

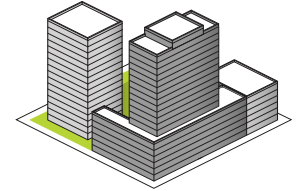








Playbook Summary: Post-War 8+Stories

These buildings are typically at a minimum of 8 floors in height and can be found in virtually every context—from lot line buildings, to free standing buildings on campuses. Many buildings of this type include mixed uses at the ground floor, such as retail (grocery stores, pharmacies, etc.) and commercial offices (Doctor’s offices, etc.). Basic tenant amenities are common, such as laundry, gym, and storage. The height and layout of buildings in this typology vary considerably with both simple towers and podium-tower arrangements common, both corner and mid-block.

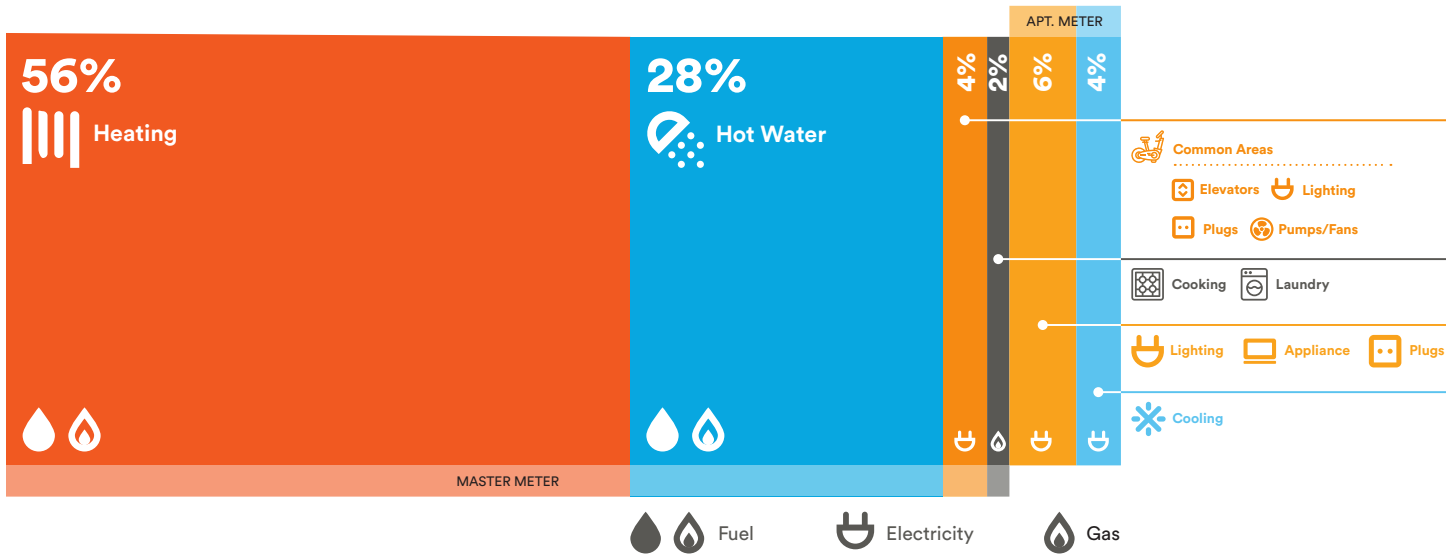
Download Full Playbook →

<https://be-exchange.org/report/lowcarbonmultifamily-postwar-high/>

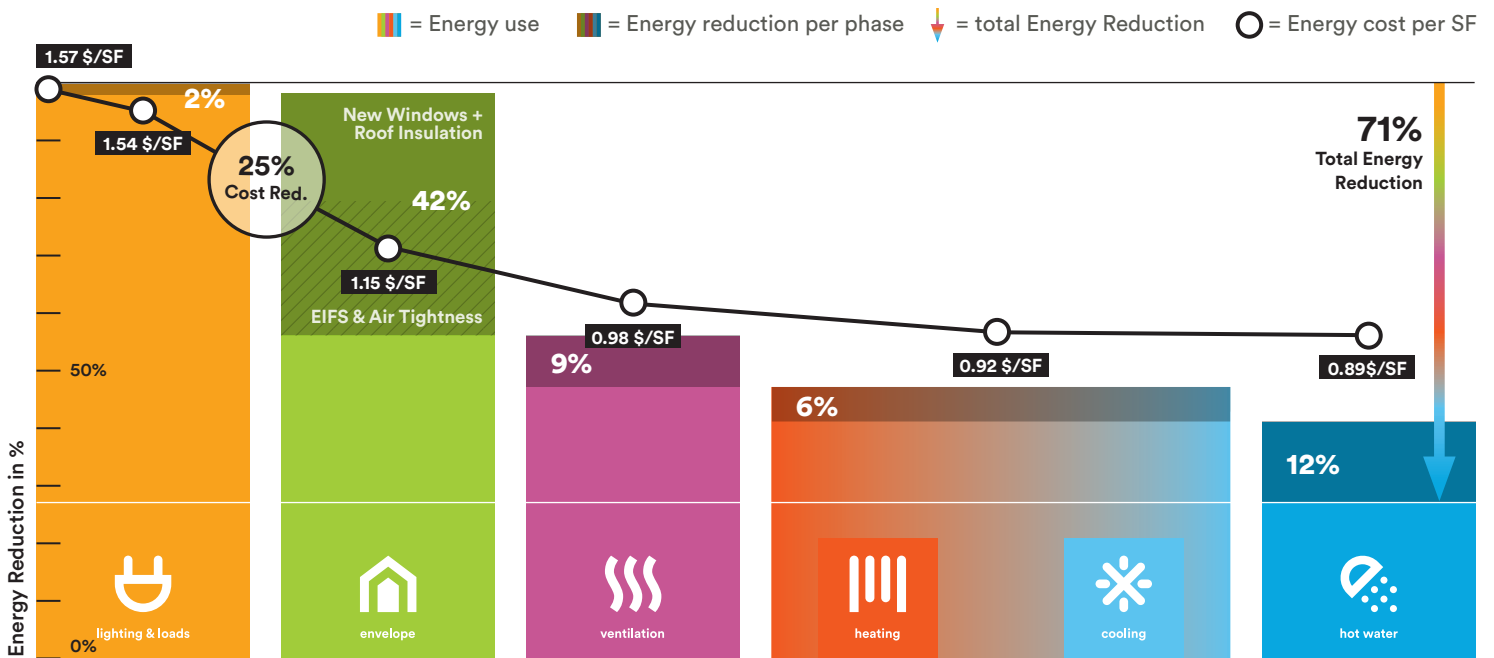


ELEMENTS		ISSUES	Retrofit Strategies		Recommended Targets	
EXTERIOR WALLS Typically simple load bearing masonry with punched window openings.	<ul style="list-style-type: none"> - Often no insulation - Major thermal bridges at perimeter beams, balconies, and parapets - High maintenance costs 	ROOF → Insulate Roof		→ Minimum of R-30	Whole Building U-value 0.093 Btu/hr.ft ² .F	
						EXTERIOR WALL → Add Interior insulation → Add Exterior Insulation
WINDOWS Aluminum, double hung frames (no thermal break), single glazing or weak double glazing common.	<ul style="list-style-type: none"> - Little thermal resistance - High air leakage - Major comfort issues - Condensation risk - Absorb significant solar heat common. 	WINDOWS → Replace Existing Windows with High Performance Windows	→ Recommended U Value 0.167 Btu/hr.ft ² .F			
		AIR TIGHTNESS → Ensure Air Sealing as part of Exterior Wall and Window Upgrades	→ Recommended airtightness 1.0 ACH → Whole Building U-value 0.093 Btu/hr.ft ² .F			
HEATING Commonly two-pipe steam systems served by oil or gas fired boiler	<ul style="list-style-type: none"> - Limited control - Overheating common - High short-term maintenance costs 	 → Building-Wide VRF System	→ Heating: 3.3 COP 47 °F Cooling: 4.4 COP			
