BUILDINGENERGY BOSTON

Who Pays and Who Saves? How Electric Rates Shape Equitable Multifamily Electrification

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RMI

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Who’s in the room today?

- Building owners / managers
- Technical providers (engineers, consultants, architects, designers)
- Government agency staff, utilities, regulators
- NGOs, community groups, advocates
- Students

What level of familiarity do you have with electricity rates?

- I am as close to an expert as there can be, I influence or help design electric rates
- I have a working knowledge of electric rates and a basic understanding of how rates are designed
- I understand the basics (e.g., $/kWh, fixed vs. variable charges)
- I have skimmed my own electric bill

Learning Objectives

Understand how current and proposed electric rate structures in Massachusetts affect the economics of building electrification, particularly for affordable multifamily housing.

Evaluate the impact of new heat pump rates through case studies and sensitivity analyses that compare heating and cooling load profiles under electrification.

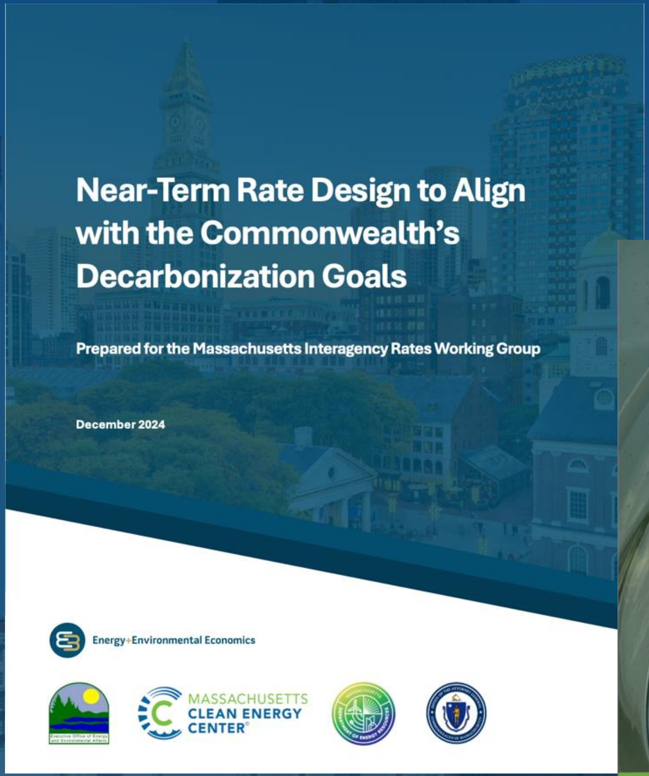
Identify the role of metering strategies and rate design in balancing owner and tenant cost burdens while supporting equitable decarbonization.

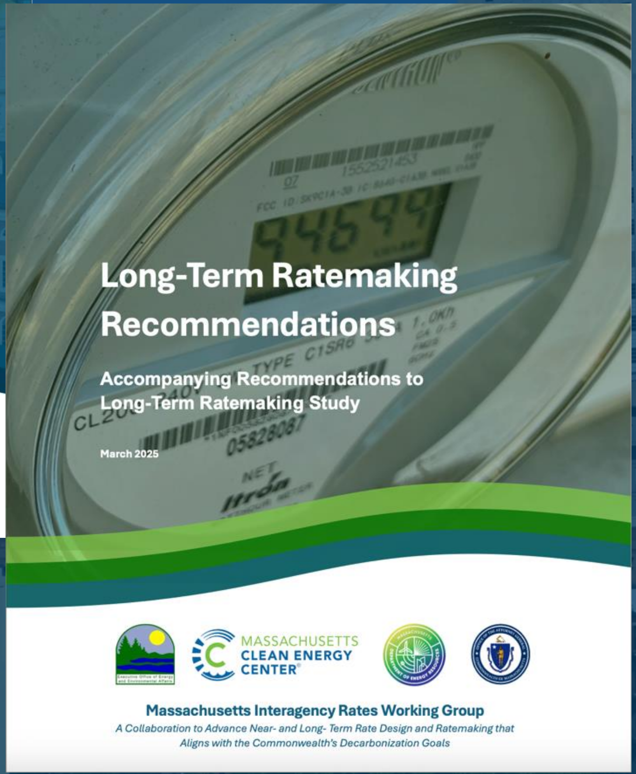
Discuss potential policy interventions and program models that can align utility rate structures with the goals of affordability, resilience, and rapid electrification.

Agenda

1. Framing the challenge
2. The purpose of our analysis
3. Analysis results
4. Emerging insights
5. Discussion
6. Closing reflections

Rate design is an obvious lever in the energy transition





Why is electrification so complicated in multifamily buildings?

In Massachusetts, new construction and major retrofits are going all-electric—replacing fossil fuel systems with heat pumps and other efficient technologies.

Both **commercial and residential rate structures** could apply to these buildings, and depend on system design, metering, and who's paying.

This creates real decisions for owners—with **many variables and limited guidance.**

Utility costs in multifamily buildings remain a concern

MA has the 3rd highest electricity rates in the US

(almost 2x the national average)

Natural gas is 2-4x cheaper than electricity*

Gas is the most common heating fuel in the state

Possible cost-shifting from owners to tenants

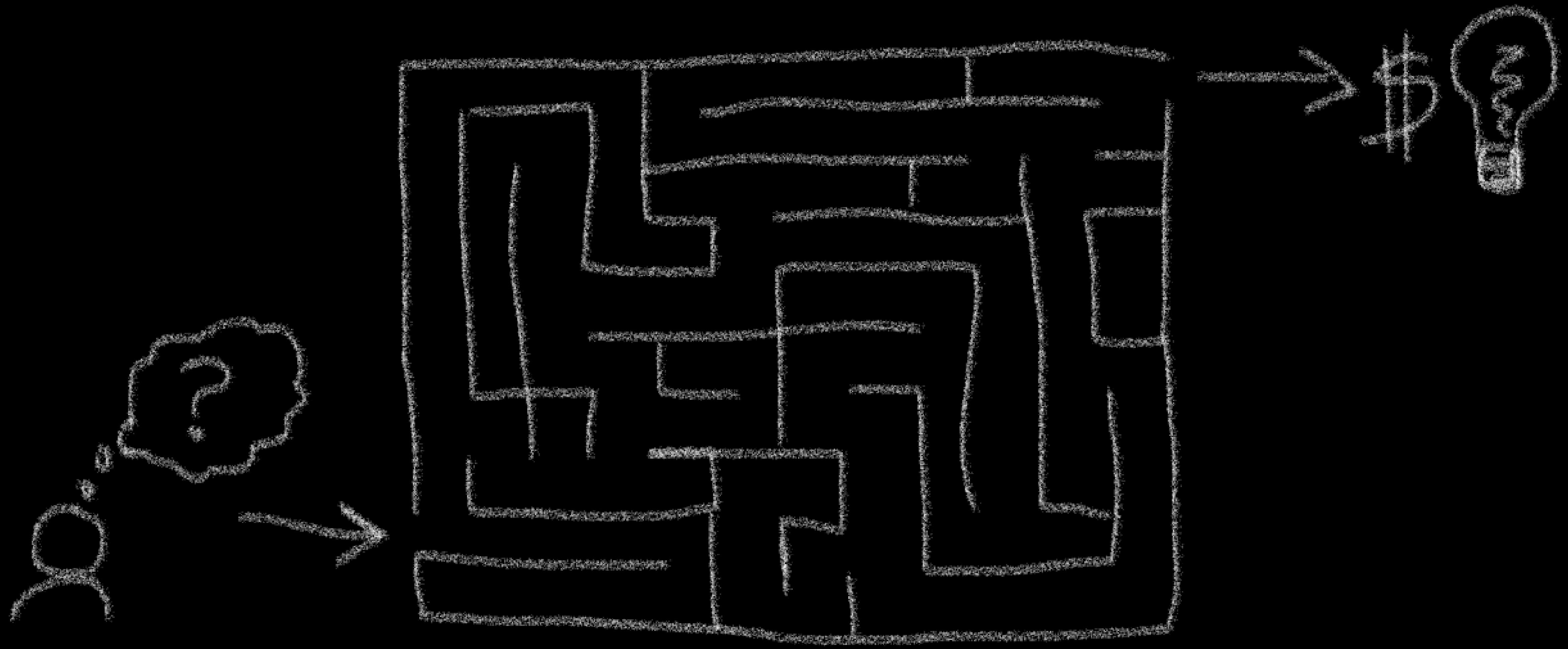
Utility burden / affordability could shift

