Attachment A

CAC Six-month Look Ahead (Nov. 2024 - Apr. 2025)			
Date	**Type**	**Item**	**Lead Department**
Nov/Dec TBD, 2024	Engagement	Building Performance Ordinance stakeholder engagement webinars - add new dates once approved	Environmental Services
December 2, 2024	Transportation & Environment Committee (T&E)	Electric Vehicle Fleet and Charging Infrastructure Status Report	Energy, Public Works, Transportation
December 2, 2024	Transportation & Environment Committee (T&E)	San José Power Status Report	Energy
February 3, 2025	Transportation & Environment Committee (T&E)	Climate Adaptation and Resilience Plan Update	City Manager's Office
February 3, 2025	Transportation & Environment Committee (T&E)	Transportation Activities Annual Report	Transportation
February 2025 TBD	City Council	San José Clean Energy 2025 Rates and Power Mix	Energy
March 3, 2025	Transportation & Environment Committee (T&E)	San José Clean Energy Programs Roadmap Status Report	Energy
April 7, 2025	Transportation & Environment Committee (T&E)	Climate Smart Zero Waste Element	Environmental Services
April 7, 2025	Transportation & Environment Committee (T&E)	Climate Smart Semi-Annual Update	Environmental Services
April 8, 2025	City Council	San José Clean Energy Programs Roadmap Status Report	Energy
April 22, 2025	City Council	Climate Smart Zero Waste Element	Environmental Services
April 22, 2025	City Council	Climate Smart Semi-Annual Update	Environmental Services
Spring 2025	City Council	Climate Smart Plan Update	Environmental Services

Attachment B

Observations (from Ad Hoc committee)

- After a rough interlude of low and negative operating margins SJCE turned the corner to profitability
  - Key factor in recovery was increased rates
- Since 2020 operating cost margins have averaged 32%
  - Result is SJCE's cash position has been growing $34M per quarter
  - As of March 2024 SJCE's net cash position was $279M
  - Operating reserves (cash minus adjustments for potential encumbrances) were $238M
- SJCE's stellar credit rating is no accident
- What does SJCE do with its growing cash position?

RECENT AND FORECAST RESERVE BALANCES

	FY23-24 Year end Balances (audited)	FY24-25 Q1 Balances (unaudited) (9/30/24)	FY24-25 Q2 Estimated Balances (12/31/24)
Operating Reserve ($M)	$211.3	$232.9	$220.0
Days of Operating Expenses (liquidity on hand) from Operating Reserve	187 days	174 days	157 days
Rate Stabilization Reserve balance ($M)	$50.0	$50.0	$50.0
Days of Operating Expenses (liquidity on hand) from Rate Stabilization Reserve	44 days	37 days	36 days
Total Days of Operating Expenses (liquidity on hand) for Operating Reserve + Rate Stabilization Reserve	231 days	211 days	192 days

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RESERVES SUPPORT SJCE'S STRATEGIC OBJECTIVES

Operating Reserve:

- Secure favorable commercial terms with vendors, including power producers
- Maintain stand-alone investment grade SJCE credit rating
- Develop a source of funds for investment in generation and other local programs
- Emergency funds

Rate Stabilization Reserve:

- Provide a contingency to support rate stability for SJCE customers
- Provide a source of funds to respond to unforeseen expenditures or market events
- Support maintaining compliance with financial covenants

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THE PCIA COLLECTS THE ABOVE-MARKET COSTS OF THE IOU'S (PG&E'S) PCIA GENERATION PORTFOLIO

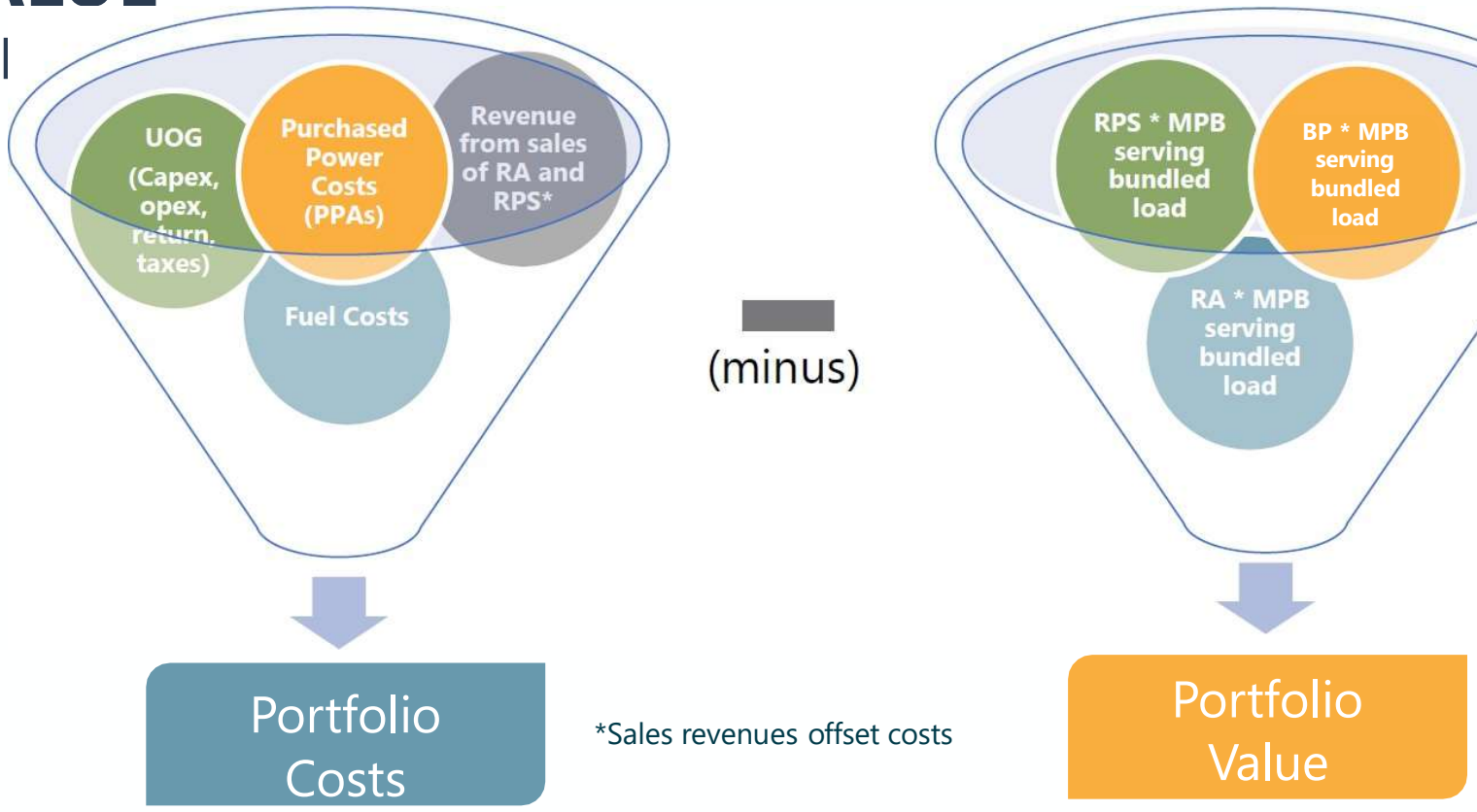
*Value calculated using "Market Price Benchmarks" (MPB)

PCIA "ELEVATOR PITCH"

- **What is it?** A $/kWh charge that appears on electric bills that varies depending on a customer's vintage, which is marked by the date on which the customer "departed" IOU bundled service.
- **What am I paying for?** The above-market costs of the Power Purchase Agreements (PPAs) and Utility-Owned Generation (UOG) that the IOUs bought/contracted on **all bundled** customers' behalf at the time of execution.
- **Why am I paying it?** Public Utilities Code Sections 366.1 and 366.2 guarantee IOUs recovery of "stranded" above-market costs associated with those PPAs and UOGs, ensuring recovery of all costs associated with those contracts and investments that exceed current market prices.
- **Who pays it?** Everyone, both bundled and unbundled customers, but not everyone pays for the same resources. This is where vintages come in. (More later . . .)
- **How does it impact CCAs?** The PCIA affects CCAs' ability to compete against IOU generation service, for better or for worse, depending on market conditions.
- **Does it go by other names?** Yes, people also refer to it as a departing load charge, a nonbypassable charge, stranded cost, and exit fee (misnomer).

COMPONENTS OF PORTFOLIO COSTS AND VALUE

FOR



LARGE VOLATILITY IN COMPONENTS OF PCIA

	2024 Forecast	2024 Final	2025 Forecast	Revised 2025 Forecast
System RA MPB	$15.23	$28.65	$42.54	$40.31
Local RA MPB - PG&E	$9.52	$12.22	$13.29	$13.29
Flex RA MPB	$9.12	$12.89	$14.16	$16.97
RPS MPB ($/MWh)	$31.73	$54.56	$71.24	$71.24

- All parties agree that current PCIA methodology needs to be revised
- A wide range of proposed fixes ➔a wide range of financial impacts to CCAs

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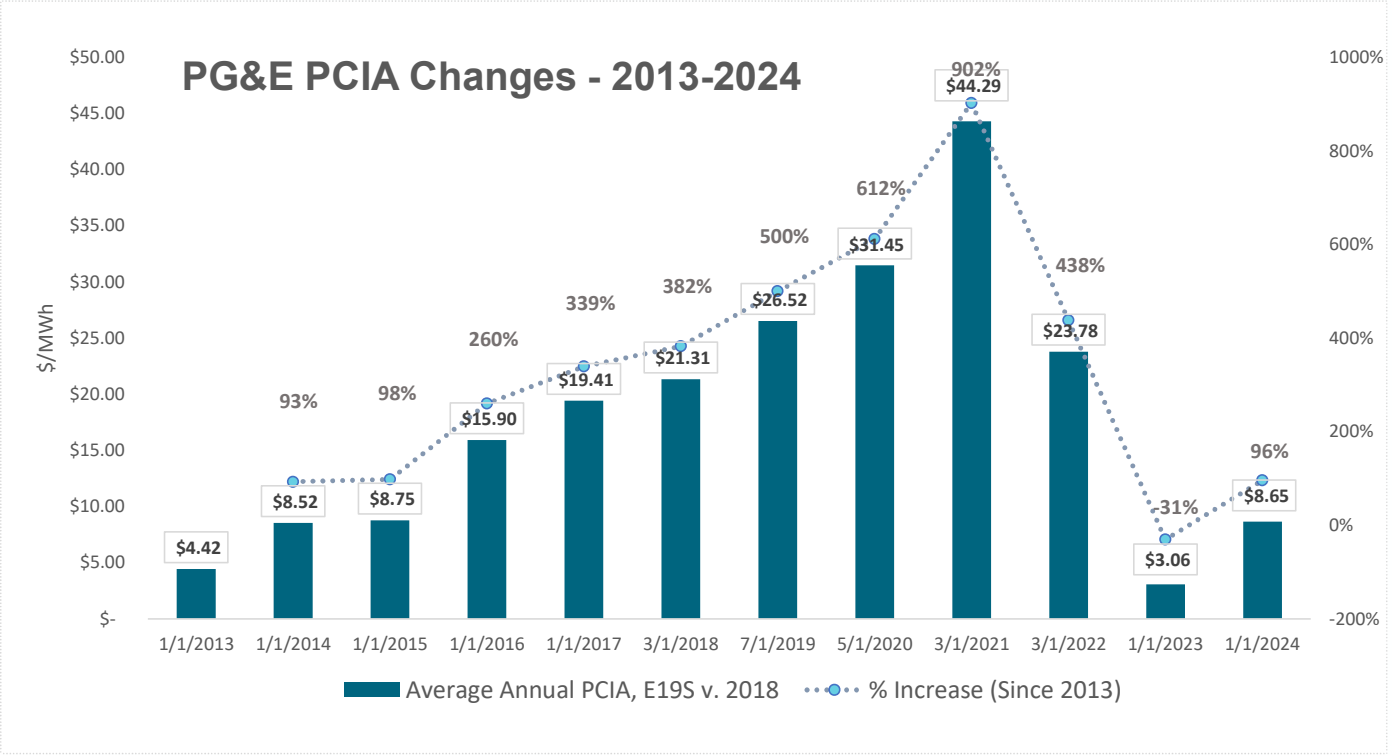
PCIA VOLATILITY HAS BEEN EXTRAORDINARY

- In 2024, PG&E will collect approx $23M more from SJCE customers than in 2023.
- Though CCAs have more visibility and ability to participate in annual PCIA process at CPUC, very hard to estimate PCIA with precision.
- $10/MWh = 1¢/kWh



Note that the PCIA value is the average PCIA for the year. The date is when the PCIA changed to reflect the new rate for the rest of the calendar year

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WHAT ABOUT OTHER CCAS' RESERVES POLICIES?

CCA	Target Days or percentage of annual operating expenses	Summary of Reserve Policy	Maintains a Rate Stabilization Reserve
AVA Community Energy; formerly EBCE	50%	May range from 25% to 75%	Yes
Central Coast Community Energy	25%	- Strategic Reserve Policy (25% of budgeted appropriations) - Energy Rate Stabilization Reserve (20% budgeted cost of energy) - Renewable Energy Initiative Reserve (5% budgeted cost of energy) - Capital Infrastructure Reserve	Yes
Clean Power Alliance	50%	Minimum: 30%; Maximum: 60%; Target of 120 days liquidity on hand	Yes
Marin Community Choice Energy	60%	Target: 240 days liquidity on hand	Yes
Peninsula Clean Energy	180 days		Yes
Pioneer Community Energy	160 days		No
San José Clean Energy	180 days		Yes
Silicon Valley Clean Energy	350 days	Minimum: 120 days, Maximum: 500 days; Target: 350 days	No
Sonoma Clean Power	280 Days	Minimum: 180 days; Target: 280 days	Yes

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GOING FORWARD

Margins will be much lower

- Still expect to be able to offer competitive rates to PG&E
- Significant regulatory/financial uncertainty year to year means that we need to be prepared for a range of scenarios

Recommend no change to reserves policy at this time

- If cash continues to build in excess of target, explore bill credits/rebates
- Continue to advocate for regulatory changes to reduce market volatility, which could allow for lower reserve targets

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QUESTIONS?

WHAT ARE THE MECHANICS OF THE RESERVES?

Operating Reserve:

- Cash on hand to maintain liquidity in operations
- Credit agencies, power vendors and banks value a solid operating reserve as it indicates fiscal health and stability of the operation, this leads to favorable ratings and terms for SJCE
- Use of the reserve is per SJCE operations as approved in the budgeting and rate-setting processes

Rate Stabilization Reserve:

- Can be drawn on to increase the revenues balance in the current period's financial statements which is useful to maintain debt covenants and/or positive operating income without raising customer rates
- Can be drawn on to increase the cash available for operations without dipping in to the Operating Reserve balance
- Use of reserve is per ED Director discretion and balance is reported to Council, this allows for timely responses to unanticipated events

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Attachment C

Sideayard Setback for Heat pumps - 11-14-24

Sideyard Setback and HP Noise Ordinances

- Often homeowners may prefer to locate their HP in their sideyard, rather than front or back yards. However, there are 2 ordinances that can be problematic, sideyard setback and sometimes noise ordinances also.
- **Setback Ordinances**:
  - Some cities, including San Jose, have a five foot (or larger) sideyard setback requirement, that often is not compatible with a sideyard siting of a HP (depending on details).
  - The 5' requirement (in SJ) is historical, and partly pertains to clearance that some city fire departments prefer, however:
    - numerous cities/fire departments operate just fine with a 3' sideyard setback rule.
    - cities, including San Jose, actually have numerous 'allowed exceptions' (eg for chimneys, bay windows, tankless gas water heaters!!!, etc) that effectively result in 3' clearance. Unfortunately, SJ currently(Oct 2024) does not allow exceptions for heat pumps;however there is recent indication of willingness to consider ordinance changes.
  - Some of us (including some members of the SJ Climate Advisory Commission(SJ CAC)) are requesting the SJ Planning department(PBCE) to revise it's ordinances to allow a minimum clearance down to 3 feet, for heat pumps for small sideyards that cannot accommodate the 5' ordinance.
    -

Noise Ordinance

- **<u>Noise Ordinances</u>**:
  Focusing on San Jose, we currently have a noise ordinance requirement of 55dBA at the property line. We've been told SJ permit and inspection for heat pumps does not track the noise. We feel this is reasonable for several reasons: modern heat pumps are relatively quiet, there is not a significant known issue with HP noise complaints, we prefer to avoid unnecessary regulations for homeowners, and there are various complexities in quantifying the noise that make it non-trivial to design ordinances around. We note the following:

  - 1) While HP noise is spec'd at full speed, it is rarely operated at full speed. Normally inverter heat pumps operate at lower compressor (and fan) speeds, so noise will normally be less than the spec'd value (for inverter HPs). We estimate 3dB less. (>> Modern inverter heat pumps (also sometimes called 'variable speed' heat pumps) are typically quieter than traditional older single speed heat pumps (or A/C's). So don't gauge by experience with older single speed AC's.)

  - 2) Heat pump spec values are measured at ~3 feet distance from the HP. For a HP spec's at 60dBA, placed 3 feet from property line, the actual noise at property line would be 60-3(for invtr)=57dB (or less). Considering that a 60dBA ('sound pressure') is roughly the level of normal conversation, then 60dBA HP spec ordinance (@3' placement) we feel is reasonable.

  - 3) Point noise soucres drop off by 6dB as distance from source is doubled. So for HP's placed 6' from prop line, the noise at prop line would be 6dB below the spec'd value. Then slighly noisier HP's can be used provided they are placed further away from property line. 6dB drop/doubling_dist (square law rule) is ideal; slightly weaker more conservative scaling would be appropriate for sideyards (see proposal).

Noise Ordinance - Continued

- 4) The noise vs distance drop-off also means that as one moves an additional 6 feet(for example) BEYOND the property line, into the neighbor's property, the noise drops off several more dB (eg 6dB). For sideyard geometries(distance to prop line) of several feet, the 'doubling distances' is always short; this is unique to sideyard geometry (or any noise source close to the prop line), so the noise is quite localized and of less impact to neighbors.

