



Attachment 2: High-Rise Multifamily and Nonresidential Building Electrification Costs

To better understand costs and other constraints related to multifamily and nonresidential building electrification, Rincon reviewed best-available existing resources on this topic, namely, the PCE 2035 Decarbonization Plan (2022), and The Rocky Mountain Institute The Economics of Electrifying Buildings: Medium Size Commercial Retrofits (2022)¹. This document review is also supplemented by original contractor interviews conducted by Rincon for the upcoming Sacramento Electric Buildings Strategy (2022). Though not strictly City of San Mateo specific, the technical considerations of challenges to electrify oversized buildings are consistent between Sacramento and San Mateo, so are referenced here as recent region-specific resources for commercial electrification in Northern California.

Electrification Up-Front Costs and Other Considerations

While single family and low rise multifamily residential buildings tend to use similar equipment and operate in similar ways, commercial buildings and high-rise multifamily buildings tend to be highly variable. In original research conducted by Rincon for the City of Sacramento in the summer of 2022, all interviewees² communicated that larger multifamily and nonresidential buildings are more complicated to electrify than single-family homes and estimating costs is typically only possible on a project-by-project basis. This is because for most larger buildings, replacing a gas system with a similarly sized electric system is cost-prohibitive and therefore, often requires building re-engineering to determine appliance replacement and sizing options. For this reason, a detailed cost analysis for larger multifamily and commercial buildings was not developed and included here. Smaller buildings with domestic-sized space and water heating end uses, such as small to medium-sized retail or service buildings, have similar electrification costs as seen for single-family homes.

However, some equipment types are similar across building types and the cost to electrify can be more readily analyzed at a high level. For example, the PCE analysis notes that packaged commercial HVAC equipment, namely, packaged Single Zone (SZ) Gas Furnace with Cooling, are easy to electrify, as existing building 2-way A/C ordinances can cover most units without the requirement for incentives.

The Rocky Mountain Institute (RMI) 'The Economics of Electrifying Buildings: Medium-Size Commercial Retrofits' Report notes that local policy, or expectations of new local building electrification policies, will be a key driver in advancing commercial energy electrification, as portfolio owners will want to avoid stranded assets unless they undertake electrification. The RMI report focused on the electrification of HVAC systems from rooftop units (RTUS) with Heat Pump Rooftop Package Units (RTUs), on a prototypical 50,000 sq ft office building.

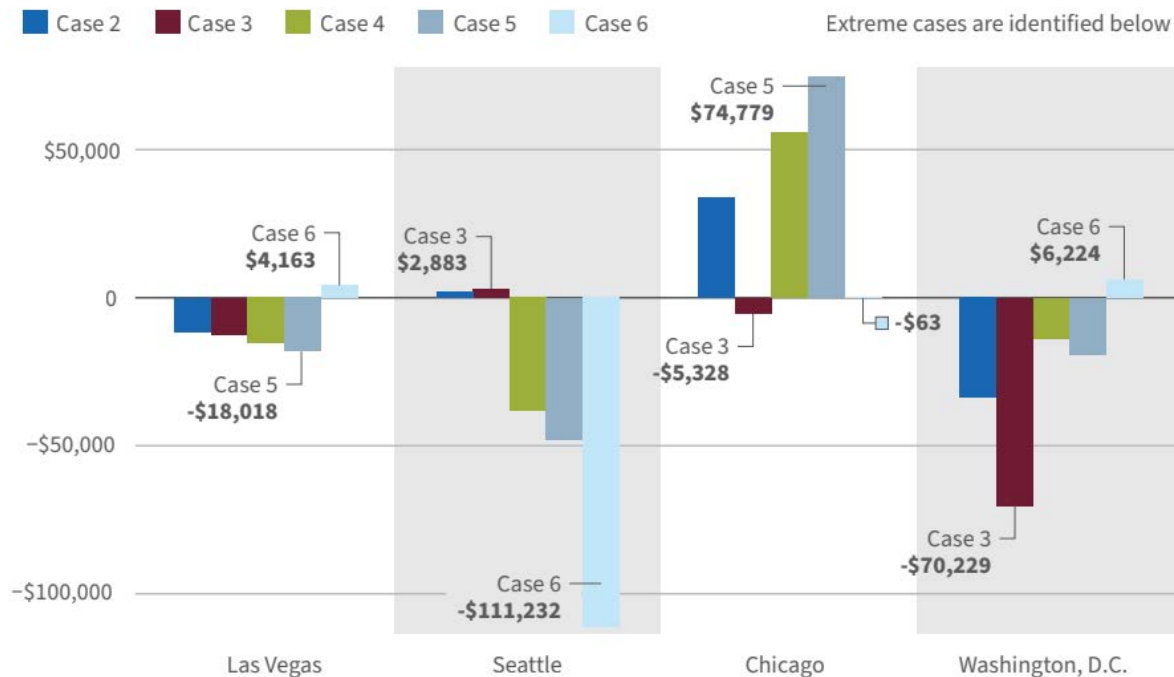
The RMI report modeled 5 cases to assess the economics of RTU retrofits: Case 1: No electrification, Case 2: Partial electrification, Case 3: Full electrification, Case 4: Efficient electrification, Case 5: Efficient electrification + demand management, Case 6: Efficient electrification + demand