COOLING Window AC units, sporadically deployed.	<ul style="list-style-type: none"> - Increases whole building U-value - Creates drafty conditions - Major thermal bridge - Noisy, inefficient - Winter removal very rare 	 → Building-Wide Hydronic Loop Hybrid ACs	→ Heating: 2.3 COP Cooling: 2.2 COP			
		 → Decentralized Energy Recovery Ventilation System	→ Sensible Heat Factor: 80% Max Fan Power: 0.76 W/cfm			
DOMESTIC HOT WATER Heat exchange at steam boiler with constant recirculation loop.	<ul style="list-style-type: none"> - Requires running steam boiler in shoulder and cooling seasons 	 → Air to Water Heat Pump Water Heaters	→ Min. COP: >2.2			
		→ Water to Water Heat Pump Water Heaters	→ Min. COP: >3.1			
VENTILATION Exhaust only at kitchens and bathrooms; corridors may have exhaust or supply.	<ul style="list-style-type: none"> - No direct fresh air introduction - System is not balanced, drives infiltration from exterior and adjacent units 	 LIGHTING → High Efficiency Common Area Lighting	→ 50% Reduction in W/SF			
		PLUG LOAD → High Efficiency Appliances and Smart Systems	→ 55% Reductions in Plug Loads			

Energy Use Analysis



Energy & Cost Reductions by Phase



Takeaways:

To meet future stringent efficiency and carbon regulations, buildings' upgrades should be approached proactively and not as a response to a system's failure or tenant's turnover. Building owners must also consider the long-term advantages of planning, scheduling, and testing based on recommended performance targets that work in concert with the envelope, HVAC systems, water, lighting controls, and other systems. Taking the initiative

to actively ensure each component is working at its intended operating capacity while providing continuing maintenance to the building's equipment is critical, cost-effective, and most likely result in health and comfort benefits.

Resources

Other Playbooks → <https://be-exchange.org/lowcarbonmultifamily-main/>