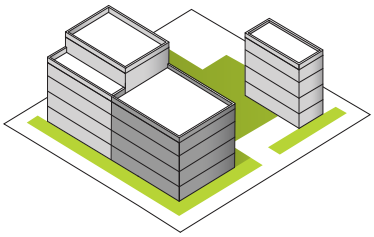
Playbook Summary: Post-War 4-7 Stories

These buildings, typically between 4 and 7 floors in height, are found in virtually every context, from lot-line to free standing buildings. Buildings of this typology rarely include mixed uses and/or tenant amenities. Though limited in height, the layout of this typology varies considerably, with different arrangements of courtyards and street-facing facades.

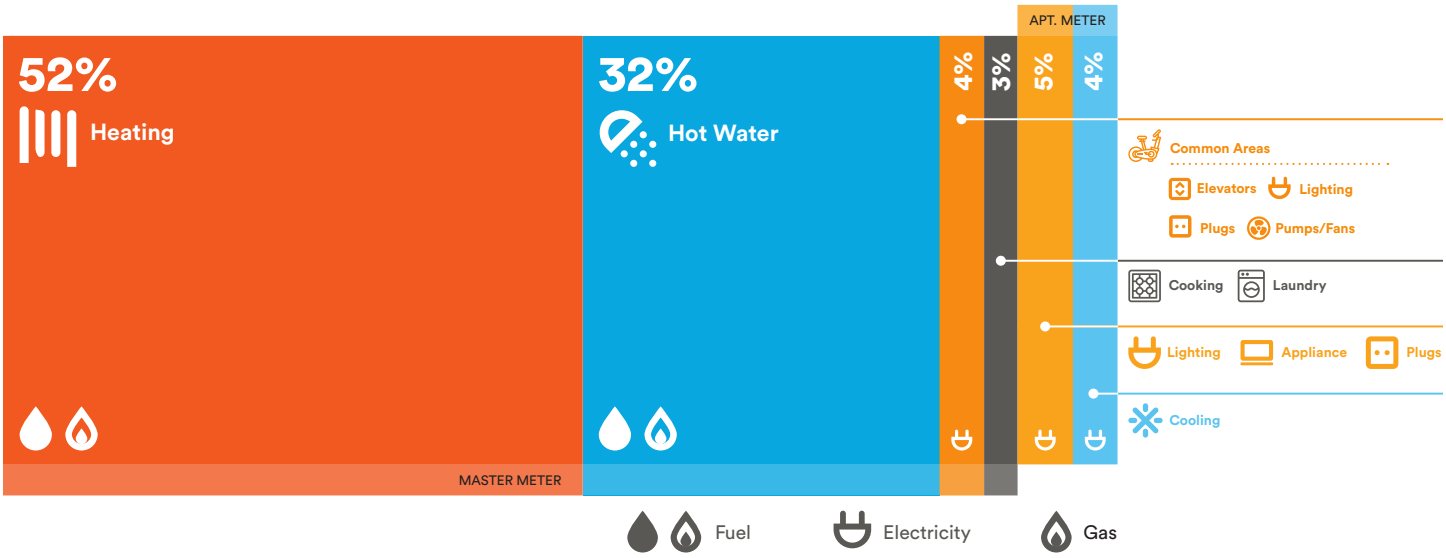
Download Full Playbook →
https://be-exchange.org/report/lowcarbonmultifamily-postwar-low/



