CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: HONORABLE MAYOR AND CITY COUNCIL

FROM: Kerrie Romanow

SUBJECT: SEE BELOW

DATE: May 31, 2022

Approved Jennifer S. Maguire

Date 06/02/22

SUBJECT: CLIMATE SMART SAN JOSE EXISTING BUILDING ELECTRIFICATION FRAMEWORK

RECOMMENDATION

Accept the Electrify San José: A Framework for Existing Building Electrification.

OUTCOME

City Council approval of the recommendation will establish a community-guided framework for the City of San José's (City) building electrification initiatives for existing buildings in support of Climate Smart San José and the City's carbon neutrality by 2030 efforts.

EXECUTIVE SUMMARY

City Council approved Climate Smart San José (Climate Smart), the City's climate action plan in 2018, and in November 2021, City Council adopted a resolution setting a communitywide carbon neutrality by 2030 goal. City Council directed staff to return in June 2022 with strategies to accelerate progress towards this new carbon neutrality goal.

Over the last few years, the city's electricity supply has moved rapidly to low-carbon, renewable sources. In contrast, the high carbon nature of natural gas has remained unchanged and its use in buildings continues to be a major source of greenhouse gas (GHG) emissions making building electrification an important strategy for reaching carbon neutrality. In addition, state and regional policies and significant funding resources are facilitating building electrification across California, providing an opportunity for the San José community to leverage and benefit from this support. Building electrification can provide many co-benefits including: increasing energy efficiency and decreasing operating costs; improving indoor air quality and comfort; and creating new high-quality electrification jobs.

The Electrify San José: A Framework for Existing Building Electrification (Framework) does not establish any mandates but instead provides the City with guidance on how to pragmatically

prepare and support community transition away from carbon-centric natural gas usage in existing homes and businesses. The Framework identifies four priority areas developed with the community: 1) health and air quality; 2) housing and energy costs; 3) clean and reliable energy; and 4) workforce development. It recommends supportive strategies, developed through extensive engagement with community-based organizations (CBO); development, housing, and labor stakeholders; technical experts; and residents within each of the priority areas. These supportive strategies are intended to increase the positive health, economic, and resiliency benefits that building electrification can bring to San José.

BACKGROUND

Adopted in 2018, Climate Smart is a data-driven plan to reduce community-wide GHG emissions through energy, water, and mobility strategies. In November 2021, City Council adopted a resolution setting a communitywide carbon neutrality by 2030 goal and directed staff to return in June 2022 with a strategy for the acceleration of work in Climate Smart needed to put the City firmly on a path to achieve its carbon neutrality goal by 2030.

In February 2019, City Council approved the City's partnership with the American Cities Climate Challenge (ACCC), that included ACCC support valued at $2.5 million. As part of its ACCC partnership, which is set to conclude in June 2022, the City committed to developing a framework for electrifying buildings. Building electrification for existing buildings means replacing fossil fuel systems and appliances such as water heaters, dryers, furnaces, and stoves/ovens with electric alternatives such as heat pumps, which are typically much more energy efficient.

The City's most recent communitywide GHG inventory indicates that building emissions, from electricity and natural gas, make up about one-third of San José's GHG emissions. San José Clean Energy currently supplies electricity that is from 95 percent carbon neutral sources and has a goal to provide 100 percent carbon-neutral electricity. However, natural gas remains the major source of GHG emissions in the building sector. Over the past few years, the City has supported the transition to all-electric buildings by adopting all-electric requirements for new developments and providing and promoting electrification incentives, trainings and educational events, and outreach campaigns.

State and regional action, including the 2022 California Building Energy Efficiency Standards and the Bay Area Air Quality Management District's draft regulations to phase out the sale of natural gas space and water heaters starting in 2027 and significant funding allocations, are rapidly accelerating the transition toward all-electric new and existing buildings across California. The federal government, in its Infrastructure, Investment and Jobs Act, also provides an unprecedented amount of funding supporting building electrification.

With ACCC support, City staff conducted extensive community and stakeholder engagement in years 2020 to 2022, released a draft existing building electrification framework in March 2022,

and hosted additional rounds of community meetings to gather public input and refine the draft framework.

ANALYSIS

With San José Clean Energy's base power product moving towards being 100 percent carbon-neutral, switching from natural gas- to electric-powered appliances in existing buildings is a key strategy for reaching the City's carbon neutrality by 2030 goal. Regional, state, and federal support, planning, and regulations already indicate a clear directive toward building electrification. The City should support its residents and businesses to get ready for and make this transition. While the City has already transitioned to all-electric new buildings, a framework is necessary to guide existing building electrification in a way that addresses community priorities and benefits all residents.