Affordable multifamily buildings operate on thin margins

Small increases impact reserves needed

*per unit heating capacity

Uncertainty and confusion remain about existing options and their efficacy in lowering electricity costs

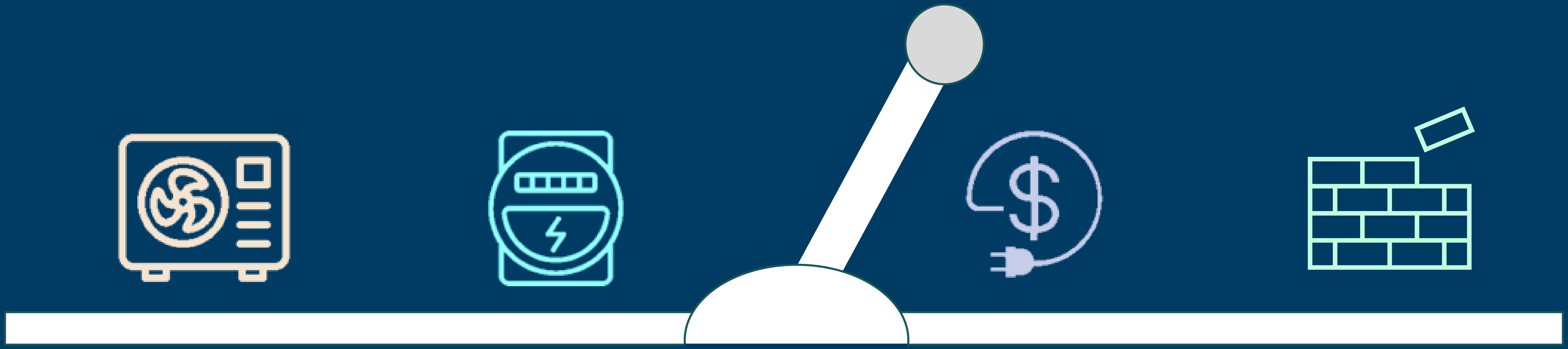


Key questions we set out to answer

- What **options** are available to multifamily housing owners?
- Can multifamily buildings **benefit** from the heat pump rate?
- Is it more **cost effective** to have residents pay for utilities on the heat pump rate or owners pay on the commercial rate?
- Does the rate structure **drive technical approaches**?
- What does multifamily housing **need** to make electrification more affordable?
- How does the story vary for different building types (low rise vs mid rise)?

What are you curious about?

Levers in this analysis



HVAC System Selection

- In-unit ASHP system
- Central VRF system

Metering Strategy

- Direct metered
- Master metered
- ~~Sub metered~~

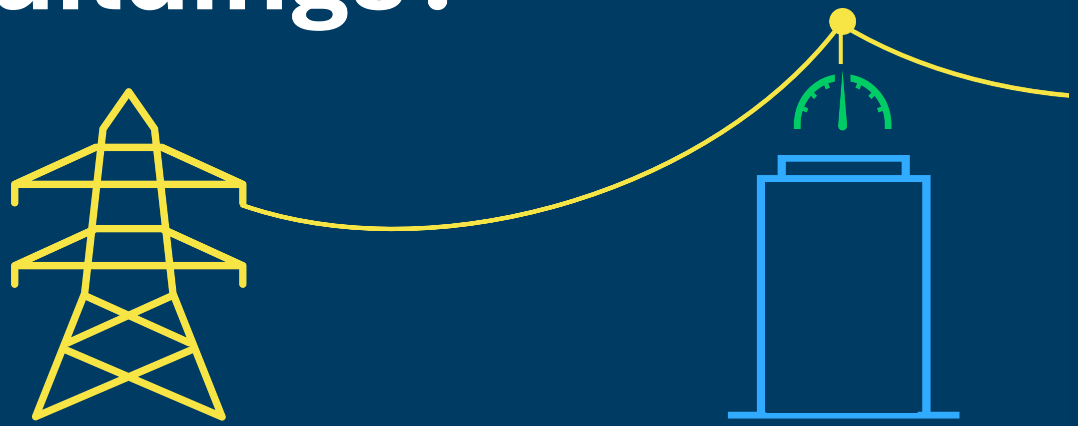
Utility Rates

- Residential electric space heating
- Residential heat pump rate
- Residential low-income discount
- Commercial demand-based rate
- Commercial non-demand rate

Envelope Efficiency

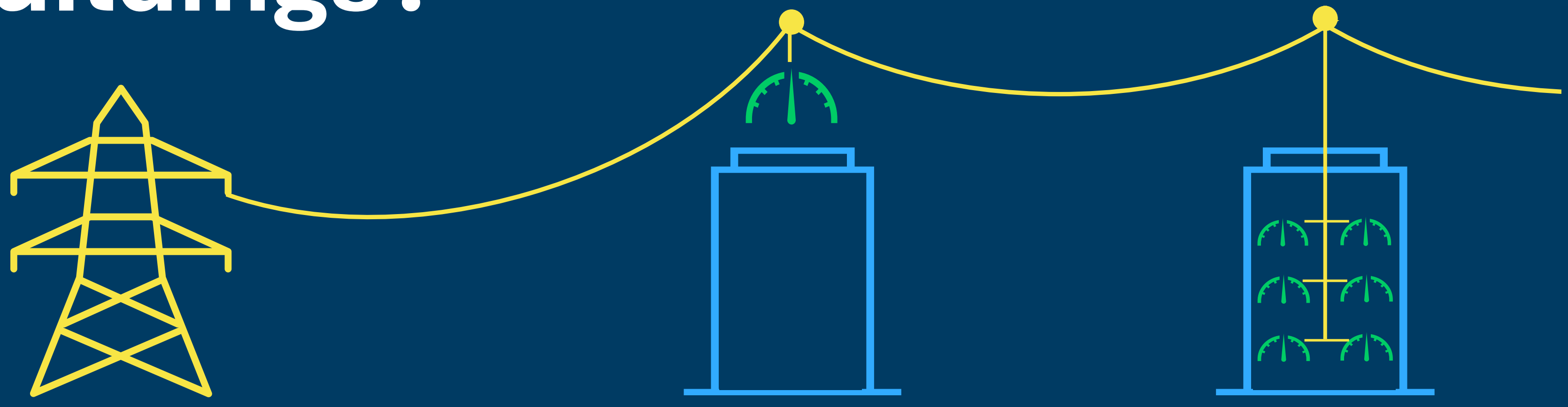
- High-performance (~stretch/specialized code)
- Medium-performance (~base code)

What are the common set ups in multifamily buildings?



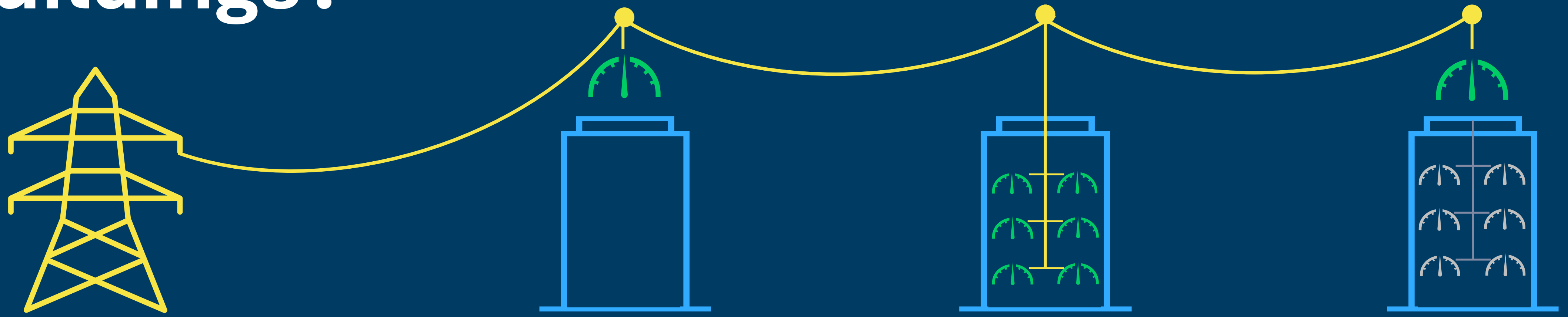
	Master Metering
Utility account	One (owner)
Who pays utility bill	Owner
How tenant pays	Usually through rent
Typical electric rate	Commercial
Access to heat pump / discount rates	Usually no

What are the common set ups in multifamily buildings?



