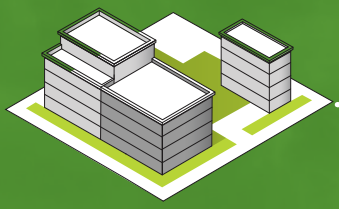
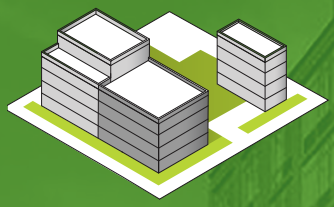
playbook

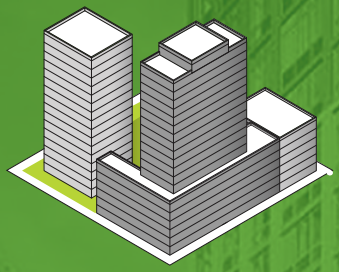
Multifamily Low Carbon Retrofit Playbooks



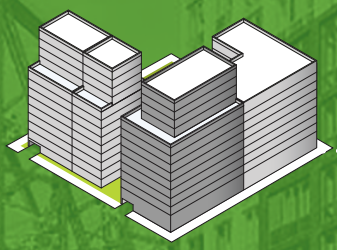
Pre-War 4-7 Stories



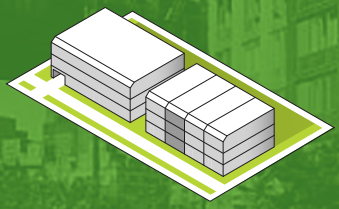
Post War 4-7 Stories



Post-War 8+ Stories



Post-1980 8+ Stories



Garden Style 1-3 Stories

How to use these playbooks

The multifamily playbooks include a list of deep retrofit strategies for several building typologies and all of their main building systems.

These measures maximize occupant comfort and energy savings through a transition from fuel to electricity-based heating, cooling, and hot water systems.

What's inside:

- Typology Information
- Model Building Information
- Energy Targets and Phasing Options
- Benefits of Low Carbon Retrofits
- Matrix of Efficiency Strategies
- Envelope Strategies
- Ventilation Strategies
- Heating & Cooling Strategies
- Domestic Hot Water & Plug Loads

Playbooks can be found here:

- **Pre-War**
  https://be-exchange.org/report/lowcarbonmultifamily-prewar-low
- **Post-War**
  https://be-exchange.org/report/lowcarbonmultifamily-postwar-low
- **Post-War 8+ Stories**
  https://be-exchange.org/report/lowcarbonmultifamily-postwar-high
- **Post-1980 8+ Stories**
  https://be-exchange.org/report/lowcarbonmultifamily-post1980
- **Garden Style 1-3 Stories**
  https://be-exchange.org/report/lowcarbonmultifamily-garden

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Matrix of Efficiency Strategies

The playbooks describe the primary benefits of a low carbon retrofit with details on the major system upgrades needed to unlock those benefits. Aligned with typical improvement cycles, these strategies will prepare buildings for increasingly stringent efficiency and greenhouse gas emission targets.

	Retrofit Strategies	Building Typologies				
		Pre War 4-7 Stories	Post War 4-7 Stories	Post-1980 8+ Stories	Post War 8+ Stories	Garden Style 1-3 Stories
envelope	**ROOF**					
	→ Insulate Roof	✓	✓	✓	✓	✓
	EXTERIOR WALL					
	→ Add Interior insulation	✓	✓			
	→ Add Exterior Insulation		✓	✓	✓	✓
	WINDOWS					
	→ Replace Existing Windows with High Performance Windows	✓	✓	✓	✓	✓
	AIR TIGHTNESS					
	→ Ensure Air Sealing as Part of Exterior Walls and Window Upgrades	✓	✓	✓	✓	✓
heating / cooling	→ Package Terminal Heat Pumps			✓		
	→ Mini Split Heat Pumps	✓	✓			✓
	→ Building-Wide VRF System	✓	✓		✓	
ventilation	→ Centralized Energy Recovery Ventilation System			✓	✓	✓
	→ Decentralized Energy Recovery Ventilation System	✓	✓			✓
hot water	→ Air to Water Heat Pump Water Heaters	✓	✓	✓	✓	
	→ Split Air to Water Heat Pump Water Heaters					✓
lighting & loads	**LIGHTING**					
	→ High Efficiency Common Area Lighting	✓	✓	✓	✓	✓
	PLUG LOAD					
	→ High Efficiency Appliances and Smart Systems	✓	✓	✓	✓	✓
solar	**PHOTOVOLTAIC**					
	→ Install Solar PV Array	✓	✓	✓	✓	✓

Takeaways:

To meet future stringent efficiency and carbon regulations, buildings' upgrades should be approached proactively and not as a response to a systems' 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 conponent is working at its intended operating capacity while providing continuing is critical, cost-effective, and certainly result in health and comfort benefits.