Community Co-creation of the Framework

Historically marginalized communities, including vulnerable populations, low-income communities, and communities of color, are disproportionately impacted by negative health, safety, and economic impacts associated with climate change, and yet they are not often included in important decision-making. The City developed the Framework (see Attachment A) with broad community input, including historically marginalized communities, in order to minimize these potential negative impacts and maximize the benefits of this important transition for all San José residents. From 2020 to 2022, the City partnered with two CBOs that work directly with community members in the Vietnamese and Latino/a/x communities, the International Children's Assistance Network (ICAN) and Veggielution respectively, to understand the key challenges and concerns of these communities and integrate them into the foundation of the Framework.

To share the draft framework with the broader community and gather input to refine it, City staff also hosted individual meetings with more than 40 CBOs and labor, environmental, development, and housing organizations; three community forums with CBOs, labor organizations, and housing organizations; and five virtual public information sessions, promoted to more than 450 stakeholders including neighborhood associations. The City also posted a list of Existing Building Electrification Frequently Asked Questions on the Environmental Services Department's Building Electrification webpage (see Attachment B).

Building Electrification Framework Overview

The Framework does not require that existing buildings switch from natural gas to electric appliances. The purpose of the Framework is to guide the City on how to equitably electrify existing homes and businesses in San José as it moves forward supporting the community in this transition. Based on community input, the Framework identifies the following four community priority areas:

- health and air quality;
- housing and energy costs;
- clean and reliable energy; and
- workforce development.

The Framework includes four foundational strategies and additional supportive strategies, informed by the extensive community engagement, in order to advance each of the community priorities while guiding the transition to building electrification and reducing communitywide GHG emissions. The foundational strategies are to:

- Engage the community in the evaluation of policy options supporting building electrification;
- Invest in supportive programs and resources to enable an equitable building electrification transition;
- Create more equitable and accessible engagement across the San José; and
- Build a coalition for equitable building electrification.

The Framework recommends additional supportive strategies intended to increase the positive health, economic, and resiliency benefits that building electrification can bring to San José.

Co-benefits of Building Electrification
The Framework details how, in addition to reducing GHG emissions, building electrification can provide many co-benefits including the potential for:

- Decreased operating costs due to the increased energy-efficiency of electric appliances;
- Improved indoor air quality through the elimination of harmful pollutants emitted from natural gas appliances, and additional comfort from ability to use smart controls and the provision of air cooling for homes that do not already have it; and
- Creation of new high-quality electrification jobs that allow working families to live and thrive in San José.

With the provision of significant state and federal funding and other resources to support building electrification, the City will aggressively seek to leverage these resources to support and benefit the San José community.

Continued Community Engagement
Though building electrification has demonstrable benefits, the City should approach the transition in a thoughtful manner to minimize any negative impacts and ensure all of the community can realize its rewards. The Framework provides the City with the initial community-driven guidance to continue moving forward in a thoughtful and equitable way, but it is only the beginning. City

staff will continue to provide community outreach and engagement as it moves forward in its support of building electrification.

CONCLUSION

Decreasing reliance on natural gas and increasing building electrification is a foundational component to mitigate climate change. The Electrify San José: A Framework for Existing Building Electrification, developed with community engagement, recommends strategies to support equitable building electrification. In addition to reducing GHG emissions, building electrification has other positive benefits. It can increase energy efficiency and decrease operating costs, improve indoor air quality and comfort, and create new high-quality jobs. It is important to implement building electrification measures thoughtfully and with ongoing community engagement, incentives, and external funding.

EVALUATION AND FOLLOW-UP

Staff will provide progress updates to the Transportation and Environment Committee and City Council as part of the semi-annual Climate Smart San José updates.

CLIMATE SMART SAN JOSE

The recommendation in this memorandum aligns with one or more Climate Smart San José energy, water, or mobility goals.

PUBLIC OUTREACH

The City completed significant community outreach to inform the proposed Framework, including:

1. Fifteen meetings over seven months with CBO partners, ICAN and Veggielution, to ensure the City included the perspectives of Spanish- and Vietnamese-speaking residents and communities that are most vulnerable to poor air quality and other climate impacts,
2. Individual meetings with more than 40 CBOs, labor organizations, environmental organizations, nonprofits and housing organizations
3. Three community forums with CBO, labor organizations and housing organizations, and
4. Five virtual public information sessions, promoted to more than 450 stakeholders including neighborhood associations, to share a draft Framework with the broader community and gather input to refine the Framework.

This memorandum will be posted on the City's Council Agenda website for the June 14, 2022 City Council meeting.