	Master Metering	Direct Metering
Utility account	One (owner)	Each tenant
Who pays utility bill	Owner	Tenant
How tenant pays	Usually through rent	Direct bill from utility
Typical electric rate	Commercial	Residential
Access to heat pump / discount rates	Usually no	Yes

What are the common set ups in multifamily buildings?



	Master Metering	Direct Metering	Submetering
Utility account	One (owner)	Each tenant	One (owner)
Who pays utility bill	Owner	Tenant	Owner
How tenant pays	Usually through rent	Direct bill from utility	Reimburses owner
Typical electric rate	Commercial	Residential	Commercial
Access to heat pump / discount rates	Usually no	Yes	Usually no

Electric rate primer

Rate	Bill calculations	Eligibility
R-3 Residential Space Heating	Fixed charge Usage: per-kWh	**Residential units** with electric space heating as primary heat
R-1HP Residential Heat Pump	Fixed charge Usage: per-kWh	R-1 Residential customers with eligible heat pump
R-2HP Residential Assistance Heat Pump	Fixed charge Usage: per-kWh Low-income discount: 42%	Income-qualified R-2 customers with eligible heat pump. 42% discount applied to total bill
G-1 Small General Service (Non-Demand)	Fixed charge Usage: per-kWh	**Non-residential customers** ≤100 kW (12-mo avg); default for new customers
G-1 Small General Service (Demand Price Option)	Fixed charge Usage: per-kWh Demand: per-kW	Non-residential customers ≤100 kW; not allowed if ≤10 kW
G-2 Medium General Service	Fixed charge Usage: per-kWh Demand: per-kW	Customers >100 kW (12-mo avg); voltage <14 kV. Demand price required.

Clarifying rate impacts through multifamily scenario analysis

Two sample *all-electric* building types with two different HVAC systems as case studies

Assume buildings are in Boston and on Eversource rates

Use NREL ResStock data to develop load profiles

Use RMI rates analysis tool to apply different Eversource electric rates to load profiles and determine bill impacts

Compare different scenarios and identify optimized utility cost strategies

Typology	HVAC System	Metering
Low-rise ~20 units	Central VRF	Master metered
Low-rise ~20 units	Unit ASHP	Direct metered*
Mid-rise ~50 units	Central VRF	Direct metered
Mid-rise ~50 units	Unit ASHP	Direct metered*

*includes separate common area meter

A few things we didn't factor

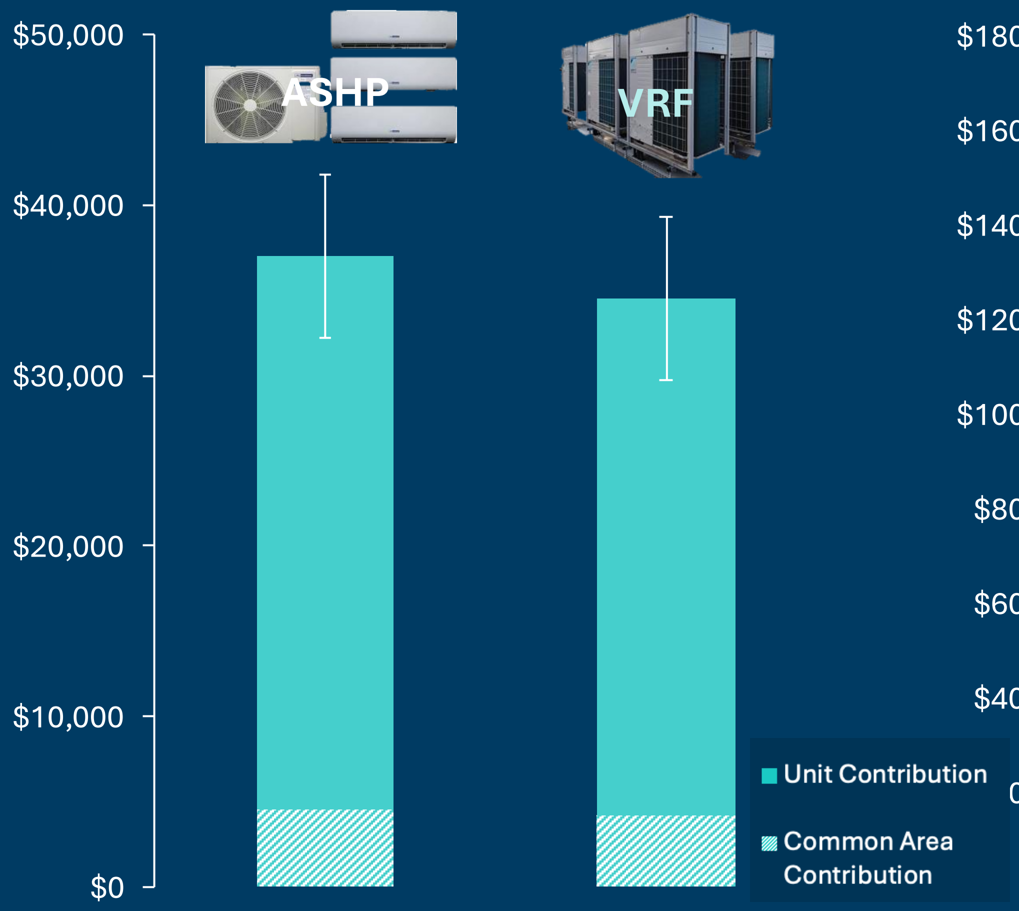
- Low-income discount rate are underutilized (28% of households qualify in large utility areas qualify, 16% are enrolled)
- Utility allowances
- On-site solar cost reductions
- Behavioral impacts:
  - Tenants tend to be more conservative in their usage when they pay for their utilities
  - Building monitoring systems can help control usage / peak demand

Analysis Results

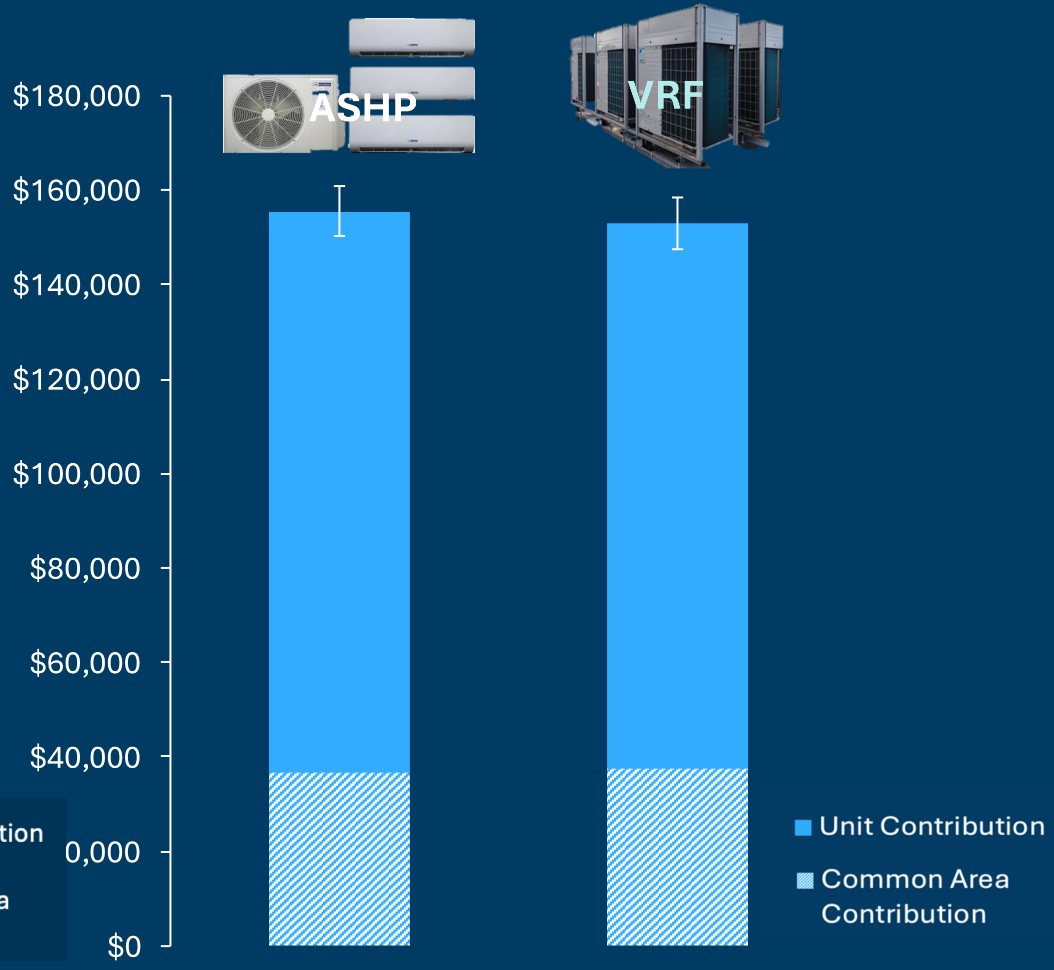
How do all-electric multifamily buildings achieve the lowest electricity costs?