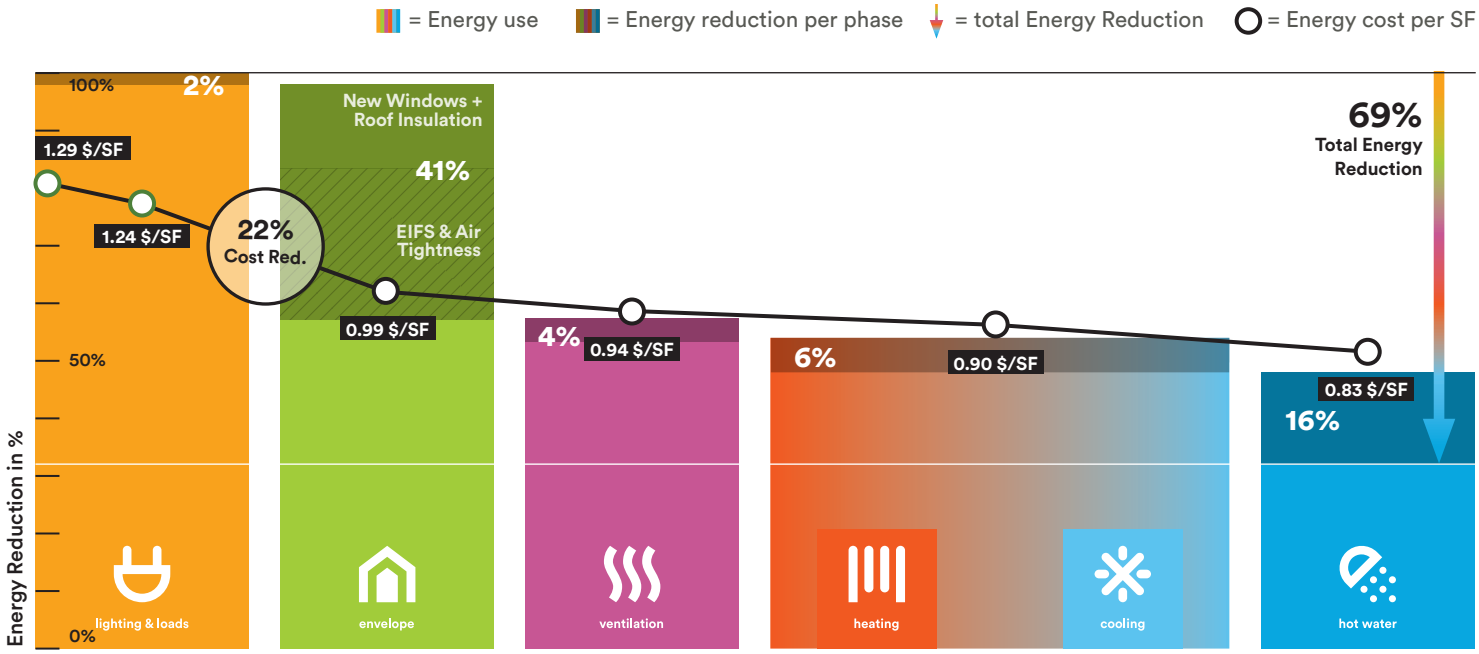
ELEMENTS	ISSUES
EXTERIOR WALLS Typically simple load bearing masonry with punched window openings.	- Often no insulation - Often no air barrier - Major thermal bridges at corners and parapet walls
WINDOWS Both wood and aluminum common, typically double-hung frames without thermal breaks, single glazing or weak double glazing common.	- Little thermal resistance - Air leakage high - Major comfort issues - Condensation risk - Absorb significant solar heat
HEATING Commonly one-pipe steam systems served by oil or gas fired boiler.	- Limited control - Overheating common - High short-term maintenance costs
COOLING Window AC units, sporadically deployed.	- Increases whole building U-value - Creates drafty conditions - Major thermal bridge - Noisy, inefficient - Winter removal very rare
DOMESTIC HOT WATER Heat exchange at steam boiler with constant recirculation loop.	- Requires running steam boiler in shoulder and cooling seasons
VENTILATION Mixture of partial kitchen/bath exhaust and natural ventilation.	- No direct fresh air introduction - No exhaust from bathrooms or kitchens

Retrofit Strategies	Recommended Targets	
ROOF		
→ Insulate Roof	→ Minimum of R-30	Whole Buiding U-value 0.084 Btu/hr.ft².F
EXTERIOR WALL		
→ Add Interior insulation	→ Minimum of R-20	
→ Add Exterior Insulation	→ Minimum of R-10	
WINDOWS		
→ Replace Existing Windows with High Performance Windows	→ Recommended U Value 0.167 Btu/hr.ft².F	
AIR TIGHTNESS		
→ Ensure Air Sealing as part of Exterior Wall and Window Upgrades	→ Recommended airtightness 1.0 ACH	
→ Building-Wide VRF Systems	→ Heating: 3.3 COP 47 °F Cooling: 4.4 COP	
→ Mini-Split Heat Pumps	→ Heating: 3.3 COP Cooling: 4.4 COP	
→ 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	
→ Split Air to Water Heat Pump Water Heaters	→ Min. COP: >2.2	
→ Water to Water Heat Pump Water Heaters	→ Min. COP: >3.1	
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/

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