- 5) Some HP models (like mine) allow for quieter operation by reduction of fan (and/or compressor) speeds (although this is rarely used or needed for modern inverter HPs, to my knowledge).

- 6) It should be noted there are additional mitigating measures available to reduce noise, in the unlikely event there is need for further noise reduction. Noise dampening or deflecting barriers can be placed near the heatpump (eg dampening blankets or tiles on walls or fences near HP; a normal solid wood fence appear to serve to reduce noise a few dB.

- 7) Finally, we note that typically most homeowners and neighbors find their heatpumps (at least inverter type) to be quite quiet.

Noise Ordinance - discussion

- While we support the current omission of noise from the inspection process, if for some reason there is a strong interest to add a noise regulation, we propose the following ordinance for SJ, for a HP Spec, given it's distance from property line. The target noise at property line is only 2dBA above the current 55dBA ordinance goal:

HP Distance from Property Line (feet)	Target Noise limit at Property line (dBA)	HP Spec (Full Speed) for Invtr HP, that achieves Target Noise Limit, assuming Pt Source, and 3dB invtr adjustment (dBA)	HP Spec needed to achieve Target Noise (57dB) using conservative d scaling(exponent 1.5, not 2.0) (dBA)	**Proposed Ordinance for Invtr HP (full speed) spec, w/ clip at 65. (dBA)**
3	57	60.0	60	**60**
4	57	62.5	61.9	**62**
5	57	64.4	63.3	**63**
6	57	66.0	64.4	**64**
7	57	67.4	65.5	**65**
8	57	68.5	66.4	**65**

Siting Outdoor Mechanical Equipment Guide



SOUND DECISIONS:
CONSIDERATIONS WHEN SITING OUTDOOR MECHANICAL EQUIPMENT

Preparing cities for new regulations related to fossil burning appliances

OPENING DOORS TO BENEFITS

Increasing siting opportunities for outdoor mechanical equipment aids in cleaner, safer more resilient communities.

» HEALTH

Replacing natural gas appliances with electric heat pumps improves indoor air quality and reduces building emissions.

» COMFORT & EQUITY

In a warming climate, access to cooling ensures community well-being.

» SAFETY

Combustion is eliminated, along with associated safety risks.

Figure 1: Typical Retrofit Condenser Installation

CODES AND MECHANICAL EQUIPMENT

Current codes for setbacks, noise and screening limit available siting locations for mechanical equipment, primarily condensing units for air conditioners and heat pumps. Units like the one shown in Figure 1 are currently disallowed within 3 feet of a property line in 7 of 13 cities in SVCE territory due to the equipment's noise levels.

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OPPORTUNITY FOR CODE UPDATES

IMPACT OF MUNICIPAL CODE UPDATES:

By updating municipal codes, as well as noise and zoning ordinances, cities can positively affect the cost and availability of air conditioners and heat pumps.

RECOMMENDATIONS FOR MECHANICAL EQUIPMENT INSTALLATION:

To improve options for installing mechanical equipment in space-constrained projects, Exceptions and Variances, similar to the following, should be included in municipal codes:

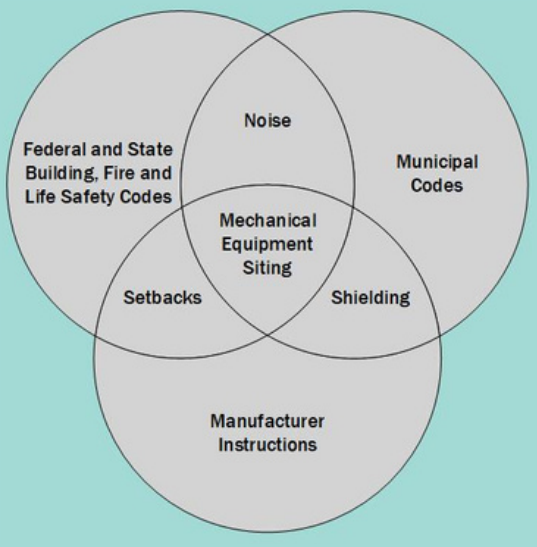

Figure 2: Complex Rules Impacting Siting of Mechanical Equipment

- Exception: Allow slightly higher dBA levels and reduced setbacks only for water heating and space heating/cooling equipment with inverter technology.
- Variance: Keep zoning and noise ordinances unchanged but allow higher acceptable levels if property owners can provide evidence of no other available location (building department approval required).

PROCEDURAL OPPORTUNITIES

There are several municipal codes affecting mechanical equipment siting that building authorities may need to amend to facilitate easier retrofit installation. Changes require careful consideration of a variety of factors, as illustrated in Figure 2. These regulations include:

Noise ordinances

Modify language regarding allowable setbacks, noise levels and mechanical equipment shielding.

Regulatory documents

Coordinate updates across departments to ensure accurate, timely adoption and implementation.

Stakeholder meetings

Promote and host stakeholder engagement meetings with contractors, homeowners' associations, engineers and architects, and the public.

Zoning ordinances

Revise language regarding setbacks, aesthetics and other relevant topics.

Reach codes

Review reach codes to avoid potential conflicts with changes to ordinances.

Exceptions

Include exceptions language to standard thresholds and setback for uniquely constrained sites.

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ORDINANCE RECOMMENDATIONS[1]

Technical thresholds and requirements that allow more flexibility in siting mechanical equipment. Importantly, these guidelines aim to balance individual quality of life with reasonable and legal standards.

» SETBACKS

Cities of Menlo Park, Campbell, Milpitas and Mountain View allow mechanical equipment to be installed within the 5-foot side yard setback, however a required minimum of 3 feet (36 inches), net clear space between the equipment and fences or other obstructions, as measured from the nearest point of the equipment to the property line or permanent barrier, must be maintained for egress and fire/life safety access (see Figure 3).

As illustrated in Figure 4 and Figure 5, equipment should be allowed to be installed within the first 5 feet from the building edge in a front yard setback if a) equipment is adequately screened from view with approved materials, b) building setback is a minimum of 15 feet from a public walkway or thoroughfare and c) equipment is no more than 4 feet above grade.

If the current ordinance lacks setback requirements for mechanical equipment, defining a new minimum setback is needed. This may include a distance of at least 3 feet from a property line, along with the use of manufacturer-recommended sound transmission-attenuating materials. The new language may include: "Equipment must be a minimum of 3 feet from the property line on any side yard utilized for ingress or egress. Additionally, equipment should be installed with manufacturer-recommended mechanical sound transmission-attenuating materials."

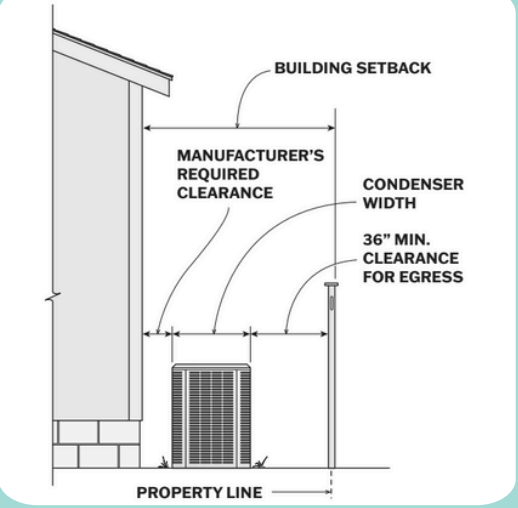

Figure 3: Mechanical Equipment Side Yard Setback Encroachment

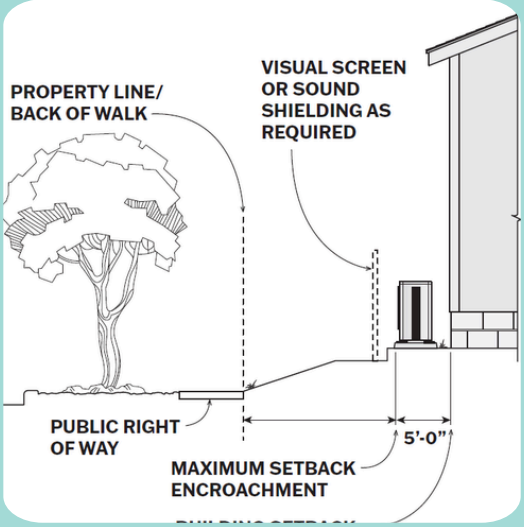

Figure 4: Mechanical Equipment Front Yard Setback

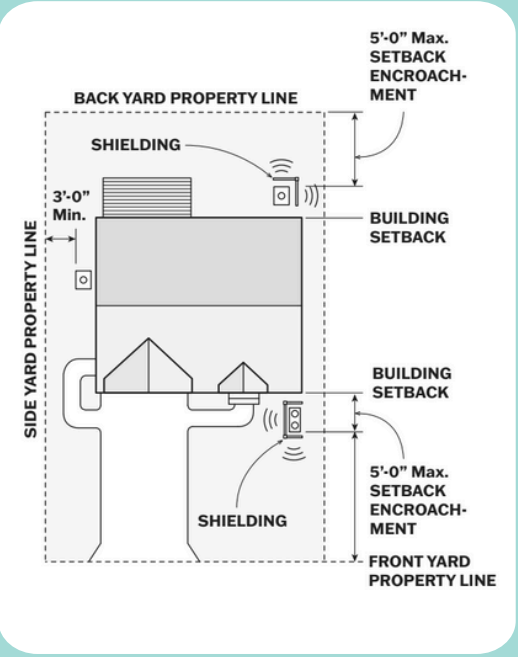

Figure 5: Mechanical Equipment Setback Encroachments

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NOISE LEVELS

Depending on the style of heat pump, sound ratings range from 48-75 dBA. This is about the same level as normal conversation. Noise ordinances and the allowable maximum thresholds vary between municipalities based on the time of day and noise source. Cities like Gilroy and Mountain View have already passed amendments that encompass day/night (Ldn) and duration, such as L10 or 10% of the time. Options for allowable noise level limits might include:

- **Option 1:** 65 dBA during the day (7:00 a.m. – 10:00 p.m.) and 60 dBA at night (10:01 p.m. – 6:59 a.m.) and with a cumulative period of no more than 50% of operating time (L50).
- **Option 2:** 60 dBA levels day and night (Ldn) or 70 dBA 15% of the time (L15) measured at the property line if no solid barrier at the property line is present (fence, wall, or other sound attenuating shielding)
- **Option 3:** 60 dBA for inverter driven and 55 dBA for non-inverter driven equipment as measured at the property line if a solid barrier at the property line is present (fence, wall or other sound attenuating screen is in place, measured on the opposite side of the barrier).

AESTHETIC SCREENING AND ACOUSTIC SHIELDINGAESTHETICS

Allow mechanical equipment to be installed within the first 5 feet from the building edge of the front or rear setback with appropriate aesthetic screening (see figure 6) to maintain visual requirements and dBA levels at the property line or back of the walk (edge of public access). Not all aesthetic screening provides adequate acoustic or noise shielding.

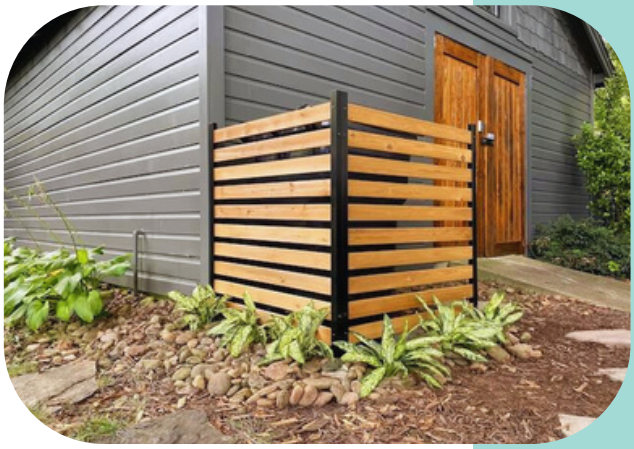

Figure 6: Equipment Screening

EXCEPTIONS AND VARIANCES

Examples of potential variances and exceptions allowed under certain conditions include:

Hardship variance:

If the property owner can provide reasonable evidence that without the variance, installation of mechanical equipment would be either impossible or unreasonably costly (need to define parameters), allow for variance from ordinance thresholds if shown the variance will not negatively impact adjacent properties or the public right-of-way.

Setback exceptions:

Allow for installation of specific electrical equipment (condensers) within setbacks if the property owner can provide reasonable evidence that no other location exists.

Scan the QR code to access specific recommendations and model noise, setback and screening ordinances examples , in the: "Considerations and Alternatives for Siting Outdoor Mechanical Equipment" extended document.

Submitted to:

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rhainc.com

Last Updated:
May 2, 2024

Siting Outdoor Mechanical Equipment Guide-extended

SOUND DECISIONS:
CONSIDERATIONS WHEN SITING OUTDOOR MECHANICAL EQUIPMENT

Preparing cities for new regulations related to fossil burning appliances

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Last Updated: May 17, 2024

SILICON VALLEY CLEAN ENERGY

PREFACE

Acknowledgments

The authors would like to express our deepest gratitude and recognize the contributions of individuals who have supported the development of this guide. This work would not be possible if it were not for the contributions from: Anthony Eulo with SVCE; Shaunn Mendrin, Aastha Vahist, Suzanne Park and George Schroder with the City of Sunnyvale; Jennifer Armer and Robert Gray with the Town of Los Gatos; Sam Fishman and Wen Yang with SPUR; Sean Hatch with the City of Cupertino; Bruce Hodge and Bret Anderson with Carbon Free Palo Alto; Tom Kabat with Redwood Energy; the AWHI equity committee; Geoff Wickes with Northwest Energy Efficiency Alliance; Scott Blunk with SMUD; Caren Ferrari with ASF Electric; Steve Israel and Allan Rago with Quality Conservation Services; Scott Lovotti and Brian Thomspon with Lovotti Air Inc.; Dave Graves with Simple Switch; Aaron Gianni and Alejandro Perez with Larratt Brothers Plumbing; and SFPUC Power Enterprise.

About SVCE

Silicon Valley Clean Energy (SVCE), a Community Choice Energy agency, was formed as a Joint Powers Authority in 2016 and now serves approximately 270,000 residential and commercial electricity customers across a service area comprised of the following 13 communities: Campbell, Cupertino, Gilroy, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Morgan Hill, Mountain View, Saratoga, Sunnyvale and Unincorporated Santa Clara County. 97% of electricity customers in SVCE's service area receive their electricity from SVCE. SVCE was formed with the primary intention to address climate change through a variety of services provided to residential and business customers. Since SVCE-provided energy is significantly less carbon-intensive than both general grid power and methane gas combustion, much of SVCE's work has centered on encouraging and supporting building electrification.

About RHA

Richard Heath & Associates, Inc. (RHA) is a Minority Business Enterprise and leading California program design and management firm, specializing in delivering equitable access to energy efficiency, resiliency and beneficial decarbonization. Founded in 1980, RHA's earliest initiatives included partnering with a California utility to pioneer one of the state's first income-qualified energy efficiency programs. RHA has since built on this legacy and operates over 50 programs as a program administrator/implementer, government and utility technical consultant and training organization. This work has helped lead over 2.7 million Californians to more efficient, cleaner energy solutions, healthier homes and lower utility bills.

Disclaimer

The information presented in this document serves as a general guide for building code compliance and is for informational purposes only. The content herein does not constitute legal advice. Always consult licensed professionals regarding the details of any construction project. Richard Heath & Associates Inc. disclaims any expressed or implied warranty of the information provided herein, including any warranties of merchantability and/or fitness for a particular purpose of this content.

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Revision Table

Version	Date	Description
1.0	03/28/24	Initial draft
2.0	04/19/24	Revised per SVCE feedback, added graphics, modified recommendation section
3.0	05/17/24	Revised per stakeholder suggestions

Table of Acronyms, Abbreviations, and Definitions

Abbrev.	Definition
A	Ampere
AHJ	Authority Having Jurisdiction
BEV	Battery Electric Vehicle
CA	California
CEC	California Electric Code
dBA	Decibel
EMS	Energy Management System
EVSE	Electric Vehicle Supply Equipment
GHG	Greenhouse Gas
HEA	Home Energy Analytics
HPWH	Heat Pump Water Heater
NEC	National Electric Code
NFPA	National Fire Protection Association
RHA	Richard Heath & Associates, Inc.
ROW	(public) Right of Way
SME	Subject Matter Expert
SVCE	Silicon Valley Clean Energy

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PURPOSE

This guide is intended to help cities prepare for upcoming changes to rules for the installation of fossil burning appliances while ensuring citizens have equitable access to modern heating and cooling systems that will be required under these new rules. Increasing siting opportunities for outdoor mechanical equipment aids in cleaner, safer more resilient communities.

Health: Replacing natural gas appliances with electric heat pumps improves indoor air quality and reduces building emissions. Heat pumps provide air conditioning, protecting against extreme heat events, while reducing humidity mold risks, and protecting against extreme heat events.

Comfort and Equity: In a warming climate, air conditioning is crucial for community and individual well-being. Updating outdated rules ensures equitable access to modern heating and cooling systems.

Safety: Gas furnaces emit combustion byproducts, including carbon monoxide. By switching to electric heat pumps, you eliminate the risk of carbon monoxide exposure indoors. This is a significant safety benefit. Heat pumps operate without combustion, ensuring that no harmful gases are released inside homes.

WHAT'S INCLUDED

This guide offers research-backed, implementable solutions for updating municipal codes that impact the available siting locations for mechanical equipment. It is focused primarily on condensing units for air conditioners and heat pumps, similar to those shown in Figure 1. These solutions aim to increase available siting options on physically constrained properties while minimizing potential negative impacts on local aesthetics, noise and compliance with local regulations. While the recommendations herein may also apply to commercial sites, specific thresholds recommended here are focused on new and existing residential buildings.

Figure 1: Typical Retrofit Condenser Installation

BACKGROUND

Silicon Valley Clean Energy (SVCE) acknowledges that the placement of exterior mechanical equipment for heat pumps is an important and complex issue in HVAC retrofits and can present challenges for customers, contractors, and municipal staff charged with developing planning policies and issuing building permits. In response, SVCE collaborated with consultant Richard Heath & Associates, Inc (RHA) to create this Informational Guide for planning staff and other stakeholders.