- Through HVAC system efficiency?

Different equipment types on the same rate show similar results



G-1 commercial non-demand rate



G-2 commercial demand rate

Assumptions

Low-rise ~20 units

Mid-rise ~50 units

Annual electricity costs per building

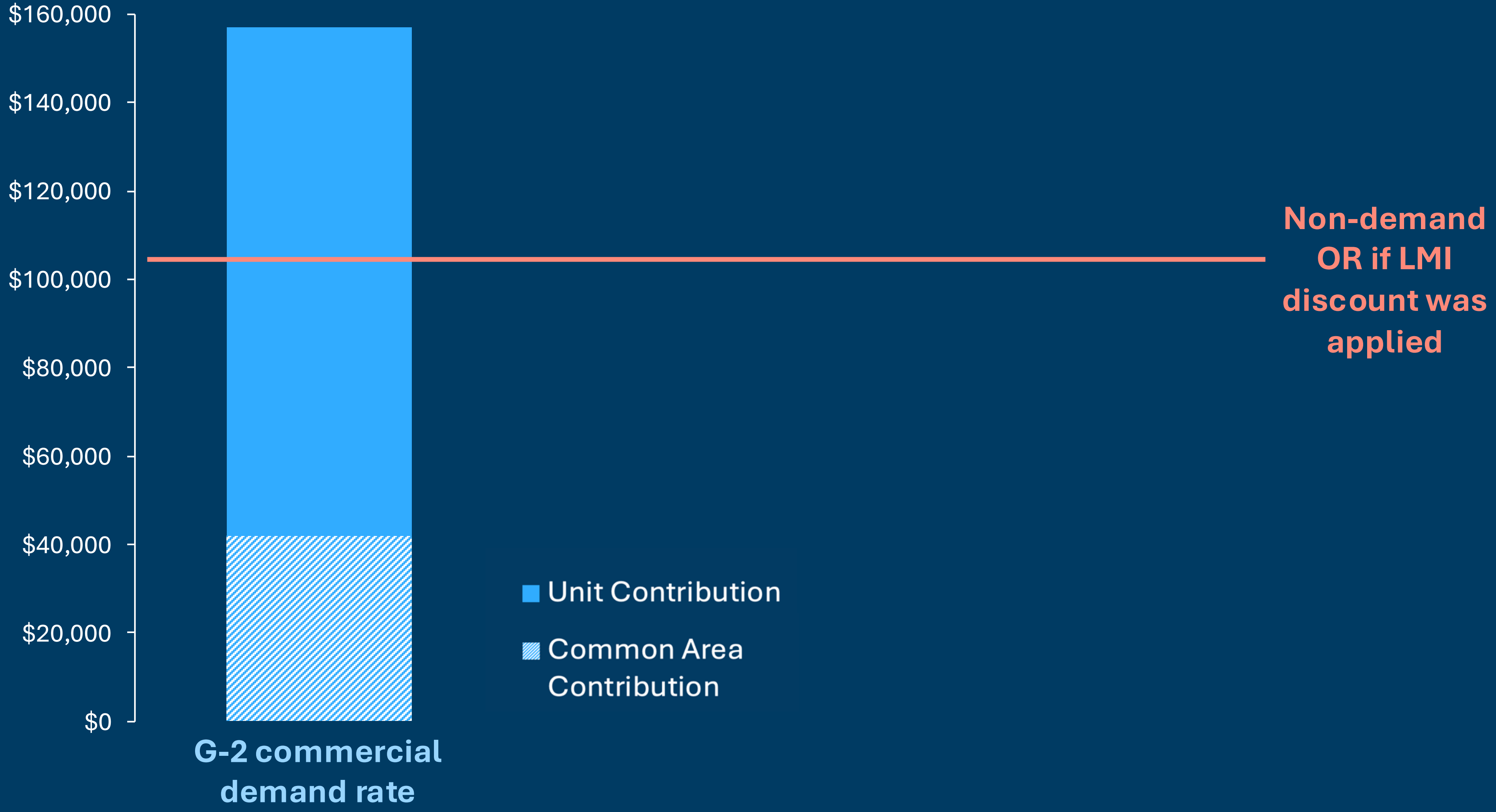
High performance envelope

Common area = 25% of SF for MR, 5% of SF for LR

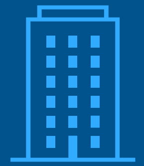
How do all-electric multifamily buildings achieve the lowest electricity costs?

