat pump water heaters (HPWH) will replace the current hot water system in the same location.

- Some HPWHs require additional air flow and should be in unheated indoor spaces.
- Split HPWHs (see below) can be used where indoor space is limited.

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 too — ASHPs should be installed in the in the spring or fall.
- Electric stoves and HPWH (if current water heaters are in tenant spaces) can be replaced during tenant turn over. Otherwise, coordinate installation with other planned kitchen renovation projects to minimize costs and disruption.

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

Asbestos can significantly increase upgrades to walls and ceilings.



DUCTED ASHP, WITH INDOOR AND OUTDOOR COMPONENTS.



SPLIT HPWH, WITH HEAT PUMP OUTSIDE AND STORAGE TANK INSIDE.

ONGOING MAINTENANCE AND RESPONSIBILITIES



Education

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

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

Ongoing Maintenance

ASHP and HPWH regular maintenance includes changing or cleaning filters and keeping outdoor units clear and clean.

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