Section 1: Recommendations for Code Updates

By updating municipal codes, noise and zoning ordinances or other locally adopted regulations, cities can have a positive impact on both the cost and availability of air conditioners and heat pumps for homeowners and contractors looking for solutions, while ensuring compliance with all needed fire and life safety requirements. These changes require careful consideration of a variety of factors, as illustrated in Figure 2.

Legal note, adoption of noise-related ordinances is subject to CA laws and regulations, including Health and Safety Code 46000, which states, *"(f) All Californians are entitled to a peaceful and quiet environment without the intrusion of noise which may be hazardous to their health or welfare. (g) It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare."* This code is further reinforced by Section 415 of the California Penal Code, wherein it is illegal for any resident to knowingly create loud and unreasonable noises as a means of disturbing another.

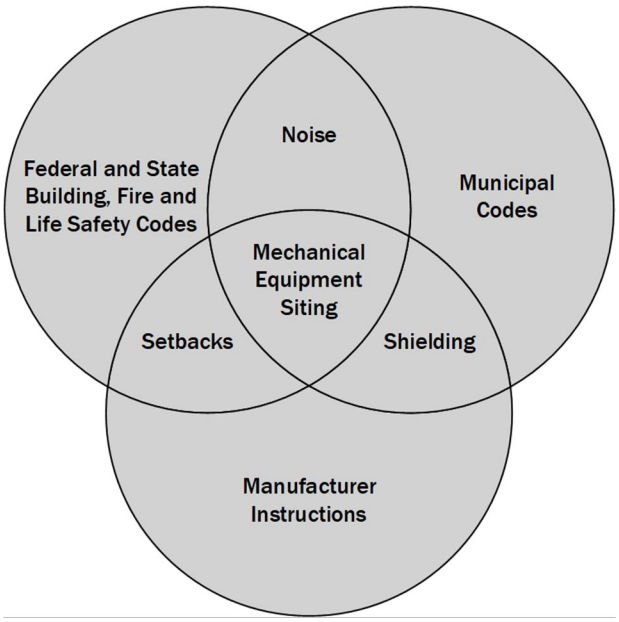

Figure 2: Competing Rules Impacting Siting of Mechanical Equipment

If implemented, the following recommendations will improve the homeowner and contractor options for installing mechanical equipment in space-constrained projects. Specific ordinance language examples are provided in Section 2.

Recommended changes to municipal codes, standards and ordinances to allow for greater flexibility in the siting of mechanical equipment. Recommend incorporating language specific to HVAC mechanical equipment may include:

- *Exception:* Allow marginally higher dBA levels and reduced setbacks only for water heating and space heating/cooling equipment.
- *Variance:* Leave zoning and noise ordinances as is, with additional higher acceptable levels allowable if the property owner can provide reasonable evidence no other location is available (building department written approval required) or if inverter driven equipment is used.

1.1 Procedural Recommendations

There are several municipal codes affecting mechanical equipment siting that building authorities may need to amend to facilitate easier retrofit installation. The regulations include:

1) Zoning ordinances – Update language regarding setbacks, aesthetics and other relevant topics.
2) Noise ordinances – Update language regarding allowable setbacks, noise levels and mechanical equipment shielding.
3) Reach codes – While they generally do not contain language related to siting mechanical equipment, review reach codes to ensure any changes to other regulations do not conflict with the reach codes.
4) Regulatory documents – When possible, coordinate between departments to update necessary regulatory documents in parallel to ensure accuracy, adoption timeliness and swift implementation.
5) Exceptions – Ordinances should include exceptions for existing buildings where space constraints would otherwise make the siting of mechanical equipment impractical or unnecessarily costly. Specific examples are listed in Section 2.2. However, each jurisdiction must consider its unique building stock, public sentiment, and other factors to determine which exceptions to allow.
6) Stakeholder meetings – Actively promote and host stakeholder engagement meetings early during the updating process to build public buy-in, including with contractors, homeowners' associations, engineers and architects, and the general public.

1.2 Ordinance Recommendations

The following recommendations, while not exhaustive, stem from research on existing codes. They focus on technical thresholds and requirements that allow more flexibility in siting mechanical equipment. Importantly, these guidelines aim to balance individual quality of life with reasonable and legal standards.

1.2.1 Setbacks

Allow mechanical equipment to be installed within the 5-foot setback, with a minimum of 3 feet (36 inches, see Figure 3) net clear space between equipment and fences or other obstructions required for ingress/egress and fire/life safety access, as measured from the nearest point of the equipment to the property line or permanent barrier.

As illustrated in Figure 4 and Figure 5, equipment should be allowed to be installed within the first 5 feet from the building edge in a front yard setback if a) equipment is adequately screened from view with approved materials, b) building setback is a minimum of 15 feet from a public walkway or thoroughfare and c) equipment is no more than 4 feet above grade.

If the current ordinance lacks setback requirements for mechanical equipment, defining a new minimum setback is needed. This may include a distance of at least 3 feet from a property line, along with the use of manufacturer-recommended sound transmission-attenuating materials. The new language may include: *"Equipment must be a minimum of 3 feet from the property line on any side yard utilized for ingress or egress. Additionally, equipment should be installed with manufacturer-recommended mechanical sound transmission-attenuating materials."*

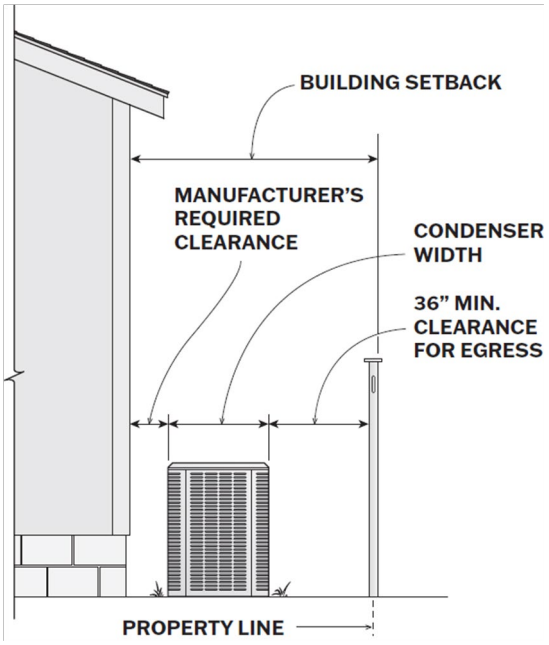

Figure 3: Mechanical Equipment Side Yard Setback Encroachment

Note: Consider language regarding equipment in rear setbacks. This will require further investigation into conditions (alley-loaded, multi-tenant buildings, etc.).

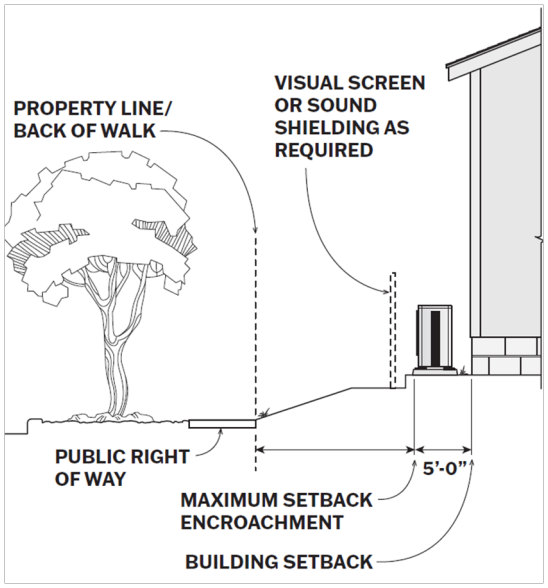

Figure 5: Mechanical Equipment Front Yard Setback Encroachment

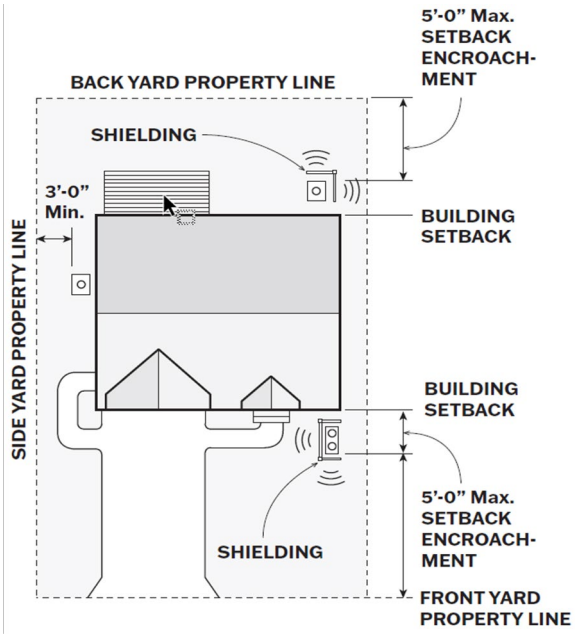

Figure 4: Mechanical Equipment Setback Encroachments

1.2.2 Noise Levels

Depending on the style of heat pump, sound ratings range from 48-75 dBA. This is about the same level as normal conversation. Noise ordinances and the allowable maximum thresholds vary between municipalities based on the time of day and noise source. Cities like Gilroy and Mountain View have already passed amendments that encompass day/night (L_{dn}) and duration, such as L_{10} or 10% of the time. Options for allowable noise level limits might include:

- Option 1: 65 dBA during the day (7:00 a.m. – 10:00 p.m.) and 60 dBA at night (10:01 p.m. – 6:59 a.m.) and with a cumulative period of no more than 50% of operating time (L_{50}).
- Option 2: 60 dBA levels day and night (L_{dn}) or 70 dBA 15% of the time (L_{15}) measured at the property line if no solid barrier at the property line is present (fence, wall, or other sound attenuating shielding).
- Option 3: 60 dBA for inverter driven and 55 dBA for non-inverter driven equipment as measured at the property line if a solid barrier at the property line is present (fence, wall or other sound attenuating shielding is in place, measured on the opposite side of the barrier).

1.2.3 Aesthetic Screening and Acoustic Shielding

Allow mechanical equipment to be installed within the first 5 feet from the building edge of the front or rear setback with appropriate aesthetic screening to maintain visual requirements and dBA levels at the property line or back of the walk (edge of public access). A unique use of fencing used as screening is shown in Figure 6. Not all aesthetic or visual screening provides adequate acoustic or noise shielding.

Figure 6: Equipment Screening

1.2.4 Exceptions and Variances

Examples of potential variances and exceptions allowed under certain conditions include:

1. Hardship variance: If the property owner can provide reasonable evidence that without the variance, installation of mechanical equipment would be either impossible or unreasonably costly (need to define parameters), allow for variance from ordinance thresholds if shown the variance will not negatively impact adjacent properties or the public right-of-way.
2. Setback exceptions: As described in Section 2.2.1, allow for installation of specific electrical equipment (condensers) within setbacks if the property owner can provide reasonable evidence that no other location exists.

Section 2: Specific Recommendations and Examples

Model noise, setback and screening/shielding ordinances are provided below for review and inclusion into code updates. This language is not meant to be exhaustive but rather to provide a starting point for ordinance changes to still meet public protection requirements while increasing options for siting equipment.

2.1 Noise Ordinance

Definitions apply to all 3 examples provided below:

"Decibel (dBA)" means a unit measuring the amplitude of sound or noise, weighted to the range of human hearing (A-weighting scale on a sound level meter).

"L_{30}" means the maximum noise level to be exceeded no more than thirty percent (30%) over the cumulative period.

"L_{50}" means the maximum noise level to be exceeded no more than fifty percent (50%) over the cumulative period.

"Noise level" means the measurement of sound in decibels (dBA) obtained by using a sound level meter at slow response.

2.1.1 Noise Ordinance Example 1

Successfully implemented in several cities, including Ashland, Oregon and in Gilroy, CA; these thresholds use a cumulative period, such as 30% (L_{30}) of operating time at a specific noise level. This is an effective modification to existing code language and has the advantage of allowing temporary fluctuations while still keeping overall thresholds within accepted bounds.

It shall be unlawful to generate noise within the city limits that exceeds the limits established in this section.

1) *Maximum Outdoor Noise Levels*
    a. *Mechanical Equipment Noise Impacting Residential Properties. Fixed-source outdoor mechanical or electrification equipment (e.g., pool, spa, air conditioning or similar equipment) is limited to a maximum of:*
        i. *Sixty-five (65) dBA as measured at the residential property line or seventy (70) dBA (L_{50}) measured at the residential property line. Such noise is limited to the hours of 7:00 a.m. – 10:00 p.m.*
        ii. *Sixty (60) dBA as measured at the residential property line or sixty-five (65) dBA (L_{30}) measured at the residential property line. Such noise is limited to the hours of 10:00 p.m. – 7:00 a.m.*

2.1.2 Noise Ordinance Example 2

Similar to the cumulative reporting example 1, this example 2 includes building type and proximity to major transportation corridors. Providing guidance by building types allows for flexibility.

1) *Residential Noise Limits*
    a. *Fixed-source outdoor mechanical or electrification equipment (e.g., pool, spa, air conditioning or similar equipment).*
        i. *Operational noise shall not exceed sixty (60) dBA during nighttime or sixty-five (65) dBA during daytime hours at any point on the property line of the adjacent single-family or duplex uses.*
        ii. *Operational noise shall not exceed sixty (60) dBA during nighttime or sixty-five (65) dBA during daytime hours on the primary useable open space of multi-family uses.*
        iii. *Operational noise shall not exceed sixty (60) dBA during nighttime or seventy (70) dBA during daytime hours on the primary useable open space of residential uses located along major transportation corridors (freeways, expressways, arterials, and rail lines) or mixed-use residential properties.*

2) *Exceptions to Residential Noise Limits*
    a. *Operational noise for residential air conditioners shall not exceed sixty-five (65) dBA for a cumulative period of no more than 30% (L_{30}) of nighttime hours and shall not exceed seventy (70) dBA for a cumulative period of no more than 50%(L_{50}) of daytime hours.*

2.1.3 Noise Ordinance Example 3

Successfully implemented in Palo Alto, higher allowable noise levels for inverter-based condenser units promote more energy efficient equipment with quieter operation. Additionally, a table of minimum setbacks from the receiving property line simplifies equipment selection and enforcement.

1) *Exterior noise limits.*
    a. *Mechanical or electrification equipment shall be deemed to comply with this noise ordinance if the equipment complies with the maximum equipment sound levels and is placed at the setbacks established in Table 1 - Setback Requirements.*

Table 1: Sample Setback Requirements

Equipment Sound Level (dBA)	Equipment Sound Level (dBA) for Inverter Equipment	Minimum Setback from Receiving Property Line (ft.)
55	60	3
57	63	4
59	64	5
61	65	6
62	66	7
64	68	8
65	69	9
66	71	10

2.2 Setbacks

Similar to the Cities of Campbell, Milpitas and Mountain View, requiring a three-foot setback for mechanical equipment with exceptions for encroachments will allow for streamlined permitting.

2.2.1 Mechanical Equipment Setback Example

1) *Mechanical or electrification equipment, including, but not limited to, air conditioner units, can encroach into the required side or rear yard setback but must be at least three (3) feet from the property line unless otherwise approved, in writing, by the local Building Official. No mechanical equipment can be located within the front yard setback or be visible from the public street.*
2) *Exceptions to the setback line requirements are as follows:*
    a. *Mechanical or electrification equipment may be located in a street-side yard setback but must be within a fenced yard consistent with fence setback requirements and traffic safety visibility area(s).*
    b. *When an acceptable side or rear yard location is not available, mechanical equipment may encroach into the required front and side yard setback so long as it is properly screened from view from a public Right of Way (ROW), adheres to the city mechanical equipment noise ordinances and written approval has been obtained from the local Building Official.*

2.3 Screening or Shielding

Simple and effective guidance for screening/shielding (similar to those implemented in Morgan Hill and Mountain View, CA) allow for both noise and aesthetic concerns to be addressed through mitigations.

2.3.1 Screening Mechanical Equipment from Public (ROW) View

1) *Roof- or ground-mounted mechanical or electrification equipment, including, but not limited to, air conditioning units, shall be visually screened from public view. When feasible, roof-mounted mechanical equipment shall be incorporated into the roof design in such a way that it becomes an integral part of the architecture or is concealed from view. Replacement of existing equipment shall trigger this requirement. Mechanical equipment shall be screened as follows:*
    a. *Acceptable screening methods include, but are not limited to, architectural elements, fences and landscaping.*
    b. *Screening or shielding shall not inhibit the proper, safe operation of the mechanical equipment, nor shall it encroach into the required clearances for service and operation, as specified by the manufacturer*.

Section 3: Additional Resources

The following sections are provided as reference information and to compile research findings for cities evaluating these updates. For all thirteen member agencies, code language was reviewed and sited. Ordinance documents from three communities (Menlo Park, Palo Alto and Ashland) that recently passed codes related to noise, setbacks and aesthetics are included.

The key findings from relevant code inquiries, important contextual references and technical data that informed the recommendations and form the basis of the model ordinance language. Information was acquired through four primary activities: 1) Evaluating model communities, 2) Conducting stakeholder interviews to gain local perspectives and insights, 3) Reviewing staff reports, presentations and local authority having jurisdiction's (AHJ) municipal codes and ordinances and 4) reviewing equipment manufacturers specifications and requirements.

3.1 Research Findings Key Takeaways

Key findings are summarized below. Emphasis is placed on challenges facing the siting of new mechanical equipment in residential retrofit applications.

1) There are discrepancies among member agencies in allowable noise levels (dBA) and the published peak levels from manufacturers, as illustrated in Figure 7.
    a. Thresholds for member agency ordinances ranged from 40 dBA to 65 dBA.
    b. The rated dBA levels for manufacturers reported at 3 feet away ranged from:
        i. Low-profile side-discharge "suitcase" style condensers: Average of 58 dBA

ii. Traditional vertical discharge "cube" style condensers: Average of 74 dBA

c. It is uncommon for the noise of a new heat pump sited near the property line to affect the neighboring indoor occupants when their windows are closed. Older existing units have higher dBA levels, which leads to this common misconception.