- Through HVAC system efficiency? **NO**
- Through rate structure? **YES**

1) Avoid demand rates



Assumptions



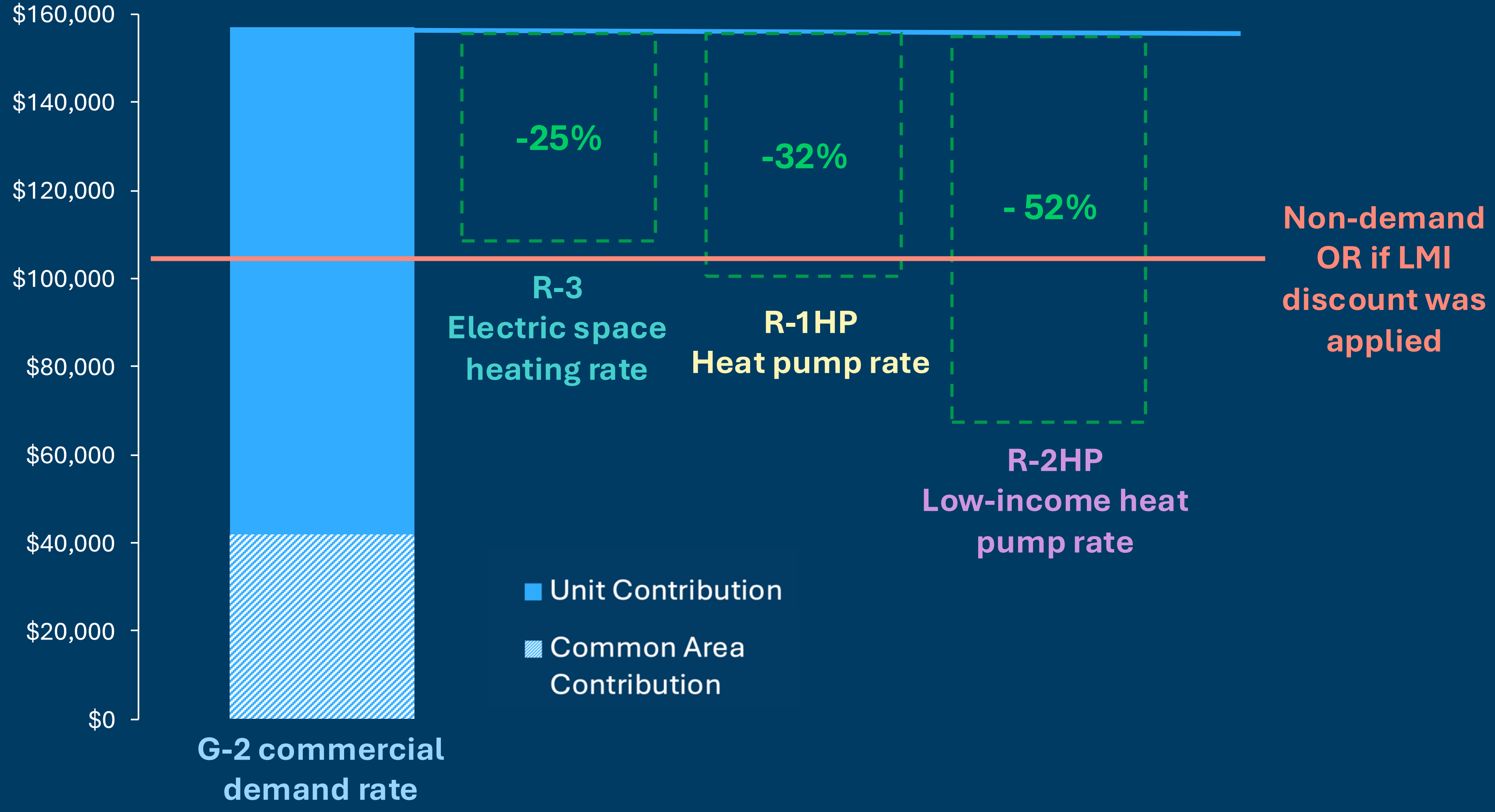
Mid-rise ~50 units

Annual electricity costs per building

High performance envelope

Common area = 25% of SF

1) Avoid demand rates



Assumptions

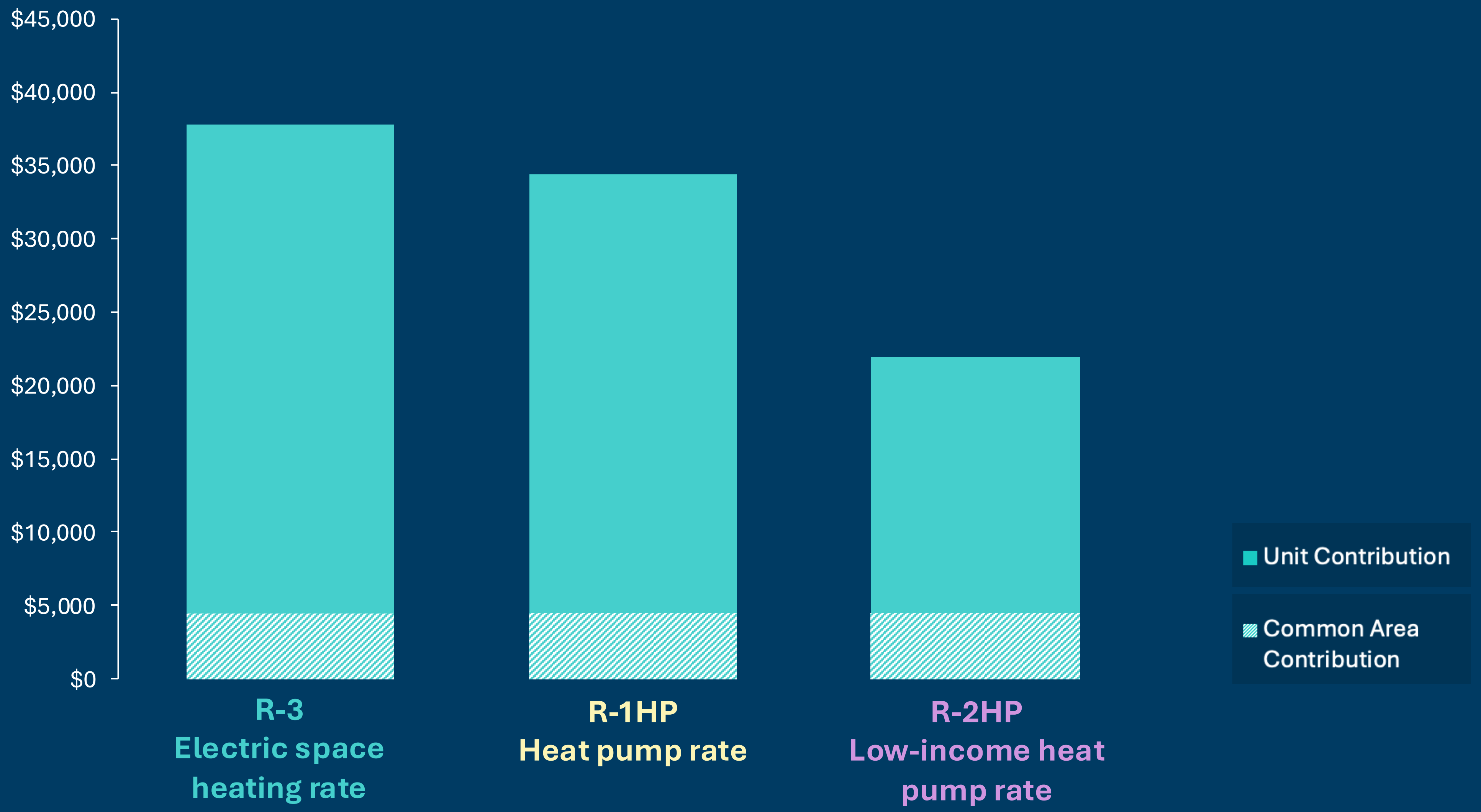
Mid-rise ~50 units

Annual electricity costs per building

High performance envelope

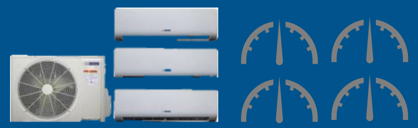
Common area = 25% of SF

2) The heat pump rate and low-income discount are an improvement



Assumptions

Low-rise ~20 units

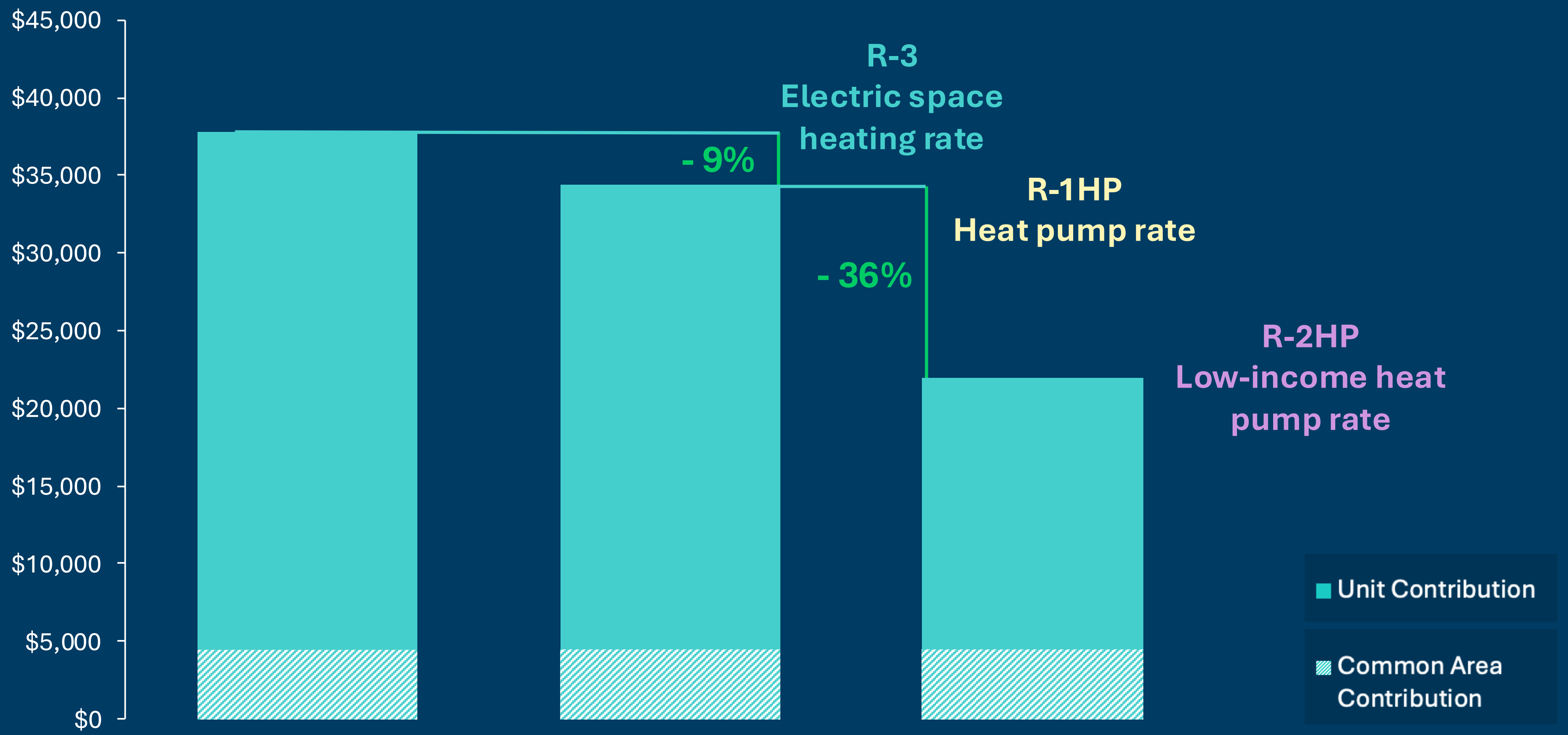


Annual electricity costs per building

High performance envelope

Common area = 5% of SF

2) The heat pump rate and low-income discount are an improvement