¹ <https://rmi.org/insight/economics-of-electrifying-buildings-medium-size-commercial-retrofits/>

² To better understand costs and other constraints related to multifamily and nonresidential building electrification, Rincon conducted interviews with three energy engineering consultants working on large building decarbonization in Sacramento. Five additional interviewees were identified through the City's contact network to speak to this topic, including energy managers and directors of UC Davis Health, Sacramento Municipal Utility District, Brighton Energy, Association for Energy Affordability, TRC Companies.

management and PV. These cases, found that in the cases of more temperate climates like Las Vegas and Seattle, building owners could achieve either neutral or positive 20-year net present value through full electrification (Seattle), or with full electrification with demand management and solar photovoltaics (Las Vegas), as shown in Figure 1.

Figure 1 RMI Report Exhibit 3: The 20-year Net Present Value of Each Case by City³



The results from the RMI study have three important San-Mateo-relevant takeaways, which is that 1) electrification policy, with electrification-specific prescriptive language for commercial building owners will be critical in actually electrifying commercial buildings, and 2) electrification of commercial building electric retrofits will likely have to be paired with a suite of demand management, energy efficiency, or renewable energy projects in order to make building electrification economical for building owners, and 3) heat pump rooftop package units are the most promising electrification solution for commercial building electrification, offering a replicable model for a 1:1 equipment swap-out.

Current Incentives

Current electrification programs and rebates are available for commercial and multi-family buildings in the City of San Mateo from PCE, TECH, and BayREN are summarized in Table 1. All residential appliance incentives also apply to multifamily residents if the applicant for rebates is also the owner of the apartment, in the case of PCE Incentives.⁴

³ Page 20 of: <https://rmi.org/insight/economics-of-electrifying-buildings-medium-size-commercial-retrofits/>

⁴ https://www.peninsulacleanenergy.com/wp-content/uploads/2022/09/Peninsula-Clean-Energy-Appliance-Rebates-Terms-Conditions_10.01.22.pdf

**Table 1 Current Incentives and Programs for Commercial and Multifamily Buildings (as of November 2023)**

Description	Amount/Type	Details
Commercial Building Incentives		
Data Connect (PCE)	Technical assistance	Access or share PCE Data Connect platform to analyze facility energy data, access data to help calculate energy carbon footprint. Could be useful for future building performance standard work.
Technical Design Assistance (PCE)	Technical Assistance	Free project assistance for all-electric buildings with TRC via AllElectricDesign.org
Inflation Reduction Act (IRA) Commercial Buildings Tax Credit	Tax Credit	Tax credit for energy efficiency based on square footage (Tax Credit 179D)
Multifamily Building Incentives		
TECH Heat Pump HVAC Systems Serving Multiple Apartments	\$1,000/unit*	HP HVAC equipment serving multiple apartments
TECH Common area HPWH rebate	\$1,800/ system*	Split or packaged rooftop/ multi/position heat pump (ducted or ductless)
TECH Electrical panel upgrade	\$1,400/ apartment receiving electrical upgrade*	Undersized apartment electrical infrastructure is upgraded as part of an apartment's HPWH or HP HVAC Installation
BayREN Common Area HVAC	\$1,000/equipment	Common area heat pump HVAC
BayREN Laundry/Common Area Heat Pump Water Heater	\$1,000/equipment	Common area laundry or heat pump water heater
BayREN Heat Pump Pool Heater	\$1,500/pool	
BayREN Subpanel Upgrade	\$1,000/apt served	
BayREN Central/common area panel upgrade	\$5,000/property	
Source : https://www.peninsulacleanenergy.com/commercial-programs/ , https://techcleanca.com/incentives/multifamily-information/ , https://www.bayren.org/multifamily-property-owners/building-improvements		

**These incentives reflect November 2023 research, Note that TECH Clean California was currently not accepting multifamily reservations at the time of writing this memo, though multifamily unitary HPWHs were set to re-open for submission on December 5, 2023.*