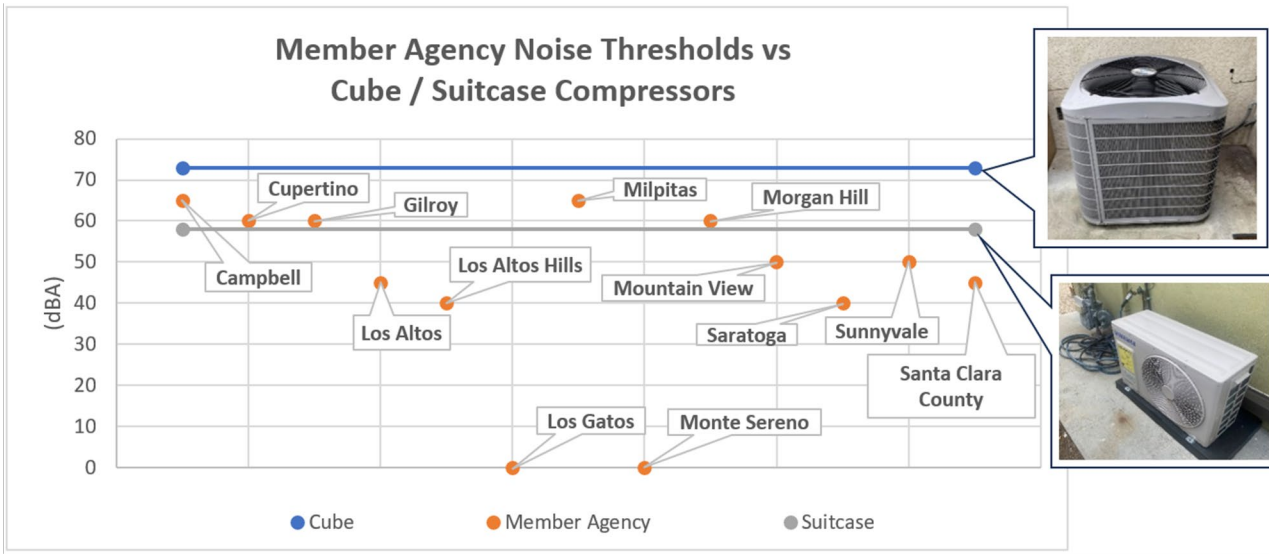

Figure 7: Noise Thresholds and Compressor Types

2) Equipment and building setback requirements are typically defined in zoning ordinances and codes, planned development guidelines and fire/life safety regulations. Mechanical equipment minimum setback of 5 feet from the property line was the most common, with 3 feet being the minimum allowed by some municipalities to allow for adequate utilized for ingress or egress.
3) Several zoning ordinances and codes included language around shielding mechanical equipment from "public view." Public view in this context is defined as view from a public Right of Way (ROW). Specifics varied from municipality to municipality.
4) When considering municipal codes, building codes, ordinances and manufacturer instructions, viable locations for installing heat pump condensers are limited unless the dwelling wall is setback at least 7 feet from the property line on the back or side yard. This 7-foot dwelling setback allows for the back or side yard to accommodate the size of a 3-foot side condenser, the equipment manufacturer's required clearance from the dwelling for proper airflow, and the minimum 3-foot setback requirement from the property line. This issue is exacerbated in areas with site-specific building constraints, such as multi-tenant buildings where condensate/refrigerant line-set may cross property boundaries, attached residences and sites with minimal private yards.
5) While many agencies are aware of the growing need for heat pump installation, few have found adequate compromises for space-constrained properties. There is

some concern about relaxing mechanical equipment design guidelines, with some agencies citing public perception and the potential for increased noise complaints.

6) Many agencies cite understaffing as a barrier to prioritizing code modifications, with planning and building officials struggling with existing workloads. Another barrier cited was the complexity of coordinating planning and building departments, the public engagement process and city council/board of supervisor's approval. Several agencies have observed increased issues with siting mechanical equipment in permit submittals.
    a. Local building stock plays a more significant role than population density alone. For example, Sunnyvale did not cite location of mechanical equipment as an issue, whereas Palo Alto did, yet Sunnyvale's population density (6,800/Sq. Mile) is more than double Palo Alto's (2,871/Sq. Mile).
7) Several cities in the US have already proposed or implemented specific policies. These will be reviewed and incorporated as appropriate into the draft guidelines. These cities include Palo Alto, CA; Ashland, OR Seattle, WA; and various cities across the United Kingdom.
8) There is little empirical evidence regarding the prevalence of customer complaints related to condenser noise or visual aesthetics. Additional research into public noise complaints would be required to better understand public perception.

3.1.1 Noise Thresholds

1) Noise is defined as sound typically received as excessive, disturbing or a nuisance. Noise levels are measured in decibels (dB). To better relate noise levels to human hearing, dBs are typically adjusted using "A-weighting" (dBA).
2) Thresholds differ among member agencies and may depend on:
    a. Time of day
    b. dBA above ambient levels versus absolute levels
    c. Land use (zoning)
    d. Inverter based condenser units versus one and two-speed units
3) Typical sound from a condensing unit is equivalent in dBA levels to normal conversation (see Figure 8). This is an important reference point when considering the impact of noise ordinance modifications.

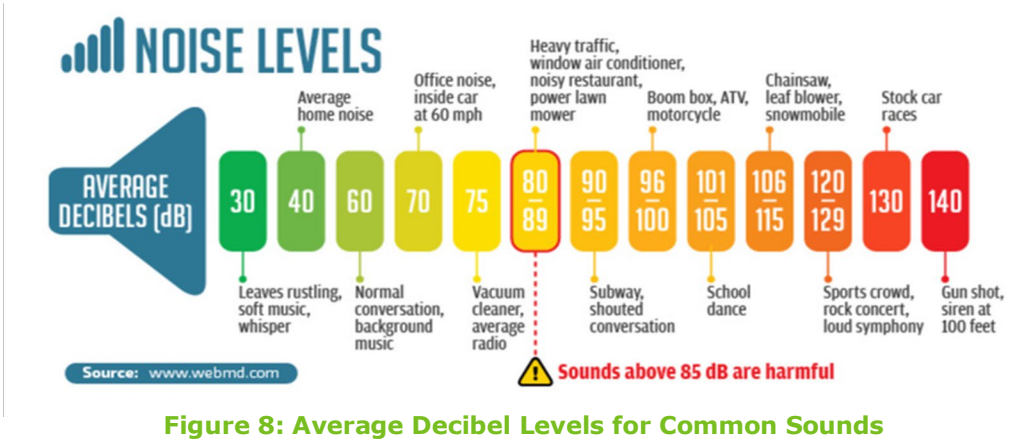

Figure 8: Average Decibel Levels for Common Sounds

3.1.2 Setbacks

1) Setback is defined as the minimum distance of a building edge or equipment from adjacent property line.
2) Minimum setbacks range from 3- to 5-foot.
3) Some agencies do not specify setbacks directly. Where not specified zoning requirements or manufacturer requirements apply.
4) Egress requires 36-inch net clear space between equipment and fences or other obstructions.
5) A table of allowable noise levels at the property line, the distance from the property line and the maximum noise level of the equipment can be found here.

3.1.3 Shielding or Screening

1) Shielding is defined as a physical barrier to reduce noise.
2) Screening is defined as a physical barrier to screen from public view.
3) Consistently required to be "screened from view from a public right of way (ROW)".
4) Both screening and shielding materials may be walls, fencing or landscaping.
5) AC screens or shields are often required when the unit is visible from a public ROW (e.g., from the front yard setbacks and rooftop installations) or when installed on the roof. This presents a challenge when locating wall-mount suitcase units in multi-family or multi-story applications.
6) Language is often vague, referring to "public view" and "screened from view." This document interprets this as view from a public Right of Way (ROW).
7) Screening/Shielding height may be impacted by the line of site requirements in municipal codes.

3.2 Additional Findings

3.2.1 Public Perception

A comprehensive planning report on air source heat pumps (ASHPs) from the United Kingdom published in 2023[1] summarizes four studies conducted on public perception of ASHPs (see Figure 9) It should be noted that the studies did not distinguish between condenser noise and interior noise for inside equipment. Some relevant conclusions from the paper are:

1) Public acceptance of condenser noise was high due to its prevalence in Europe.
2) Perception of noise as a disturbance was higher in multi-unit buildings where condensers were co-located in confined areas.
3) In urban areas, ambient noise from traffic, public streets and neighbors were of greater concern.

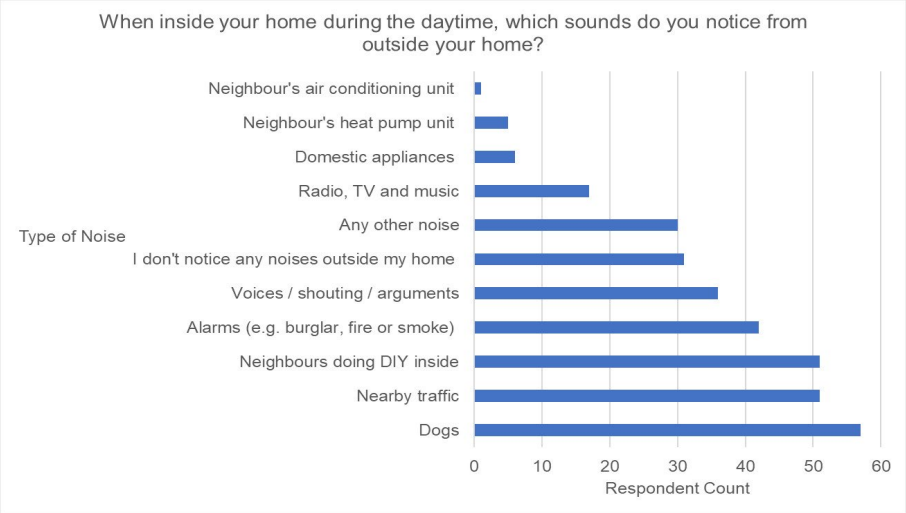

Figure 9: Survey of Noise Concerns[2]

3.2.2 Exemptions and Exceptions for Condensing Units

In interviews and documentation review, exceptions to language in municipal codes and noise ordinances were mentioned. Further investigation into this area is needed, but findings related to this issue include:

1) The City of Palo Alto[3] recently adopted noise ordinance allows for higher allowable noise levels for inverter based condenser units.
2) The United Kingdom study calls for exceptions to encroachment or equipment under certain conditions.
3) In all cases, AHJ staff approval is required before permit issuance. Measurements or manufacturer testing data may be required for submission before approval.

[1] DESNZ Research Paper Number 2023/046. Final Report. "Review of Air Source Heat Pump Noise Emissions, Permitted Development Guidance and Regulations"
[2] DESNZ Research Paper Number 2023/046. Final Report. "Review of Air Source Heat Pump Noise Emissions, Permitted Development Guidance and Regulations" pg. 30
[3] City on Palo Alto Chapter 9.10 NOISE

3.3 Building Codes, Manufacturer Instructions, and Ordinances

The following summarizes critical location and clearance requirements for heat pumps and condensers. It includes citations from:

- Existing building code requirements (CA Building, Mechanical and Energy Codes)
- Manufacturer instructions for both "cube" and "suitcase" style condensing units
- Manufacturer specifications

3.3.1 Heat Pump/Condenser Clearance Requirements

1) Minimum clearance between the heat pump and the adjacent structure, wall or obstruction shall be:
    a. 5 feet from clothes dryer moisture exhaust (2022 California Energy Code §150.0(h)3)
    b. 3 feet from gas meter set assembly (PG&E Electric & Gas Service Requirements 2022-2023 – Greenbook Manual, Section 2.4.2, Figure 2-21)
    c. 4 feet above the unit (manufacturer instructions)
    d. 24 inches on sides containing service and access panels (varies by manufacturer instructions)
    e. 12 inches on all other sides (varies by manufacturer instructions)
2) Outdoor condensers shall rest on a concrete or other approved base extending at least 3 inches above adjoining ground level (California Mechanical Code 904.3.1.1).
3) Required clearance from the property line ranges from 3 to 10 feet, depending on the AHJ (multiple member agencies).
4) Minimum clearance between the heat pump and the adjacent structure/wall/obstruction shall follow the manufacturer's instructions (2022 California Plumbing Code, 504.3).

3.3.2 Equipment Noise and Manufacturer Specifications

RHA reviewed dBA levels from specifications sheets for 30+ models from eight major manufacturers of HVAC condenser units. In addition, RHA reviewed the published dBA levels of 20 heat pump water heaters from three manufacturers. A summary of the listed sound levels of mechanical equipment in Table 2 below.

> Note: *Listed dBA levels are shown at high capacity and/or full power. These levels represent the maximum noise level of the unit, typically present during the start-up phase of the equipment. Manufacturers do not list average noise levels as these levels vary based on mounting, equipment cycling duration and other factors.*

Table 2: Equipment Noise Levels

Compressor Type	Form Factor	dBA Range*	Average Max dBA*
Inverter	Suitcase	48-60	54.8
Inverter	Cube	48-75	69
Single/Two Speed	Cube	51-76	74

*Noise levels are reported at three feet from the unit.

Real world operating dBA levels vary widely. These levels are influenced by equipment accessories and external factors as described below.

1) Manufacturers offer noise attenuation equipment including:
    a. Isolation dampers or pads
    b. Sound attenuation blankets
    c. Shields
    d. Fan blade dampers
2) External factors influencing equipment operating dBA levels include:
    a. Age and condition
    b. Unit size and capacity
    c. Compressor type and/or fan speed
    d. Installation quality
    e. Operating mode (variable speed, single speed)
    f. Inverter driven*

    Note: *Inverter heat pumps, also known as variable-speed heat pumps, have several benefits over traditional systems, including energy efficiency, faster heating and cooling[4], quieter operation and more consistent temperatures[5]*

3.4 Contractor Design Recommendations

1) Select the quietest equipment possible and utilize the manufacturer's noise control packages where applicable.
2) Utilizing landscaping to dampen sound
3) Increasing adjacent fence height (when regulations allow)
4) Locate equipment as far as possible from adjacent property lines or in areas shielded by structures or noise barriers. Acoustical enclosures may not always be feasible noise control options as airflow requirements, setback requirements or other constraints may limit their effectiveness.
5) Orient the equipment to take advantage of the directionality of the noise source (i.e., point the equipment away from known bedroom or other windows that are commonly open).

3.5 Model Community Ordinances

Below are examples of ordinance language from Menlo Park, Palo Alto and Ashland, all of which recently modified their codes for mechanical equipment associated with beneficial decarbonization. These communities embody ways codes can be successfully modified to support mechanical equipment associated with beneficial decarbonization.

The Menlo Park zoning ordinance may be found here: Title 16 ZONING
The City of Palo Alto noise ordinance may be found here: Chapter 9.10 NOISE
The Ashland, OR noise ordinance may be found here: Chapter 9.08 NUISANCES

[4] Mitsubishi Heating and Air, https://www.mitsubishicomfort.com/articles/keep-warm-this-winter-inverter-technology-for-any-climate
[5] Advantage Heating and Air, https://advantageheatingllc.com/learning-center/inverter-heat-pump/

Section 4: Appendix

This is the Appendix for Considerations and Alternatives for Siting Outdoor Equipment documentation.

4.1 References

Department of Energy. Office of Energy Efficiency and Renewable Energy. "Residential HVAC Installation Practices" 2018.

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Paz, Ori. BAYREN Forum. "Removing Known Barriers: Changing Zoning to Help Electrify Existing Homes" December 2023.

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City of Cupertino. https://www.cupertino.org/our-city/departments/community-development/building

City of Gilroy. https://www.cityofgilroy.org/209/Building-Safety-Division

City of Los Altos. https://www.losaltosca.gov/development-services/page/building-services

Town of Los Altos Hills. https://www.losaltoshills.ca.gov/292/Building-Department

Town of Los Gatos. https://www.losgatosca.gov/220/Building

1) City of Milpitas. https://www.milpitas.gov/195/Building-Permits-Resources

City of Monte Sereno. https://www.montesereno.org/2152/Building-and-Planning-Departments

City of Morgan Hill. https://www.morganhill.ca.gov/150/Building-Fire-Prevention

City of Mountain View. https://www.mountainview.gov/our-city/departments/community-development/building-fire-inspection/building-construction

City of Saratoga. https://www.saratoga.ca.us/151/Building-Division

City of Sunnyvale. https://www.sunnyvale.ca.gov/business-and-development/planning-and-building/building-and-fire-codes

Santa Clara County. https://plandev.sccgov.org/how/apply-permit/building-permit

4.2 Model Communities

Municipal codes and existing and proposed ordinances for mechanical equipment related to noise, setbacks and aesthetics were reviewed to identify how codes were modified to support mechanical equipment related to beneficial decarbonization. Table 3 summarizes the results of 5 of the 15 communities outside of SVCE territory reviewed.

Table 3: Model Communities

City	Noise	Shielding	Setbacks	Reference	Note
Menlo Park, CA	50 dBA during night, 60 dBA during day	Landscaping or fencing required	Equipment enclosures must be at least 3 feet from any side or rear lot line	Title 16 (16.60.010) – Screening & Setback Title 8 (8.06.030) – Noise	Level and day and night
Palo Alto, CA	43 dBA for non-inverter based at property line, 45 dBA for inverter based at property line	Required to be obscured from public view	Variable 3 to 34 feet from property line	Chapter 9.10 (Noise) Title 18 (Zoning)	Higher allowable noise levels for Inverter based condenser units
Ashland, OR	45 dBA for younger than 1981, 50 dBA for older than 1981 during day at property line	None	Mechanical equipment shall not be located between the main structure on the site and any street adjacent to front or side yard	Ashland Muni Code section 9.08.170 9.08.175 [Heat Pumps] Ashland Muni Code Part 18.2	Vintage and level
San Mateo County, CA	50 dBA at night, 55 during the day at property line (7 a.m. to 10 p.m.)	Still under review	Still under review	Chapter 4.88.330 – Noise Control	Level and day and night
Coral	55 dBA at night,	Screened to	25 feet front	Article VI. Noise	Level and day

City	Noise	Shielding	Setbacks	Reference	Note
Gables, FL	60 during day at property line (9 a.m. on weekends/ 7 AM on weekdays to 11 p.m.)	100% opacity	15 feet side street 10 feet rear 20 feet interior side	Article 2. Zoning Districts	and night

4.2.1 Menlo Park

Menlo Park has building codes that encompass electrical equipment like heat pumps. Noise from such equipment must not surpass 50 dBA at night or 60 dBA during the day. The equipment should be housed in an enclosure for protection, noise reduction and aesthetics. Enclosures must not extend more than 4 feet into any required side or rear yard setbacks and must be at least 3 feet from any side or rear lot line. If equipment is adequately screened by landscaping or fencing within the front, side or rear lots and meets setback requirements, enclosure exemptions may apply.