Assumptions

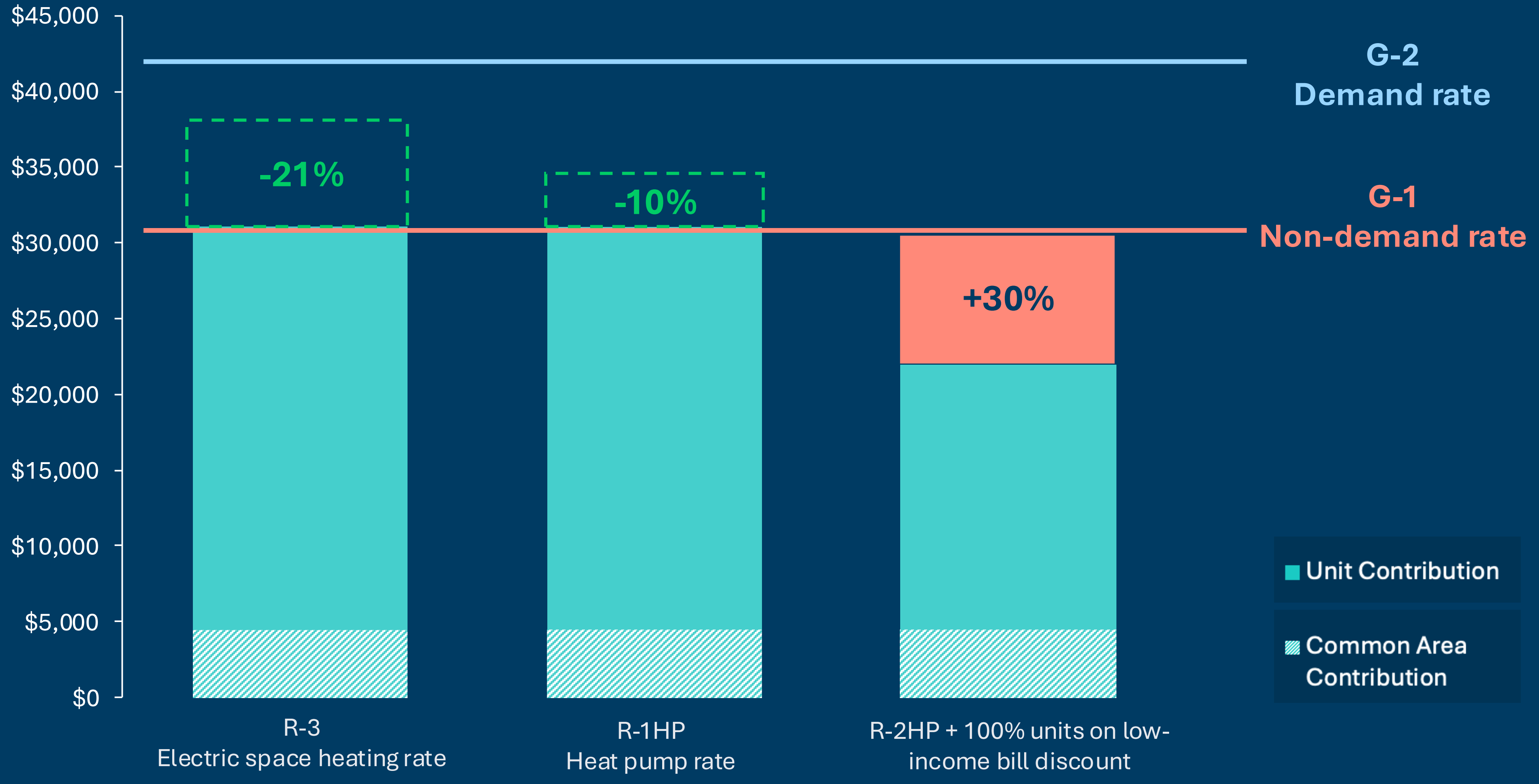
Low-rise ~20 units

Annual electricity costs per building

High performance envelope

Common area = 5% of SF

3) Residential rates improve when roughly ≥25% of residents qualify for low-income discount



Assumptions

Low-rise ~20 units

Annual electricity costs per building

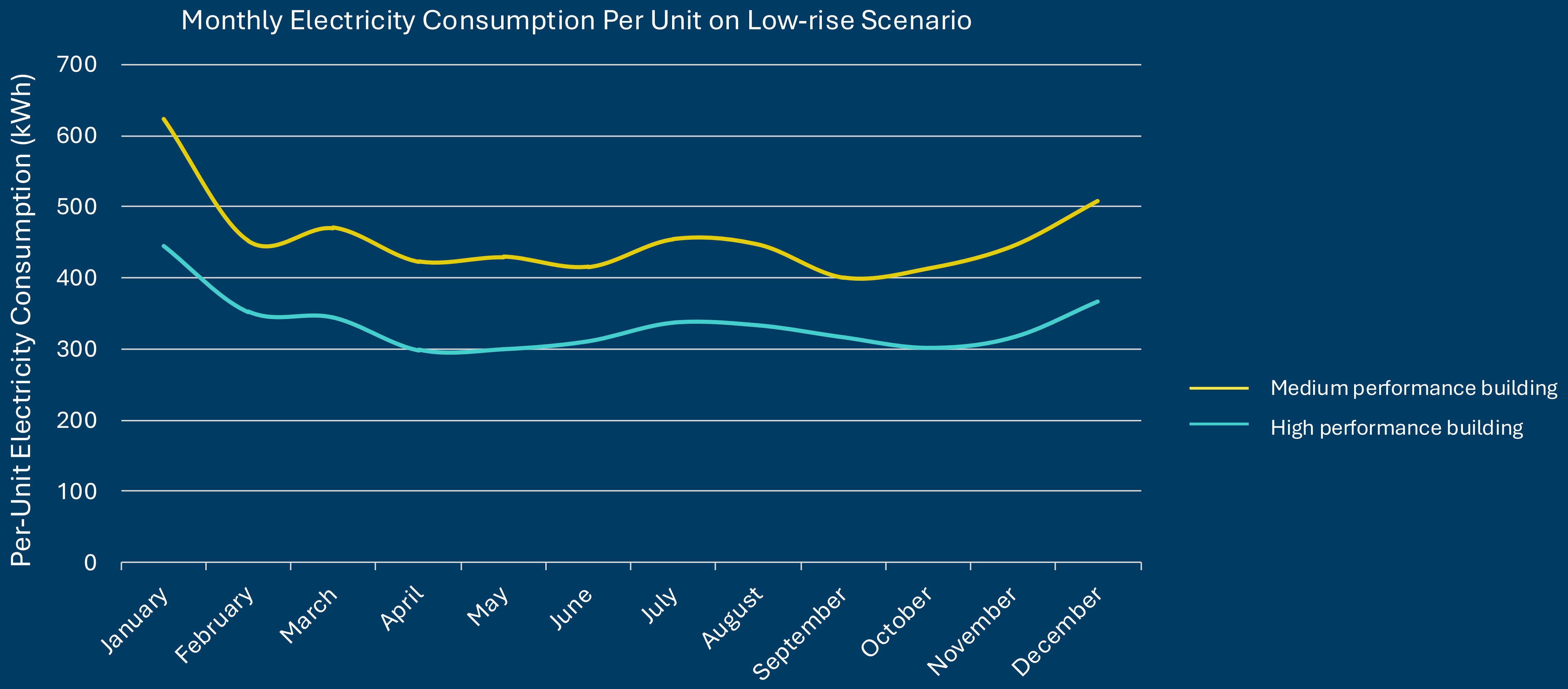
High performance envelope

Common area = 5% of SF

How do all-electric multifamily buildings achieve the lowest electricity costs?

- Through HVAC system efficiency? **NO**
- Through rate structure? **YES**
  - By avoiding demand rates
  - By leveraging low-income discounts
- Through higher efficiency building envelopes? **POTENTIALLY**

How would results differ if the building envelope was lower performance?