The City of Menlo Park has successfully revised its zoning ordinance to facilitate the beneficial decarbonization of existing homes. Author Ori Paz recently presented the details of this amendment process at a BayREN Forum[6].

The amendments focused on altering the city's setback and garage clearance requirements to accommodate mechanical equipment better. By adjusting these requirements, they increased the available locations for siting mechanical equipment. The garage clearance modifications also allowed installing heat pump water heaters. This amendment process, which took approximately 18 months to complete, began with defining the scope of the ordinance changes and concluded with an ordinance amendment approval process. Here are some key insights from this process:

- Teamwork and stakeholder buy-in are essential.
- Building a team and fostering collaboration takes time.
- Zoning is a technical field; it's beneficial to collaborate with planners and engineers.
- Workshops should be conducted with those who will implement the changes.
- "Design with the end in mind" is a good policy. It is useful to keep a running draft of the ordinance and consider its implementation throughout the process.
- The public process should be designed into the timeline.
- Work does not occur in isolation. For example, this process ran parallel to the Housing Element update to the General Plan. Cross-regulation impacts must be considered.
- A city attorney should be consulted throughout the process.
- The language and process should be simplified for external stakeholders to provide relevant insights.

[6] Paz, Ori. BAYREN Forum. "Removing Known Barriers: Changing Zoning to Help Electrify Existitn Homes" December 2023.

4.2.2 Palo Alto

The City of Palo Alto recently made changes to their noise ordinance specific to mechanical equipment. It includes a table with permissible sound levels for equipment relative to its distance from the property line as well as higher allowable noise levels for inverter-based condenser units. The Palo Alto noise ordinance may be found here: Chapter 9.10 NOISE. Palo Alto's adopted noise ordinance is somewhat unique because it separates the city into two "noise" zones with varying noise levels for each part of the city.

All mechanical equipment in Palo Alto must be hidden from public view using screens, landscaping or architecture. Residential noise-producing equipment can be located anywhere on the property but must adhere to residential zoning requirements for front yard setbacks for building and building systems. Properties bordering a side street must maintain a minimum 10-foot setback from the street.

Key parts of the ordinance include section 9.10.030 Residential property noise limits.

> *(a) No person shall produce, suffer or allow to be produced by any machine, animal or device, or any combination of same, on residential property, a noise level more than six dB above the local ambient at any point outside of the property plane, except as modified in (c) below.*
>
> *(b)No person shall produce, suffer or allow to be produced by any machine, animal, or device, or any combination of same, on multi-family residential property, a noise level more than six dB above the local ambient three feet from any wall, floor, or ceiling inside any dwelling unit on the same property, when the windows and doors of the dwelling unit are closed, except within the dwelling unit in which the noise source or sources may be located.*
>
> *(c) Electrification Equipment shall be deemed to comply with this Section 9.10.030 if the equipment complies with the maximum equipment sound levels and is placed at the setbacks established in Table 6 - Setback Requirements. As an alternative to compliance with Table 6, a property owner may utilize the limits set forth in subsections (a) and (b) of this Section 9.10.030 if those provisions would be more permissive.*

Table 4: Palo Alto Setback Requirements-Extract

Equipment Sound Level (dBA) West of Foothill Expressway	Equipment Sound Level (dBA) East of Foothill Expressway	Equipment Sound Level (dBA) West of Foothill Expressway for Inverter Pumps	Equipment Sound Level (dBA) East of Foothill Expressway for Inverter Pumps	Minimum Setback from Receiving Property Line (ft.)
43	53	45	55	3
44	54	46	56	4
45	55	47	57	4
46	56	48	58	5
47	57	49	59	5
48	58	50	60	6
49	59	51	61	7
50	60	52	62	7
51	61	53	63	8
52	62	54	64	9
53	63	55	65	10

4.2.3 Ashland, Oregon

In Ashland, Oregon, a draft ordinance codified in Sections 9.08.170 to 9.08.175 was recently approved. It sets noise levels based on equipment age, with 45 dBA allowed for equipment made after 1981 and 50 dBA allowed for equipment made in 1981 or earlier, measured at the property line during the day.

Mechanical equipment must not be situated between the main structure and any adjacent street. The equipment's location should be chosen to keep it out of sight from neighboring public streets. While there are no strict rules for shielding or screening, enclosures for mechanical equipment must not exceed permitted fence heights and must comply with local noise regulations.

The City of Ashland, Oregon, recently sought to amend its ordinances concerning noise levels associated with heat pumps and other mechanical devices. The proposed ordinance introduced definitions for prohibited noise, specifically including heat pumps and mechanical devices, and set noise thresholds.

Ashland adopted a straightforward approach for equipment placement and established a single noise level limit at the property line. This limit is based on the age of the equipment and the noise level produced in any given hour. For equipment manufactured after 1981, the following noise level policy applies:

Any source of noise which exceeds the following standards is considered a public nuisance:
1. Decibel Noise Standards[7]
Allowable Statistical Noise Levels in any One Hour:

7 a.m. to 9 p.m.	*9 p.m. to 7 a.m.*
L50--50 dBA	*L50--45 dBA*
L10--55 dBA	*L10--50 dBA*
L1--60 dBA	*L1--55 dBA*

Where:
L50 = noise level exceeded 50% of the time
L10 = noise level exceeded 10% of the time
L1 = noise level exceeded 1% of the time

4.2.4 San Mateo County

San Mateo County has a noise control ordinance for the placement of mechanical equipment but no additional rules for screening or setbacks. The county uses a cumulative number of minutes and day/night thresholds to set noise limits. For example, a maximum of 55 dBA is allowed for a cumulative amount of 30 minutes in any one-hour time period during day (7 a.m.-10 p.m.), and a maximum of 50 dBA is allowed during the night (10 p.m.-7 a.m.).

4.2.5 Coral Gables, Florida

Coral Gable, Florida, permits noise levels for heat pumps of 55 dBA at night and 60 dBA during the day at the property line (7 a.m.-11 p.m., 9 a.m.-11 p.m. on weekends).

Coral Gables requires that all mechanical equipment be screened to 100% opacity and comply with the setbacks required by the zoning ordinance. The setbacks are as follows for single-family homes: 25 feet from a principal front, 20% or 5 feet from a side interior, 15 feet from a side street, 10 feet from a rear, 10 feet from a rear at an alley, and 35 feet from a waterway.

[7] Ashland City Charter. "An Ordinance Relating to Noise and Heat Pumps or Mechanical Devices Amending AMC 9.08.170, 9.08.175, AND 15.04.185" 2023.

Noise Ordinance and Heat Pumps - letter for City Council

Sept 25, 2023
Re: Proposed Amendments to Municipal Code Concerning Noise Ordinances and Heat Pump Setbacks

Honorable Members of the City Council of Palo Alto,

There needs to be a suitable balance between important electrification goals and worst case noise concerns. Sideyard placement for heat pumps (suitcase footprint style) is preferable for many home owners with common lot sizes, and accommodating this placement will facilitate adoption of heat pumps. But noise ordinances which are overly conservative will unnecessarily impede the adoption of heat pumps. We believe the proposed noise ordinance is too conservative in two respects.

First, it does not make accommodations for 'inverter' type heat pumps, which generally operate at conditions much quieter than their dBA noise value, which by definition is the worst case noise value. Inverter heat pumps have variable speed fans (and compressors) and rarely operate at 100% speed. Non-inverter heat pumps, on the other-hand, are either 100% on (full speed) or completely off. While non-inverter heat pumps regulate building temperature by toggling on(100%) and off(0%), inverter heat pumps can vary heat (or cooling) delivery continuously, and will modulate down to match the load, and normally operate well under 100% speeds(capacity). At reduced speeds, inverter heat pumps can easily be 5dBA or more quieter than at the full speed(dBA). ('Night mode' and fan speed limits exist in some models explicitly for noise reduction purposes.)

This inverter heat pump issue is referenced briefly in staff introduction to the proposed ordinance, but the ordinance so far does not address this. We strongly encourage Palo Alto to address this and relax the noise requirements for inverter heat pumps to strike a more reasonable balance between rare low occurrence noise issues, and electrification goals.

Our second point of concern is that regardless of heat pump types, the noise requirements appear overly conservative. The ordinance seeks to maintain a noise level of less than 50dBA at the property line nearest the heat pump, and imposes heat pump noise limits of 53dBA for a setback of 5 feet from the property line, and further setback limits for slightly higher noise cases. But normal speech can measure around 60dBA, and cabin noise levels inside a car at normal speeds are typically in the ballpark of 65-70dB(A). We experience these levels everyday.

While Palo Alto here is seeking to keep noise under 50dBA at the property line other communities have different higher noise limits. From a brief search we find Portland OR targets at 55dbA, numerous cities target 60dBA, Houston TX targets 65dBA, and it appears Chicago may have limits over 70dBA (daytime noise limits). We suspect there are very few (if any) appropriate heat pumps that would meet these proposed dbA limits, and the ordinance

impact would be to severely limit and delay the installations, force homeowners to install in front or back yards, and frustrate them in the process. In practice heat pumps are installed in various other communities in sideyards with 5-8feet of space, with little known issue.

There are a few other factors too that should be pointed out that support higher noise limits. Noise levels drop 6dB with the doubling of distance, so for example a 56dbA heat pump placed at 6.0feet from property line would just fail the ordinance(50dB at property line), but measured at only another 6 feet into the neighbor's property, it's noise level would be down to 44-45dBA, which is very low. The basic point is that noise levels decay strongly with 'doubling distance', so for heat pump placement in sideyards close to the property line, eg at 5 feet, then the doubling distance is only 10feet, and the *zone of elevated noise* in the neighbor's property is exceedingly small. (This is not true if the noise source is say 50feet *from* property line, and it's noise value reaches 50dBA at the property line: here one need to go 50feet into the neighbors property to reach the additional 6dB drop in noise.). Sideyard placement is important, and we feel this consideration of the short spatial extent of the noise further supports additional relaxation of the ordinance.

There is another detail worth noting. Heat pumps will run strongest when it is very hot or very cold, but that is exactly when people tend to keep their house windows closed. So in practice, at least for indoor noise (from the outdoor unit), on average, this will tend to additionally reduce noise levels that residents are exposed to.

For sideyard installations we propose that the ordinance target to reach 60dBA at the property edge.

Due to the importance of the electrification efforts in addressing our climate goals, we feel every effort should be made to assure that the ordinances facilitate heat pump installations and do not unnecessarily restrict them. We appreciate your review and consideration of these issues.

Sincerely,
Glen Garfunkel, Co-Chair, Climate Reality Project - Silicon Valley Chapter
Adam Sweeney, Co-Chair, Climate Reality Project - Silicon Valley Chapter
Debbie Mytels(Palo Alto Resident), Decarbonization Action Director, Climate Reality Project - Silicon Valley Chapter.

Fwd_ Comments and proposals regarding proposed revisions to Palo Alto's noise ordinance

Glen Garfunkel
Fwd: Comments and proposals regarding proposed revisions to Palo Alto"s noise ordinance
Sunday, September 24, 2023 10:14:00 PM

Subject: Comments and proposals regarding proposed revisions to Palo Alto's noise ordinance

Hi Jonathan & Amy,

Bruce Hodge and Bret Andersen here from Carbon Free Palo Alto and Carbon Free Silicon Valley. We're writing to make comments about the proposal particularly with respect to electrification equipment, and to propose modifications that would align the ordinance more closely with Palo Alto's S/CAP climate goals.

Motivation

We understand that one of the intentions of the changes is to relax the noise requirements for installation of electric heat pump condensers in side yards. We believe that the goal of the noise ordinance changes should be to establish limits that enable outdoor heat pump compressor installations for most homes. This is required in order to meet the city's goals for equitable electrification by 2030 in Palo Alto. Based on the city's zone map, a significant portion, possibly the majority, of our residents will need to be able to install condensers in narrow side yards as a practical way to avoid renewing their investments in gas furnaces.

Comments

1. Side yards are often the most practical place to install outdoor condensers based on building configuration, installation cost, aesthetics and noise concerns.

2. The map of residential zones indicates that a majority of homes potentially have the 6-foot setback constraint assuming that most homes are built out to this limit.
   The side yard setbacks by zone in Palo Alto are shown on p20 of Single-Family Zoning Technical Manual (PDF, 4MB)
   R-1 has 6' setbacks between properties
   R-1 7000-20000 are Special zones with 8' setbacks
   Zone R-1 appears to be the majority of coverage on the Zoning Map

3. Table 1 in Paragraph (c) of section 9.10.030 allows for the needed option to put equipment within 3 feet of the property line. However, in the 50 dBA area the allowed sound levels will exclude the vast majority of available HVAC equipment on the market today within minimum side yard setbacks.

   Note that the average / median level of existing equipment is 56-58 dBA according to the consultants report. The attached table of inverter technology condensers available from Trane/Mitsubishi show a range of 50-59 dBA. Daikin promotes their quieter inverter systems at 57dBA at this link. The ranges are similar from other manufacturers. In fact, the majority of new heat pump condensers being installed today probably utilize inverter technology. The city noise ordinance should not prevent residents from availing themselves of mainstream inverter heat pump HVAC technology and the significant public incentives available.

4. We see no reason for requiring a substantially stricter noise limit west of Foothill Expressway for modern heat pump condensers utilizing variable speed inverter pump technology.

5. With respect to variable speed inverter technology in condenser units, it must be noted that these fans never run at 100% speed for long intervals and are more typically running at much lower speeds and noise levels. For example, see the graph below taken from the Trane brochure that compares the fan speeds of non-inverter units to inverter units. Anecdotally, many customers report that the noise levels are exceedingly quiet in practice. A comparison with single or dual speed condenser noise levels on average and maximum would help inform the decision about sound limits.

Proposed modifications and actions

1. Provide a separate Table 2 in section 9.10.030 - that allows the installation of inverter technology condensers with maximum noise levels in the range of 58-60 dBA in 6 foot side yards.

2. For paragraph 9.10.030 (a), the city should assist residents by providing a map or a table to determine the ambient noise level for a given building address. This would make it easier for residents to install equipment in known higher ambient noise zones.

3. Provide analysis of the practical impact of the noise limits on the installation of heat pump condensers and the related impact upon the 80/30 S/CAP climate goals.

   a. What percentage of the currently installed devices would qualify under the new rules?

   b. Which devices are likely to qualify for 6 and 8' setback yards and which also meet the EnergyStar specs that are needed to qualify for some incentives?

   c. Ask the noise consultant for 8760 data on noise emissions from variable speed condenser units in our climate zone. (8760 implies data once an hour over an entire year - i.e 8760 = 365 * 24)

Conclusion

We strongly feel that this existing proposal will continue to significantly restrict the ability of the residential community to electrify their heating and cooling needs in line with the 80/30 goal. It needs more discussion and revision.

Lastly, please note the recent announcement of a goal to install 20 million heat pumps in the US by 2030: https://rmi.org/what-a-20-million-heat-pump-commitment-means-for-the-us/. This is mainstream activity now.

Thanks and hope to hear from you shortly as we understand this is coming to council on Oct 2nd.

Sincerely,

Bruce Hodge - Chairperson
Bret Andersen - Board member

Carbon Free Palo Alto
Carbon Free Silicon Valley

MX Model

INVERTER MULTI

Type				Up to 2 indoor units	Up to 3 indoor units		Up to 4 indoor units	Up to 5 indoor units	Up to 8 indoor units	
Outdoor Unit				NTXMMX20A122A*	NTXMMX24A132A*	NTXMMX30A132A*	NTXMMX36A142A*	NTXMMX42A152A*	NTXMMX48A182A*	NTXMMX60A182A*
Branch Box Required				No	No	No	No	No	Yes	Yes
Power Supply	Source			R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Outdoor (Phase, Hz, V)			1-phase, 60Hz, 208/230V	1-phase, 60Hz, 208/230V	1-phase, 60Hz, 208/230V	1-phase, 60Hz, 208/230V	1-phase, 60Hz, 208/230V	1-phase, 60Hz, 208/230V	1-phase, 60Hz, 208/230V
Cooling	Capacity	Rated *1	BTU/H	18,000	22,000	28,400	35,400	40,500	48,000	60,000
	SEER			Refer to page 148						
	EER									
Heating	Capacity	Rated *1	BTU/H	22,000	25,000	28,600	36,000	45,000	54,000	66,000
		Max at 17F *2	BTU/H	12,500	19,600	21,000	26,600	30,500	36,600	65,000
		Max at 5F *3	BTU/H	11,100	18,200	18,200	24,000	26,000	32,400	57,000
	HSPF			Refer to page 148						
Outdoor Unit	MCA		A	17.2	22.1	22.1	22.1	32.5	35.0	46.0
	Recommended Fuse/ Breaker Size		A	20	25	25	25	40	40	50
	Dimensions	W	In. [mm]	33-1/16 [840]	37-13/32 [950]	37-13/32 [950]	37-13/32 [950]	37-13/32 [950]	41-11/32 [1,050]	41-11/32 [1,050]
		D	In. [mm]	13 [330]	13 [330]	13 [330]	13 [330]	13 [330]	13+1 [330+25]	13+1 [330+25]
		H	In. [mm]	27-15/16 [710]	31-11/32 [796]	31-11/32 [796]	31-11/32 [796]	41-17/64 [1,048]	52-11/16 [1,338]	52-11/16 [1,338]
	Weight		lbs [kg]	126 [57]	137 [62]	137 [62]	139 [63]	189 [86]	271 [123]	302 [137]
	Air volume (Cooling/Heating)		CFM	1,342/1,458	2,287/2,382	2,287/2,382	2,287/2,382	2,118/2,542	3,885	4,879
	Sound Level	Cooling	dB [A]	50	51	52	54	56	51	58
		Heating	dB [A]	54	55	56	56	58	54	59
Piping	Diameter	Gas	In. [mm]	3/8 [9.52]	A: 1/2 [12.7] B,C: 3/8 [9.52]	A: 1/2 [12.7] B,C: 3/8 [9.52]	A: 1/2 [12.7] B,C,D: 3/8 [9.52]	A: 1/2 [12.7] B,C,D,E: 3/8 [9.52]	5/8 [15.88]	3/4 [19.05]
		Liquid	In. [mm]	1/4 [6.35]	1/4 [6.35]	1/4 [6.35]	1/4 [6.35]	1/4 [6.35]	3/8 [9.52]	3/8 [9.52]
	Max. Length		ft [m]	164 [50]	230 [70]	230 [70]	230 [70]	262 [80]	492 [150]	492 [150]
	Height		ft [m]	49 [15]	49 [15]	49 [15]	49 [15]	49 [15]	164 [50]	164 [50]
Guaranteed Operation Range		Cooling	F [C]	14 ~ 115°FDB [-10 ~ 46°CDB]	14 ~ 115°FDB [-10 ~ 46°CDB]	14 ~ 115°FDB [-10 ~ 46°CDB]	14 ~ 115°FDB [-10 ~ 46°CDB]	14 ~ 115°FDB [-10 ~ 46°CDB]	23 ~ 115°FDB [-5 ~ 46°CDB] *5	23 ~ 115°FDB [-5 ~ 46°CDB] *5
		Heating	F [C]	5 ~ 75°FDB [-15 ~ 24°CDB]	5 ~ 75°FDB [-15 ~ 24°CDB]	5 ~ 75°FDB [-15 ~ 24°CDB]	5 ~ 75°FDB [-15 ~ 24°CDB]	5 ~ 75°FDB [-15 ~ 24°CDB]	-4 ~ 70°FDB [-20 ~ 21°CDB]	-4 ~ 70°FDB [-20 ~ 21°CDB]

Electrification (Noise) Ordinance & Heat Pumps - letter for City Council, for Nov 6th mtg
(related to Consent Calendar item #8 (Electrification Equipment Ordinance))

Members of the City Council of Palo Alto, and Staff,

We would like to clarify some issues and restate our ordinance proposal, concerning heatpump placement in sideyards.

All arguments given in our 9/25 letter below to council below still stand, including our suggestion to set the property boundary Noise Level limit to 60dBA, especially for inverter heatpumps. Our proposal to set the property boundary Noise Level limits at 60dBA is supported for these reasons:

- 60dBA is the noise level of normal conversation. An electric tooth bush at 3feet measured 65dBA. Cabin noise in a quiet car at highway speeds will measure 65dBA, or more. The point is, 60dBA is not loud. Noise example link 1. Noise example link 2.
- Inverter heatpumps as explained in our 9/25 letter below, rarely operate at the full speed noise levels. Reported spec'd noise level('sound pressure') is full speed (worst case). We can expect inverter heatpump noise levels to typically be several dB below the spec'd value. Our own measurement of noise vs fan speed is given here showing a strong noise dependence vs fan rpm (and compressor speed). A fan speed reduction of each 10% gives an additional 4 dB noise drop (these fan speed reductions seem to be common in inverter heatpumps).
- As distance from a noise source doubles, it's noise level drops by 6 dBA. As heatpump noise levels are spec'd at 3 feet, then at 6feet the noise will be 6 dB down (and at 12 feet(=6 doubled) it will be down 6 dB doubled = 12 dB). So eg for a 60 dBA heatpump placed 3 feet from a property line, then at *only three feet into* the neighbors property, the noise is already down to 54 dB. The point is, the noise levels drop rapidly with distance, and so impact to neighbors is small and very localized.
- We feel it is also helpful to understand that if a heatpump installation for some reason does result in noise exceeding some target limit, there are low cost measures that can be taken to help suppress the noise; reduction up to several dB or more may be expected, depending on situation details. For example, sound blankets for compressors (installed inside the heatpump) seem to be available for some manufactures/models. Exterior grade sound suppression blankets to be hung on nearby walls or fences are an additional option. From our own measurements we find a clear 3dB noise reduction from a simple standard solid wood fence. Stone or masonry walls are well known to be noise barriers (eg on highways near residential areas) and many dB reduction can be expected for this case (of course wall or fence height of 5-6 feet is preferred). For some heatpumps, fan (and compressor) speed can be directly controlled and limited, and numerous models allow a 'night' mode which reduces usage at night; in addition, simple thermostat nighttime settings(lower temp settings) can be used to minimize usage(noise) at night.

Data by Bret Andersen & Bruce Hodge of Carbon Free Palo Alto has shown that the commonly available heatpump selection would still be quite restricted by the current(Nov 3) 55 dBA limits.

For these reasons, along with the importance of facilitating electrification to reach our climate goals, we strongly encourage Palo Alto to establish property boundary noise targets of 60 dBA, for heatpump sideyard installations for inverter heatpumps and especially for properties with restricted sideyards of 8 feet or less.

Thank you for your consideration.

Glen Garfunkel
Climate Reality Project - Silicon Valley Chapter (Co-Chair)
https://www.climaterealitysiliconvalley.org/

Begin forwarded message:

From: Glen Garfunkel <glen100@gmail.com>
Subject: Noise Ordinance and Heat Pumps - letter for City Council
Date: September 25, 2023 at 11:58:30 AM PDT
To: City.Council@cityofpaloalto.org
Cc: Adam Sweeney <adamsweeney1@gmail.com>, Debbie Mytels <debbie.mytels@gmail.com>, "Lait, Jonathan" <Jonathan.Lait@CityofPaloAlto.org>, "French, Amy" <Amy.French@CityofPaloAlto.org>, Jon.Abendschein@cityofpaloalto.org

Sept 25, 2023
Re: Proposed Amendments to Municipal Code Concerning Noise Ordinances and Heat Pump Setbacks

Honorable Members of the City Council of Palo Alto,

There needs to be a suitable balance between important electrification goals and worst case noise concerns. Sideyard placement for heat pumps (suitcase footprint style) is preferable for many home owners with common lot sizes, and accommodating this placement will facilitate adoption of heat pumps. But noise ordinances which are overly conservative will unnecessarily impede the adoption of heat pumps. We believe the proposed noise ordinance is too conservative in two respects.

First, it does not make accommodations for ‘inverter' type heat pumps, which generally operate at conditions much quieter than their dBA noise value, which by definition is the worst case noise value. Inverter heat pumps have variable speed fans (and compressors) and rarely operate at 100% speed. Non-inverter heat pumps, on the other-hand, are either 100% on (full speed) or completely off. While non-inverter heat pumps regulate building temperature by

toggling on(100%) and off(0%), inverter heat pumps can vary heat (or cooling) delivery continuously, and will modulate down to match the load, and normally operate well under 100% speeds(capacity). At reduced speeds, inverter heat pumps can easily be 5dBA or more quieter than at the full speed(dBA). ('Night mode' and fan speed limits exist in some models explicitly for noise reduction purposes.)

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There are a few other factors too that should be pointed out that support higher noise limits. Noise levels drop 6dB with the doubling of distance, so for example a 56dbA heat pump placed at 6.0feet from property line would just fail the ordinance(50dB at property line), but measured at only another 6 feet into the neighbor's property, it's noise level would be down to 44-45dBA, which is very low. The basic point is that noise levels decay strongly with 'doubling distance', so for heat pump placement in sideyards close to the property line, eg at 5 feet, then the doubling distance is only 10feet, and the *zone of elevated noise* in the neighbor's property is exceedingly small. (This is not true if the noise source is say 50feet *from* property line, and it's noise value reaches 50dBA at the property line: here one need to go 50feet into the neighbors property to reach the additional 6dB drop in noise.). Sideyard placement is important, and we feel this consideration of the short spatial extent of the noise further supports additional relaxation of the ordinance.

There is another detail worth noting. Heat pumps will run strongest when it is very hot or very cold, but that is exactly when people tend to keep their house windows closed. So in practice, at least for indoor noise (from the outdoor unit), on average, this will tend to additionally reduce noise levels that residents are exposed to.

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Due to the importance of the electrification efforts in addressing our climate goals, we feel

every effort should be made to assure that the ordinances facilitate heat pump installations and do not unnecessarily restrict them. We appreciate your review and consideration of these issues.

Sincerely,
Glen Garfunkel, Co-Chair, Climate Reality Project - Silicon Valley Chapter
Adam Sweeney, Co-Chair, Climate Reality Project - Silicon Valley Chapter
Debbie Mytels(Palo Alto Resident), Decarbonization Action Director, Climate Reality Project - Silicon Valley Chapter.

Fwd_ _DRAFT_Palo Alto's Proposed Noise Ordinance_ Relevant Data and a Proposal

Begin forwarded message:

Hi All,

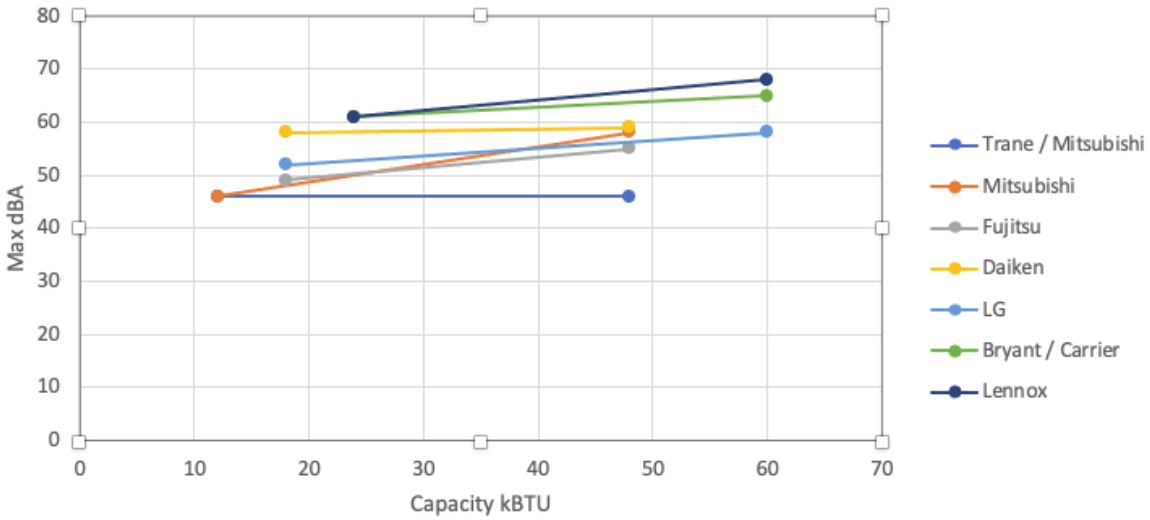
Thanks for your work on this important ordinance which has an outsize impact upon the ability of Palo Alto to electrify and meet its 80/30 climate goals.

First we offer two different spreadsheets, then a proposal.

The document Sound levels in side yards essentially provides the reverse relationship established by the proposed ordinance - for a given allowed noise level (in dBA) at the property line it lists the maximum sound levels for any device given its distance from the property line. We've listed values in 1 ft increments starting at 3' from the property line and ranging up to 10' away. It's quite easy to extend the table to have a finer granularity of distances or a greater range. This table is populated using the formula referenced by this resource and assumes that the maximum sound levels provided by the manufacturer are measured at 3' from the device. The table in the proposed ordinance makes the same assumption.

Looking at the lines in the table for 55 dBA as the maximum allowed noise (starting at line 18), one can see that a device located at 3' from the property line would have to be rated at 55 dBA or less. This is essentially the situation for all 6' side yards (we allocate a 3' wide zone for a device sited next to the building wall). If you have a 8' side yard then you can locate the device 5' from the property line and your device can emit up to 59.4 dBA. So 55 dBA for inverter units is better than before, but it's still problematic for 6' side yards. The reason for that is that not many devices have sound levels low enough to qualify.

HP HVAC Noise Levels shows data from a survey of maximum noise levels of heat pump inverter condensers from various primary manufacturers. The range of maximum noise levels is approximately 48-68 dBA. Based on our limited survey and incorporating some amount of guesswork, we estimate that only about a third of the units we surveyed qualify at the 55dBA property line limit in 6' setback yards. If that limit is raised to 60dBA at the property line, then about half of the units would qualify in 6' setback yards.



We also note that manufacturers vary in the way the measure and disclose levels, some provide a minimum sound level (e.g. Bryant / Carrier) in brochures and maximums only in their data sheets. Some values in the table and graphs are extrapolated in those cases. We did not check every model in every range but we attempted to capture the low and high capacity, which generally corresponds to lower to higher max noise levels for units within a given model range. We would actually be in favor of disallowing devices where the manufacturer does not provide maximum noise levels. It would also be helpful if all manufacturers disclosed their methodology for obtaining the maximum sound levels.

In light of this data, we propose adding a third table that allows up to 60 dbA at the property line for inverter based units in 6' setback yards. This could be conditional such that if about half of available units eventually qualify under the 55 dBA limit, then the 60 dbA limiit would be retired.

We're in favor of moving ahead with the current 55dBA limit for inverter units for now to allow projects that have been put on hold to proceed. Then staff should come back in 3 months or less with further analysis and either accept our proposal or make a counter proposal that would allow a greater choice of inverter units in 6' side yards.

Thanks for your attention to this and happy to answer questions or meet.

Best,

Bruce Hodge
Bret Andersen

Carbon Free Palo Alto

Attachment D

SAN JOSE RECYCLES CLEAN

San José Environmental Services Department

Integrated Waste Management Division

Valerie Osmond

Environmental Services Department, Integrated Waste Management

- Solid waste collection, processing, and disposal
- Residential, commercial, construction & demolition, and city facilities
- Solid waste enforcement
- Commercial Public Litter Can program
- Leader in recycling since 1985

Recycling Infrastructure

Residential Single-Family

- 215,560 households
- Unlimited collection of recycling, yard trimmings, used oil and filters, and year-round no-cost Junk Pickup
- Garbage processing since 2013 to recover organics

Recycling Garbage Yard Trimmings

Residential Multi-Family

- 119,500+ units in 3,400+ complexes
- Garbage processing since 2008

Recycling

Garbage

Yard Trimmings

Commercial Program

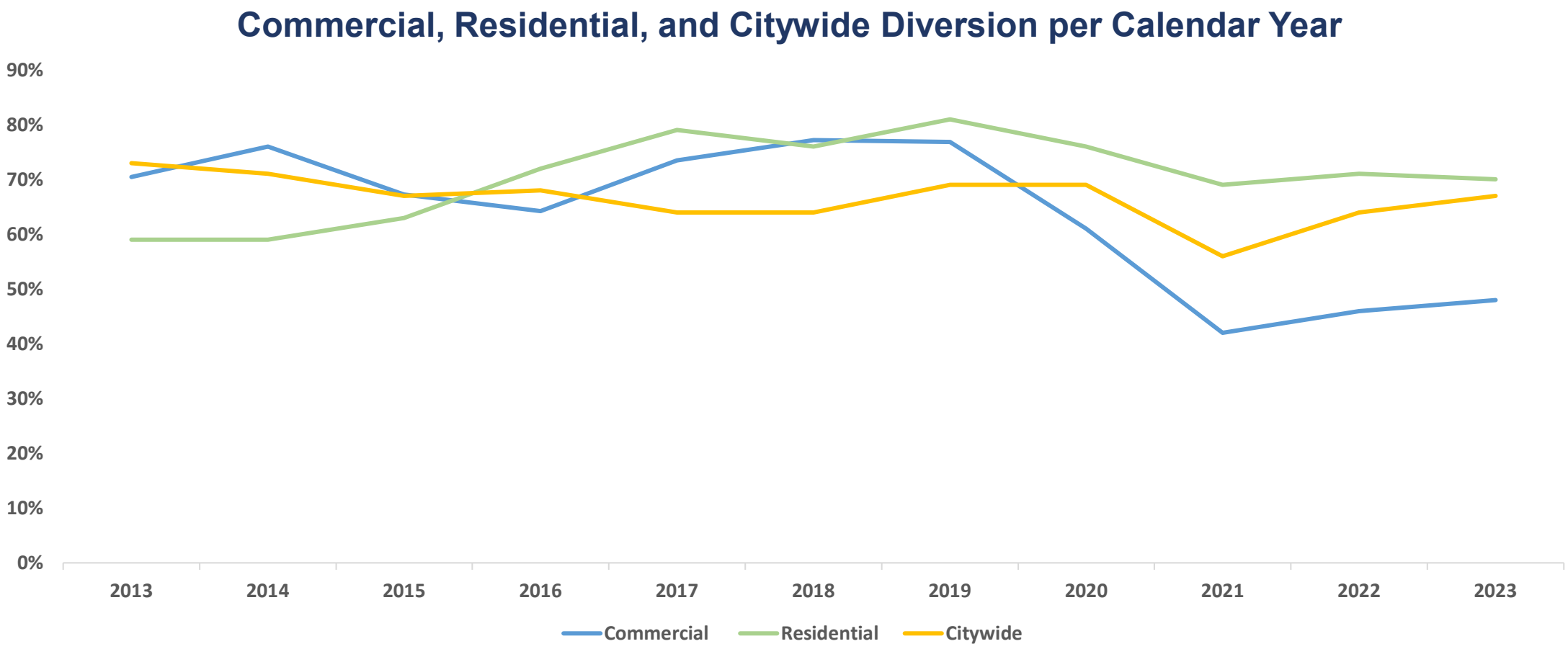
- Commercial system services nearly 8,000 accounts and over 10,000 businesses
  - 3 Material Streams: Wet (organics), Dry (recycling and everything else), and Customized (source separated recycling)

Organics (food waste, landscape waste, food/drink soiled paper)

Recyclables + mixed waste

Source-separated recycling

Commercial, Residential and Citywide Programs Diversion Trends (2013 – 2023)



Recycle Right Campaign

- City staff responsible for Outreach
- Deploying one message using many tactics including:
  - Local radio & TV stations ads
  - Facebook & Google ads
  - Direct mail & outreach events
  - Sports team partnerships
- Multilingual approaches
- Current outreach targets both single-family and multi-family households

Cart Lid Replacement Program

- Spring 2021 pilot for 5,000 single family households
- Tested Trilingual Recycle Right messages and graphics
- **Result: reduced contamination by 20%**
- In FY 23-24, procured 16,000 lids with CalRecycle grant.
- **Next Steps:** Compare data with Fall 2024 curbside recycling study results

Larger Garbage Cart Pilot

- 85% of homes subscribe to a 32-gallon garbage cart
- Pilot tests correlation between larger garbage carts and recycling contamination by providing a larger cart at no additional cost
- FY 22-23: 4,200 homes offered 96-gallon carts
- FY 23-24: 4,300 homes offered a one-size upgrade (residents with 32-gallon carts received 64-gallon & 64-gallon received 96-gallon)

Contamination And Recycling Tagging Project

- Goal: reduce recycling contamination rate in Fall 2024 by targeting behavior change in residents using direct feedback via cart tags
- Team of six visually inspecting single-family carts along routes with 60% or greater contamination
- Since March 2024, visited 50,000 addresses; targeting about 130K addresses by June 2025

Why is Zero Waste Important?