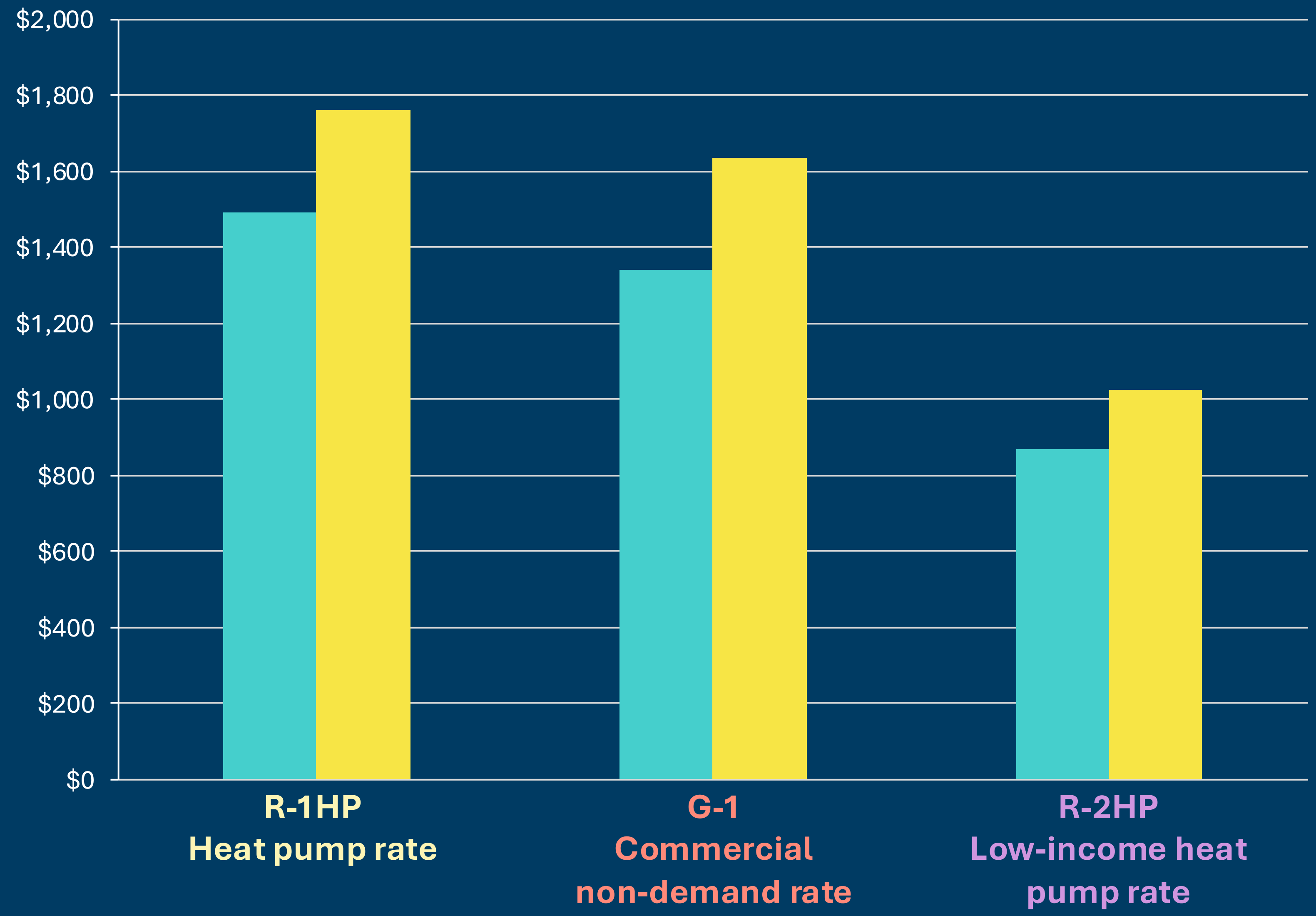
Improved building envelope performance is associated with ~12-20% cost savings

Medium performance building

High performance building

Low-rise ~20 units

Annual electricity costs per unit

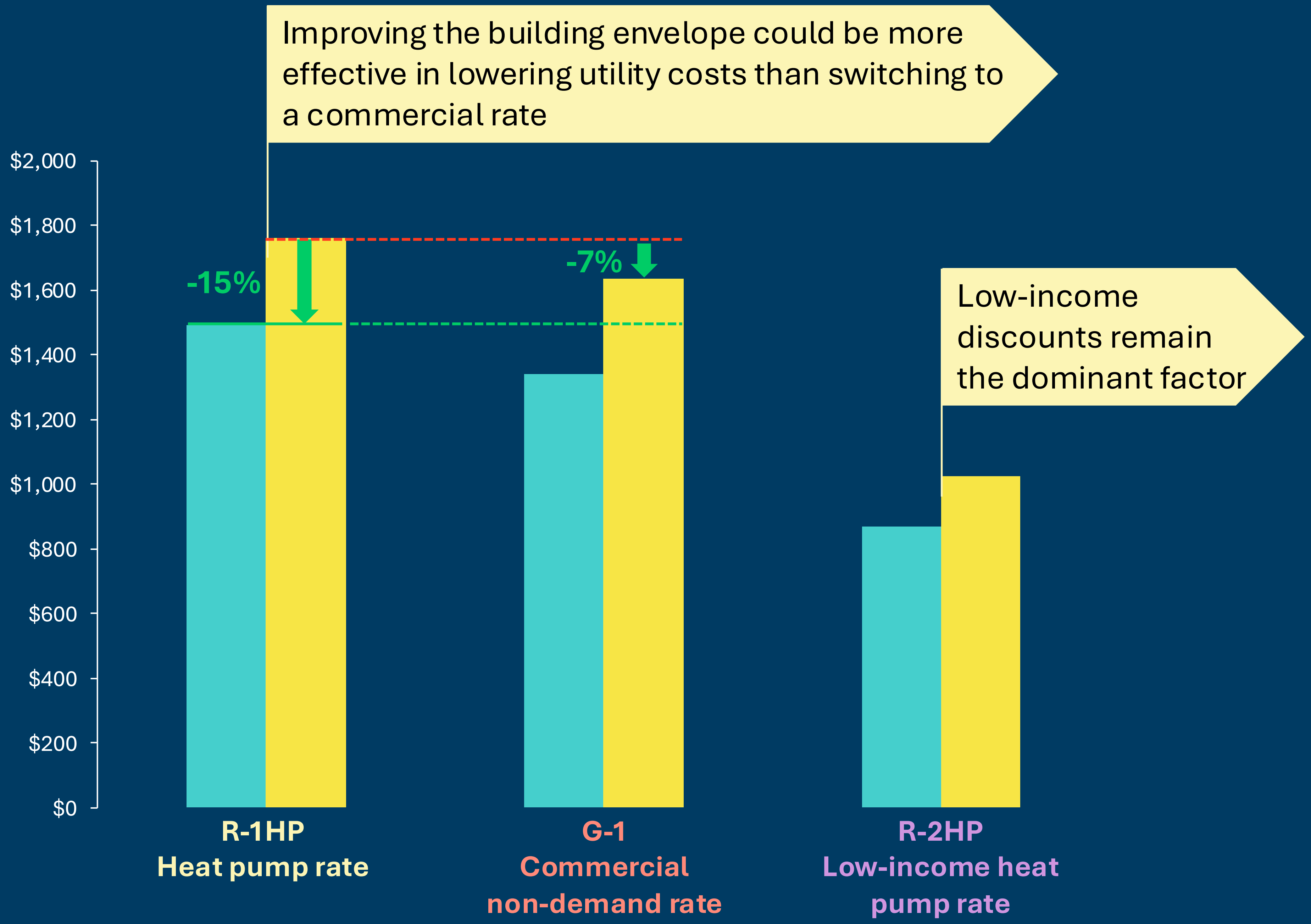


Medium performance building

High performance building

Low-rise ~20 units

Annual electricity costs per unit



Key takeaways

- Demand-based commercial rates show higher operating costs than non-demand rates
- The commercial non-demand rate show lower utility costs compared to residential heat pump rate
- Low-income discounts can yield lower costs than commercial rates
- Building envelope efficiency could be a tool for lowering utility costs when changing rates isn’t feasible

And more questions…

Rates & Policy

Are rates the right lever for affordability?

Should there be a commercial heat pump or low-income rate?

How do demand charges and TOU impact outcomes?

Commercial rate classification does not distinguish between typologies – what are ways to understand challenges, trends, and propose rate solutions specific to MF retrofits?

Building Systems

How do real-world performance differences (central vs individual units) affect costs?

Should rates and metering drive technical approaches?

People & Access

Why are low-income rates so underutilized?

How do we ensure tenants can access the best rates? Opt-out rates? Shadow billing?

What creates predictable and low utilities for tenants - transparency vs burden?

What stands out to you?

Shaping current practices – not just policy

What if we **designed for lower peak demand**, not just total energy use?

What if we treated **metering as an equity decision**, not just a technical one?

What if we **modeled multiple rate scenarios as standard early design practice**?

What if we treated **efficiency as the primary affordability strategy**, not rates?