The Environment

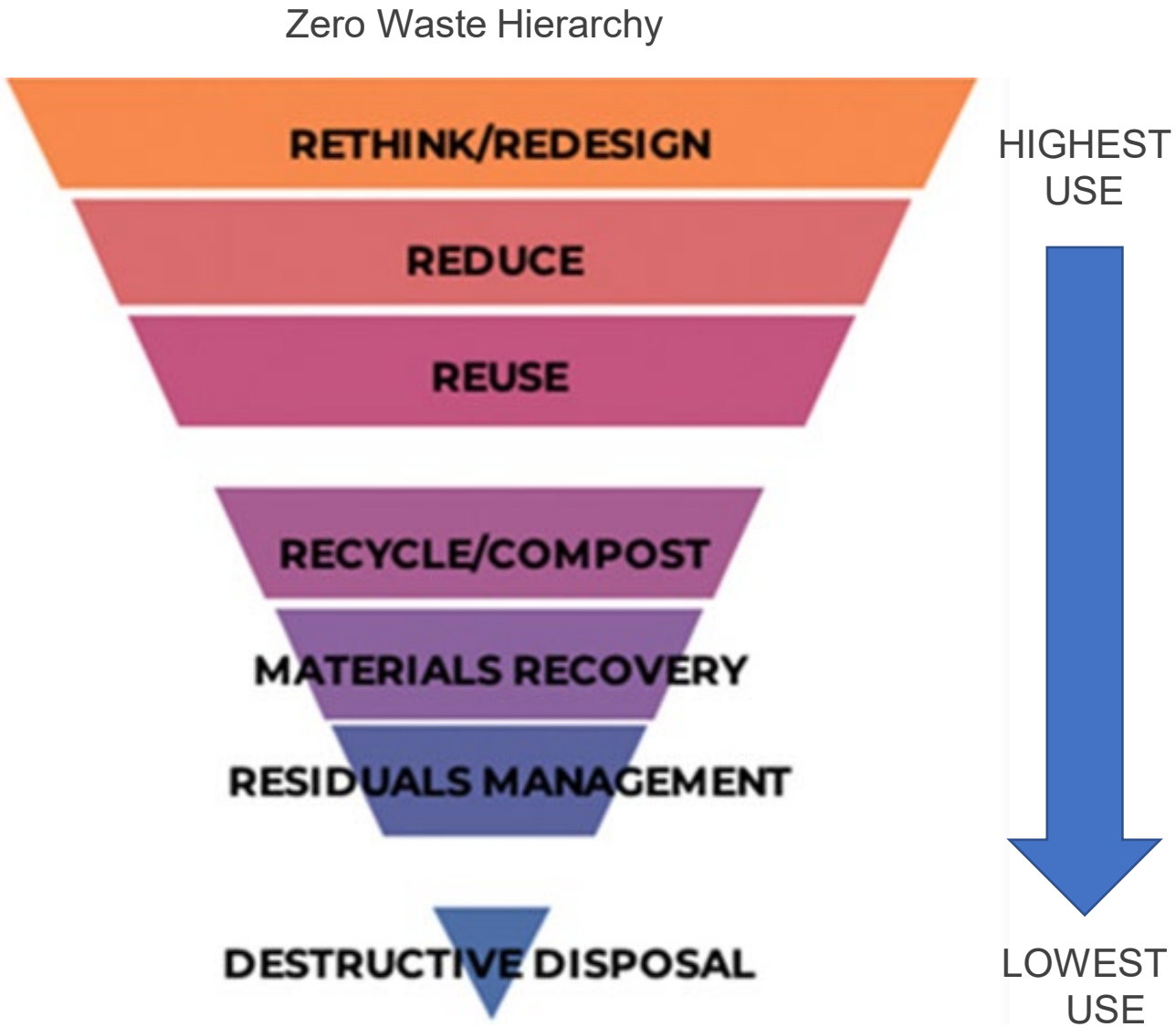
California Laws

The City's Zero Waste Goal

Landfill Capacity

What is Zero Waste?

- Avoiding sending waste to landfill by waste prevention
- Creating products that are less wasteful and a society that prioritizes conservation.



Zero Waste Element Overview

FOUNDATIONAL

- Community Engagement
- Materials Characterization
- Research & Development

RETHINK/REDESIGN

- Sustainable Products & Packaging
- Sustainable Purchasing Citywide

REDUCE

- Lead by Example
- Food Waste Prevention

REUSE

- Surplus Food Recovery
- Repair & Reuse

RECYCLE/COMPOST

- Construction & Demolition Recycling
- Reduce Disposal of Compostable Materials in Landfills
- Recycling Market Development

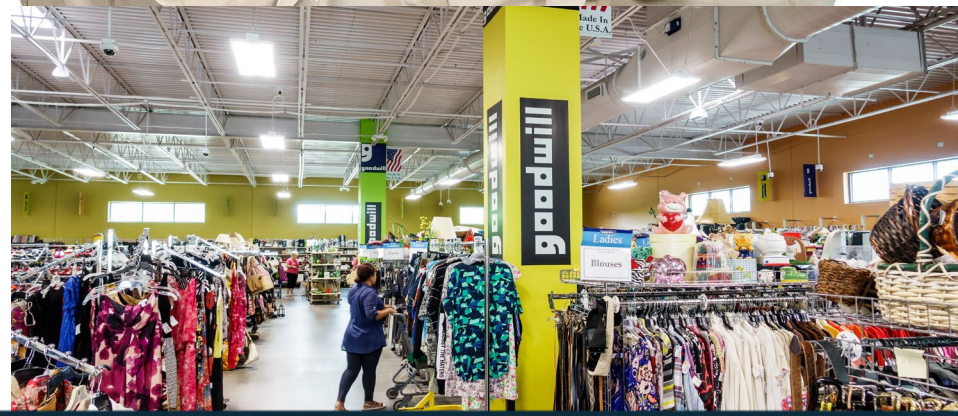
MATERIALS RECOVERY

- Technology for Higher Diversion

When should you try to stop waste?

When you buy!

- Buy smart
- Buy less
- Buy used
- Buy reusables



ZERO WASTE PLAYBOOK AT HOME

- Repair Broken Items
  - Fix-It Clinics
  - Library Tools
- Compost food scraps
- Reusable foodware

- Join the Climate Smart Challenge
- Recycle Right by visiting SanJoseRecycles.org

ZERO WASTE PLAYBOOK IN THE WORKPLACE

- Purchase items with recycled content, that can be recyclable and contain non-toxic products
- Avoid single-use foodware
- Encourage recycling and provide training to lower contamination
- Donate edible food to Food Recovery Organizations

What's Next?

Decreasing Recycling Contamination

Updating Construction & Demolition Diversion Program (CDD)

Continued implementation of SB 1383

Climate Smart Zero Waste Element


HHW.org
(408) 299-7300
FREE drop-off appointments and locations
Household Hazardous Waste


FREE
Junk Pickup
sjenvironment.org/JunkPickup


When in doubt, find out at
SanJoseRecycles.org
Or ask your smart device…
What does SanJoseRecycles.org say about [item]?
SAN JOSE RECYCLES
QUESTIONS ABOUT PLASTIC RECYCLING?
Delivering world-class utility services and programs to improve our health, environment, and economy.

THANK YOU

#KeepSJClean

Attachment E

PROGRAMS ROADMAP UPDATE

Climate Advisory Commission

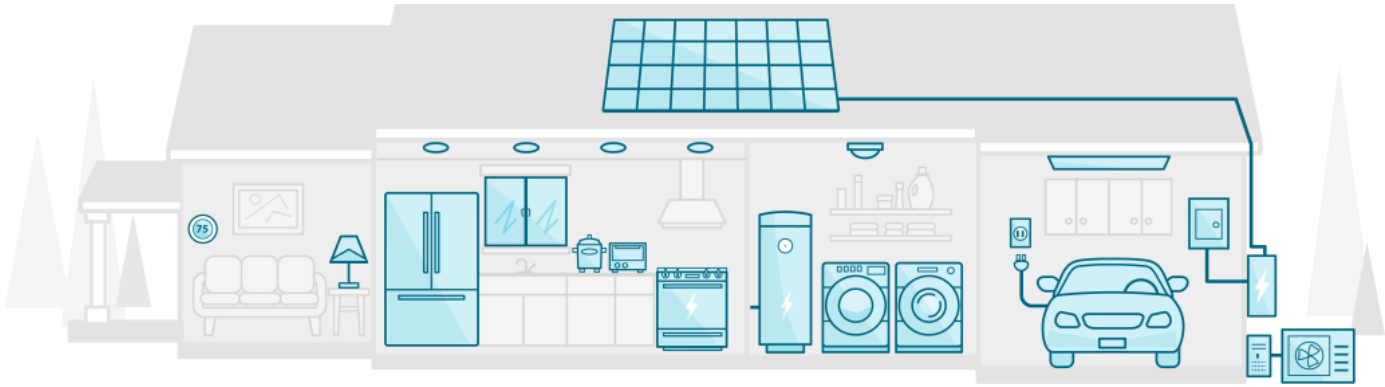
November 21, 2024

Kate Ziemba, Senior Environmental Program Manager
Josh Chanin, Senior Decarbonization Programs Specialist

SAN JOSE CLEAN ENERGY
A Program of the City of San José

AGENDA

- Background
- Guiding principles
- Program scoring and community input
- Overview of current programs
- FY 25-26 program recommendations
- Vehicle electrification programs

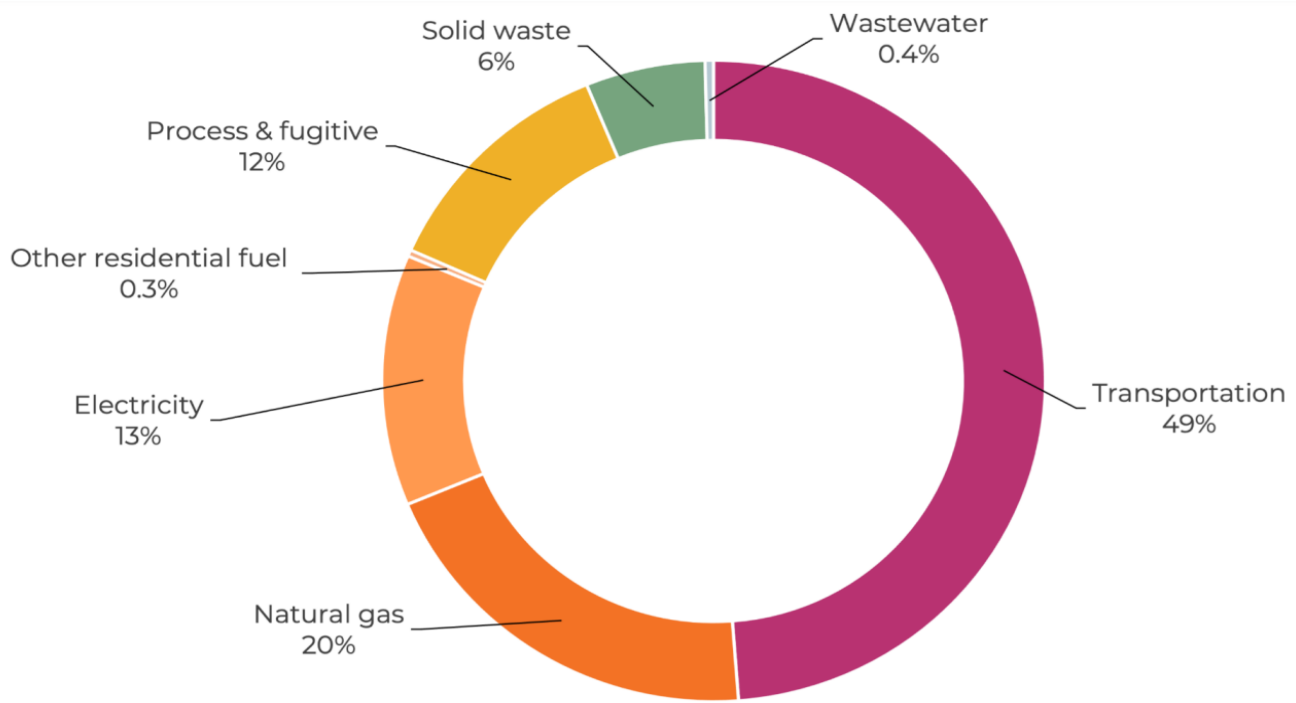


SAN JOSE CLEAN ENERGY

SAN JOSE'S CARBON NEUTRALITY GOAL

- Beyond providing a carbon-free power supply, need to electrify transportation and buildings to achieve the goal
- SJCE programs can incentivize electrification and efficiency

2021 Communitywide Emissions by Sector (Climate Smart San José)



SAN JOSE CLEAN ENERGY

PROGRAMS HISTORY & AREAS

- 2019-2021: stakeholder engagement to develop programs roadmap
- 2021: adoption by City Council

Vehicle Electrification	Building Electrification	Distributed Energy Resources
Energy Efficiency	Program-Specific Rates	Resiliency

SAN JOSE CLEAN ENERGY

PROGRAM GUIDING PRINCIPLES

- Reduce greenhouse gas emissions
- Align with Climate Smart San José
- Promote equity, increase affordability, and support priority communities
  - 50% of incentive funding for priority communities
- Benefit customers and community
- Maintain or improve financial status of SJCE

SAN JOSE CLEAN ENERGY

PROGRAM SCORING

- Staff developed a scoring framework to help prioritize programs
- Weighted metrics (highest to lowest):
  - Greenhouse gas emissions reductions
  - Investment in priority communities
  - Customer savings
  - Peak demand reductions
  - Fiscal impact for SJCE
- Qualitative considerations:
  - Contribution to personal and community resiliency
  - Ensuring all customer groups are served
  - Availability of external funding

SAN JOSE CLEAN ENERGY

COMMUNITY INPUT

Key takeaways from multilingual community survey and multilingual listening sessions:

Most important energy issues:

1. Cost of energy bills
2. Power outages
3. Climate change

Number one reason folks are not interested in making energy upgrades is **cost**.

Many renters have not talked to their landlords about energy upgrades they are interested in.

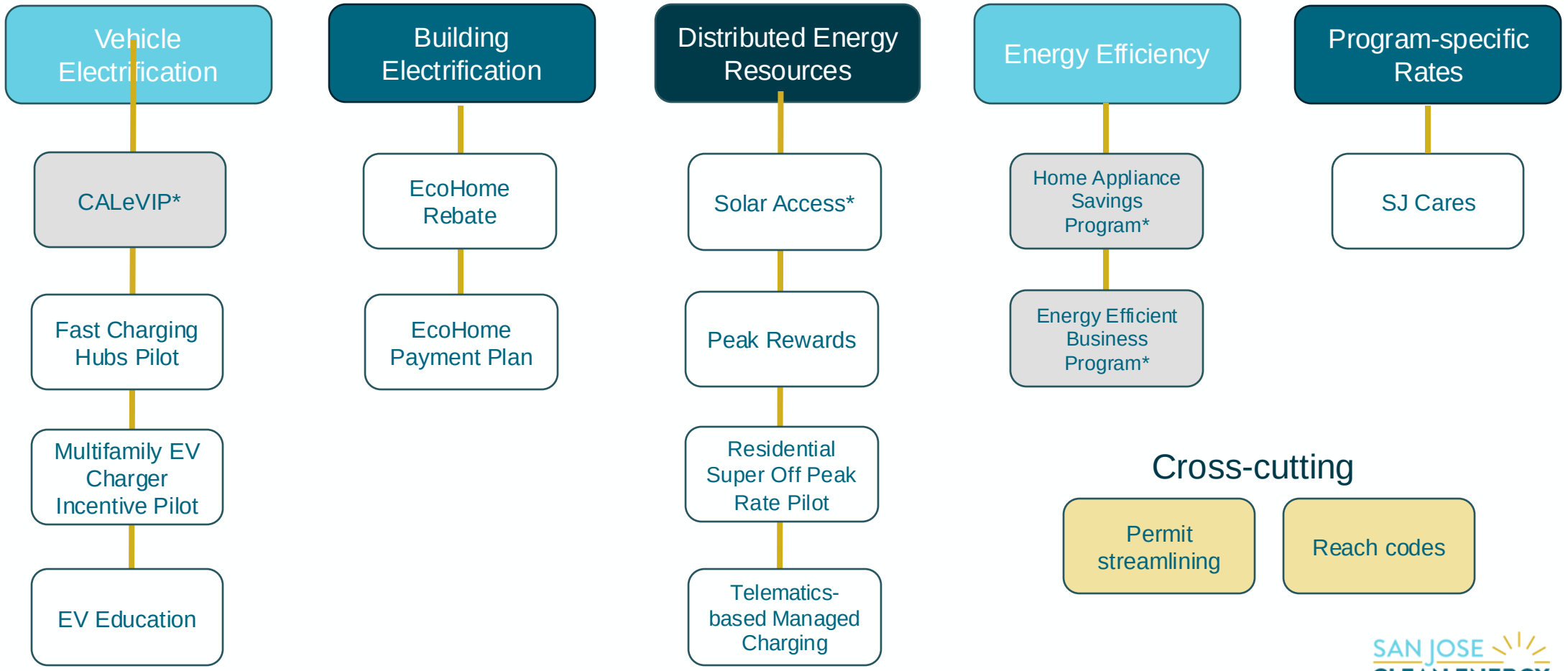
Over half of homeowner respondents were interested in a program that rewards charging an EV at different times of day.

Most residents have installed at least one type of energy-saving appliance.

SAN JOSE CLEAN ENERGY

CURRENT PROGRAMS & INITIATIVES

FY 24-25 Cost: $12M



Notes:
* denotes externally funded
Grey denotes closing out

SAN JOSE CLEAN ENERGY

IMPACT OF CURRENT PROGRAMS

Program	Installations/ customers served to date
California Electric Vehicle Infrastructure Project (CALeVIP)	29 direct current fast chargers, 185 Level 2 chargers
Solar Access	~840 participants
Home Appliance Savings Program	263 appliances installed, 140 smart power strips, 347 smart thermostats, 207 showerheads, 347 induction hotplates
Energy Efficient Business Program	775 businesses served
Peak Rewards	300 participants
SJ Cares	~70,000 participants

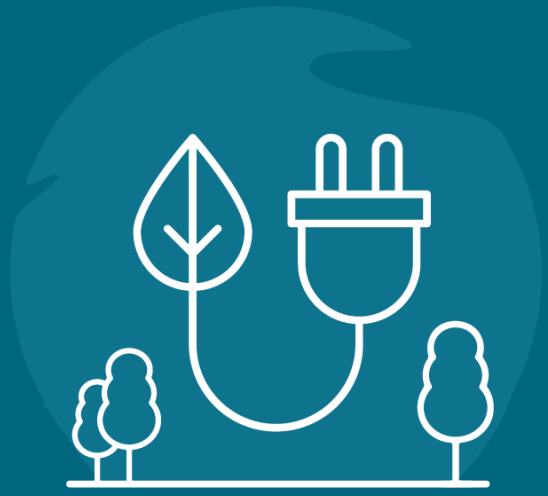
Through 2023

17,880,000 kilowatt-hours saved (same as the annual usage of 1,600 homes)

2,315 metric tons of CO_2 avoided

$29,036,500 customer savings

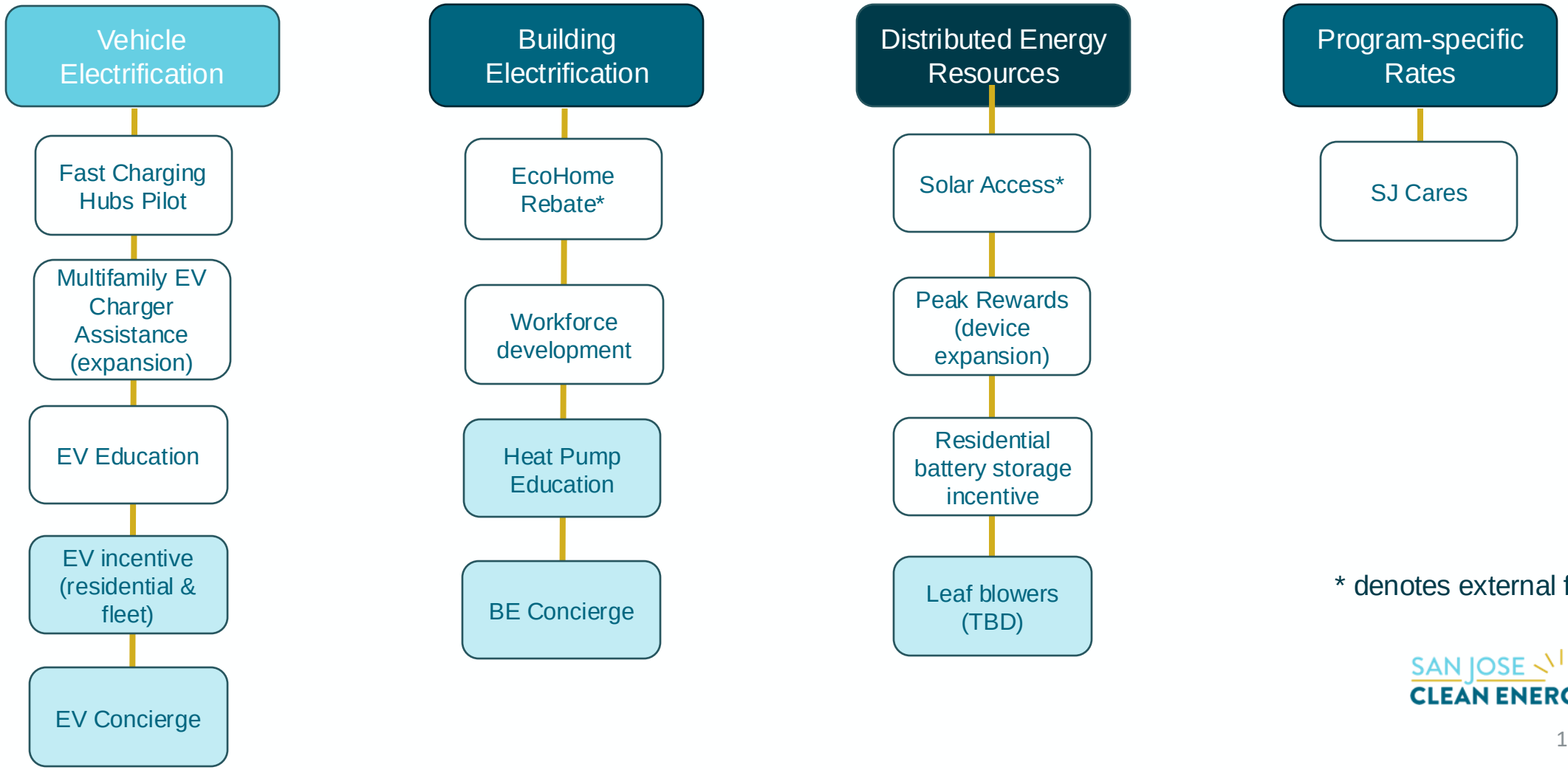
SAN JOSE CLEAN ENERGY



FY 25-26 PROGRAM RECOMMENDATIONS

FY 25-26 PROGRAM RECOMMENDATIONS

Cost: $10.5M



* denotes external funds

SAN JOSE CLEAN ENERGY

NEW VEHICLE ELECTRIFICATION PROGRAMS

Point-of-Sale EV Incentives

SJCE customers receive point-of-sale rebates as a discount when purchasing or leasing a new or used EV from enrolled car dealers. SJCE customers from Environmental Justice communities receive increased rebates.

Multifamily EV Charger Assistance Expansion

Expansion of existing Multifamily EV Charger Assistance Pilot. Support multifamily property owners in San Jose in installing low-power EV chargers at their property.

SAN JOSE CLEAN ENERGY

VEHICLE ELECTRIFICATION OTHER PROGRAMS

EV Concierge

Provide phone and email assistance to customers thinking about electrifying their transportation. Support will include EV education, charging assistance, and connecting folks with available incentives.

EV Education

Drive EV adoption by raising awareness of EV benefits and bridging information gaps in communities with low EV adoption. Will include workshops about EVs, charging, and financial empowerment and community dinners delivered in partnership with community-based organizations.

SAN JOSE CLEAN ENERGY

VEHICLE ELECTRIFICATION CONTINGENCY

Federal EV incentives may now be at risk. The City has a chance to play a major role supporting residents in the EV transition.

Inflation Reduction Act (IRA) tax credits play a major role in increasing EV adoption to achieve state and city emissions goals. Come 2025, those incentives may be at risk for both residents and fleets.

Increasing planned EV incentives in 2025-2026 could reduce the impacts of potentially losing the IRA tax credit and keep San José on track to meeting climate goals.

SAN JOSE CLEAN ENERGY

PROJECTED ANNUAL IMPACT OF RECOMMENDED PROGRAMS

Program expenditures in FY25-26 will result in these lifetime savings:

117,860 metric tons of CO_2 avoided
(2.4% of total communitywide emissions in 2021)

$57.8M in customer savings

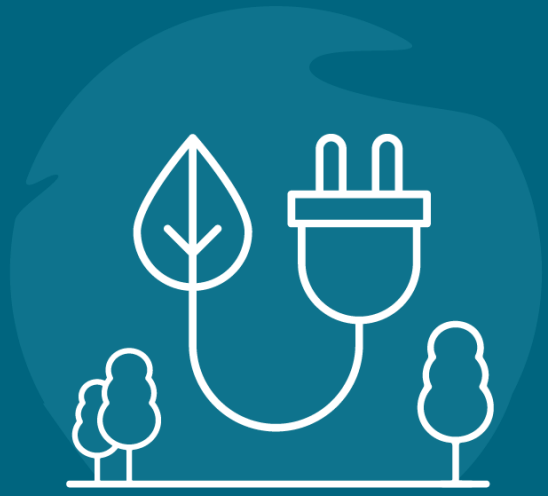
SAN JOSE CLEAN ENERGY

QUESTIONS & DISCUSSION

- Recommendation language for Commission to finalize for inclusion in the March 3 Transportation & Environment Committee memorandum:

The Climate Advisory Commission accepts staff's update on current San Jose Clean Energy programs and supports its recommendations for Fiscal Year 2025-2026, including the focus on vehicle electrification programming given transportation's outsized emissions.

SAN JOSE CLEAN ENERGY



EXTRA SLIDES

ECOHOME REBATE PROGRAM

- Projected launch Dec 2
- Residential
- Focused on removing highest GHG-emitting gas equipment and enabling future electrification
- $1.2M budget through 6/30/24

Equipment/Add-On	Rebate Amount Market Rate	Rebate Amount Environmental Justice Community Qualified
Heat Pump Heating, Ventilation, and Air Conditioning System (HP-HVAC) (gas replacement)	$2,500	$3,500
Heat Pump Water Heater (HPWH) (gas replacement)	$2,000	$3,000
Electric Service Panel Upgrade (add-on)	$1,000	$2,000
Attic Insulation – must be paired with HP-HVAC	$0.75/sq ft. max incentive $700	$0.75/sq ft. max incentive $1000
EV Circuit Prewiring (add-on)	$500	$750
Dryer Circuit Prewiring (add-on)	$500	$750
Cooking Circuit Prewiring (add-on)	$500	$750
Circuit Pauser/Splitter Device (add-on)	$250	$250

ENVIRONMENTAL JUSTICE COMMUNITY QUALIFICATIONS

- Enhanced rebates are offered to residential customers in select geographical communities and for income-qualified customers
- Must meet one of the three criteria:
  1. Enrollment in CARE/FERA/SJ Cares
  2. Enrollment in another income-qualifying program
  3. Households located within a census track with CalEnviroscreen 4.0 percentile of 60% or more and verification of household income up to 150% area median income (AMI)

SAN JOSE CLEAN ENERGY

ECOHOME PAYMENT PLAN

- Projected launch Dec 2
- Zero interest loans up to $5,000 per customer
- Paid back on monthly PG&E electricity bill
- Rebates are stacked with the loan, if participating in both programs
- Loan amount paid directly to contractor
- Loans are:
  - Up to $5,000
  - Financed between 2-5 years
  - 0% interest, no credit checks, no fees
- $1.25M budget through 6/30/24

SAN JOSE CLEAN ENERGY

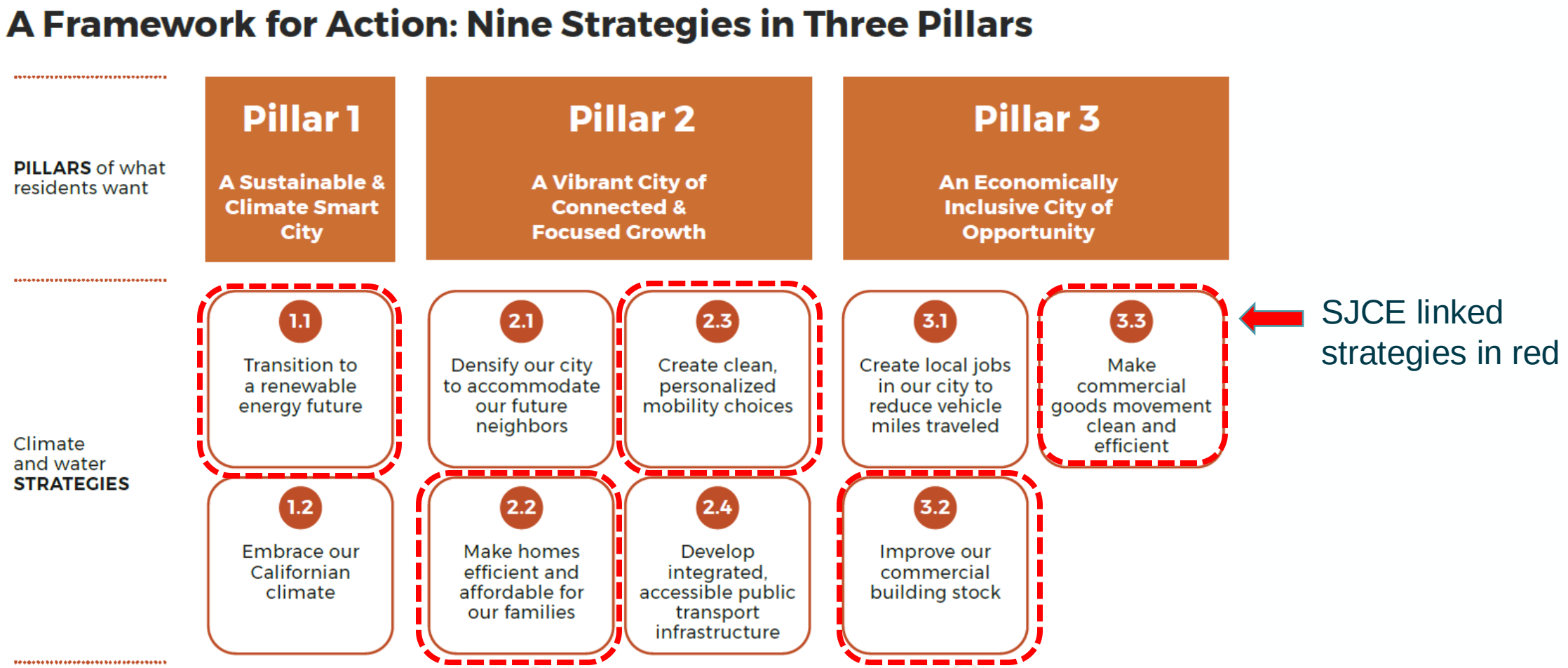
PROGRAMS ROADMAP HISTORY

- Stakeholder engagement: residents, businesses, industry experts, Clean Energy Community Advisory Commission, and Transportation & Environment Committee

- Every spring to Transportation & Environment Committee

SAN JOSE CLEAN ENERGY

SJCE PROGRAMS ALIGNED WITH CLIMATE SMART



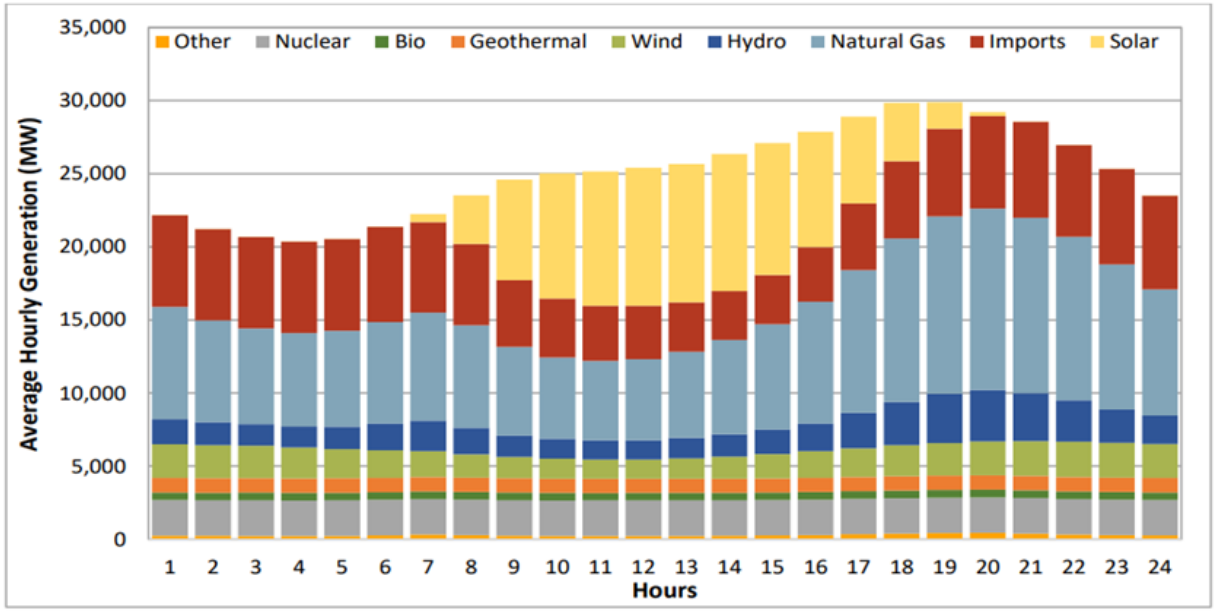
SAN JOSE CLEAN ENERGY

VEHICLE ELECTRIFICATION

SJCE is focused on:

1. Managing the additional electric demand from charging to reduce greenhouse gas emissions and improve resiliency

2. Helping ensure equitable EV adoption and access to charging infrastructure



California Independent System Operator Average Hourly Power Production by Resource Type – 2020

SAN JOSE CLEAN ENERGY

DISTRIBUTED ENERGY RESOURCES: DEMAND RESPONSE

- Compensating customers who reduce their usage during events
  - CAISO emergencies (demand outstrip supply)
  - High power market prices
  - High demand
- Types
  - Behavioral: people take action to reduce usage
  - Automated: wirelessly adjust equipment (thermostats, EV chargers, smart plugs)
  - Load shaping: smoothing demand peaks (storage, HVAC, EV charging)

SAN JOSE CLEAN ENERGY