HVAC System Selection

What if we documented and shared **real project outcomes more consistently**?

What if systems included metering **strategies or zones to limit peak load**?

Metering Strategy

What if we evaluated **multiple metering + rate combinations** before locking in a design?

What if **submetering could include strong tenant protections + transparency**?

Utility Rates

What if **shadow billing** was used to understand tenant impacts?

What if rates were designed **specifically for multifamily, not commercial vs residential?**

Envelope Efficiency

What if we **right-sized systems more aggressively** to avoid demand spikes?

Within control or system change?

	Low complexity / Can do now	High complexity / System change
Within control	🟢 Do Now	🟡 Plan / Influence
Beyond control	🟠 Advocate	🔴 System Change

What's one way this could change how you approach your next project?

Building Performance Exchange

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Appendix

Analysis Assumptions: Generating Building Samples

Building sample generation (ResStock 2025.1)

- Analysis based on ResStock 2025.1
- Filtered for:
  - Norfolk & Suffolk Counties, MA
  - R-11 or R-19 wall insulation
- Representative buildings:
  - Low-rise: 20 units, 2–3 stories, ~623–824 sq ft/unit
  - Mid-rise: 53 units, 5–6 stories, ~824 sq ft/unit
  - 6 building IDs per typology used
  - Mid-rise mix includes studios + 1–2 BR units to reflect affordable MF diversity
- Envelope scenarios:
  - High-performance (baseline)
    - Upgrade Scenario 11 (air sealing): this models improvements to the building envelope that result in Air Changes per Hour at 50 Pascals (ACH50) infiltration values down to 5 for all dwellings with ≥6 ACH50 . No other changes in performance are assumed, besides decrease in ACH50.
    - ACH50 ≤ 5.5
  - Medium-performance (used only for envelope performance comparison)
    - ACH50 > 5 (majority of units)

Analysis Assumptions: Calculating Load Profiles

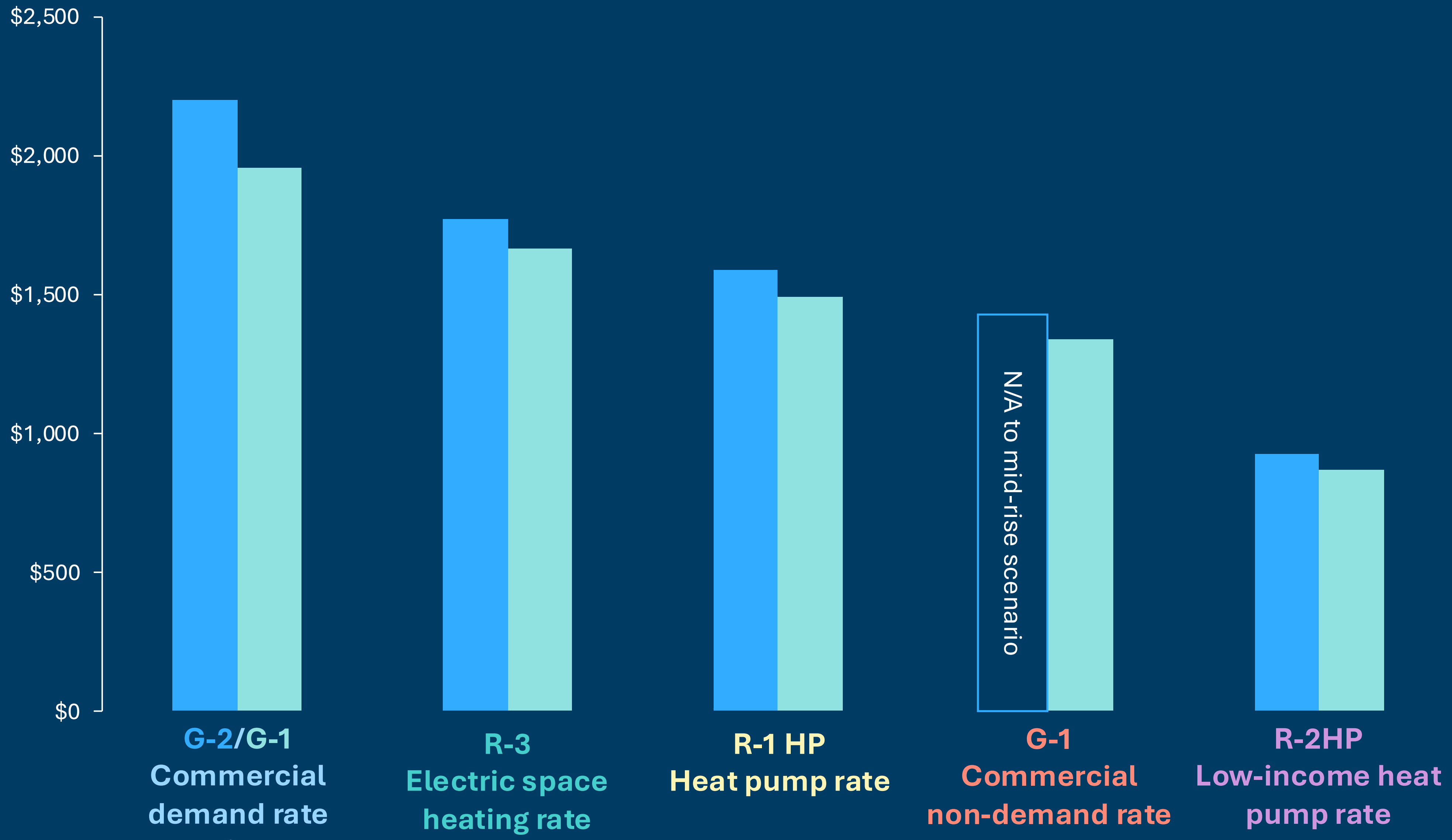
- Load profiles were developed using ResStock 2025.1 hourly energy delivered data (kBtu) for space heating, space cooling, and water heating. This metric reflects the thermal energy required by the building, independent of the equipment used, and varies only with factors such as envelope performance or occupant behavior.
  - The medium-efficient envelope case uses the ResStock baseline scenario, while the more efficient case uses Upgrade Scenario 11 (air sealing improvements reducing ACH50 to <5). Improved air sealing results in lower thermal energy demand (kBtu).
- These thermal loads were then converted to electricity consumption (kWh) using performance curves from the NEEP cold climate heat pump database and the specific heat pump and heat pump water heater equipment assumed (see equipment specifications below). This step produces modeled HVAC and DHW electricity consumption that reflects system performance and outdoor temperature-dependent efficiency.
  - Systems modeled:
    - Direct metered system: Daikin minisplit ductless ASHP, AHRI # 212494260
    - Central VRF system: Gree Ultra Heat GMV6, AHRI # 212437187
    - Heat pump water heater: RHEEM 65-gallon hybrid
    - Central water heater: Mitsubishi QAHV-N136TAU-HPB
- To isolate non-HVAC loads (plug loads, lighting, and appliances), ResStock's reported electricity consumption for space heating, space cooling, and water heating was subtracted from total electricity consumption.
- Final load profiles were constructed by combining these derived non-HVAC loads with the modeled electricity consumption for heating, cooling, and water heating, producing a full hourly electricity demand profile consistent with ResStock total electricity use while replacing HVAC and DHW with equipment-specific performance.
- Common area loads were estimated using floor area and EUI assumptions

Analysis Assumptions: Applying Electric Rates

Electric tariff data was pulled from Genability, a comprehensive tariff database that includes fixed, variable supply, demand, and all types of volumetric charges. The tariff data is up to date as of February 2026.

- Eversource tariffs used for analysis:
  - *R-1HP – Residential Heat Pump (R-1HP – M.D.P.U. No. 85)*
  - *R-3 – Residential Space Heating (R-3 – M.D.P.U. No. 9)*
  - *R-2HP – Residential Assistance Heat Pump (R-2HP – M.D.P.U. No. 86)*
  - *G-1 – Small General Service (Non-Demand Price Option) (G-1 – M.D.P.U. No. 11)*
  - *G-1 – Small General Service (Demand Price Option) (G-1 – M.D.P.U. No. 11)*
  - *G-2 – Medium General Service*
- Application:
  - Individual system / direct metered scenarios: all common area loads were assessed using the G-1 Non-Demand Price Option, regardless of what tariff was applied to the housing unit load
  - Central system / master metered scenarios: all common area and unit loads had the same respective commercial tariff applied

Summary on per-unit basis



Assumptions

Mid-rise ~50 units

Low-rise ~20 units

Annual electricity costs **per unit**

High performance envelope

Summary on per-unit basis