COORDINATION

This memorandum has been coordinated with the City Attorney's Office, City Manager's Budget Office, and departments of Community Energy, Housing, and Planning, Building and Code Enforcement.

COMMISSION RECOMMENDATION/INPUT

No commission recommendation or input is associated with this action.

FISCAL/POLICY ALIGNMENT

Climate Smart San José activities align with the Climate Smart San José strategies and the City's Envision 2040 General Plan approved by City Council.

CEQA

CEQA Statutorily Exempt, File No. PP17-001, CEQA Guidelines Section 15262, Feasibility and Planning Studies.

/s/
KERRIE ROMANOW
Director, Environmental Services

For questions, please contact Julie Benabente, Deputy Director, via email at Julie.Benabente@sanjoseca.gov.

Attachments
A - Electrify San José: A Framework for Existing Building Electrification
B - Existing Building Electrification Frequently Asked Questions

Attachment A

ELECTRIFY SAN JOSE

A Framework for Existing Building Electrification

May 2022

CLIMATE SMART SAN JOSE
LIVING BETTER TODAY FOR TOMORROW

ELECTRIFY SAN JOSE

A Framework for Existing Building Electrification

May 2022

PREPARED BY:

City of San José
Environmental Services Department

www.sanjoseca.gov

IN COLLABORATION WITH:

SPECIAL THANKS TO:

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

From hotter summers and heat waves to wildfires and drought, San José residents are already experiencing the impacts of climate change, and historically marginalized communities of San José are impacted first and worst. San José must both adapt to this new reality and reduce greenhouse gas (GHG) emissions to help mitigate the impacts of climate change. The Electrify San José framework ("Framework") lays out **how to reduce GHG emissions from existing buildings** in San José through building electrification, **while bringing to the forefront the concerns and priorities of historically marginalized communities**. In order to equitably address climate change, the City of San José ("City") will seek to minimize the burdens and maximize the benefits of the transition to all-electric buildings for historically marginalized communities, while considering the needs of all building owners. This includes committing to the pursuit of more affordable and healthier housing, better indoor and outdoor air quality, high quality jobs, and increased reliability of energy for critical facilities and services.

This Framework builds on Climate Smart San José (2018), San José's climate action plan, which sets the foundation for reducing GHG emissions community-wide and has existing goals around building electrification. In November 2021, the City passed a bold resolution to achieve carbon neutrality by 2030, accelerating its current Climate Smart plan in order to match the urgency of the most recent climate science.[*],[1] This aspirational goal, passed during the development of this Framework, will require additional strategic planning and community engagement to ensure community outcomes are achieved on this accelerated timeline. San José will need to work with unprecedented political expediency, undertake strategic and inclusive coalition-building work, identify substantial funding and program support, and accelerate new policies to enable a transition that addresses both social inequities and climate change.

The Framework documents major priorities and concerns of key stakeholders, historically marginalized communities, and the broader community concerning the electrification of San José's existing buildings, providing a framework to equitably move buildings toward carbon neutrality. This Framework also includes a set of recommendations rooted in the community's priorities to equitably decarbonize buildings in San José. The City aligns with State efforts and joins other leading U.S. metropolitan areas that have already begun work to eliminate fossil fuels from existing buildings. San José's own local efforts are necessary to create a healthier, safer, and more prosperous city for all residents.

* The City defines carbon neutrality as meeting within a given year net-zero GHG emissions from at least: fuel use in buildings, transport, and industry; grid-supplied energy; and the treatment of waste generated within the city boundary.

Purpose of this Framework

Why did the City create this Framework? What does the City hope to accomplish?

Identify short- and long-term actions to achieve equitable building electrification

Identify the concerns and goals of communities concerning building electrification in San José with a focus on residential buildings and on hearing from historically excluded voices

Demonstrate the City's commitment to improved and expanded community engagement with historically marginalized groups during the development and implementation of new policies and programs

Intended Outcomes

What will the City do with this Framework?

Establish a community-guided framework to implement the recommended actions and to establish transparency and accountability throughout implementation.

Provide guidance to co-develop and implement building electrification policies and solutions with the San José community.

Requirements

In November 2021, the San José City Council (the City Council) passed a resolution aiming for a goal of carbon neutrality in San José by 2030. **The Framework itself is not a requirement** for residents to switch existing natural gas-powered appliances for electric alternatives. The City, with community input, will need to consider how to approach building electrification moving forward as it continues to develop plans for accelerating progress toward the carbon neutrality goal.

Historically Marginalized Communities

There are many terms meant to describe communities who have been routinely and intentionally excluded from important decision-making, who have been forced to bear the burdens of harmful policies and systems for generations, who suffer disproportionately negative outcomes related to health, wealth, mobility, and opportunity, and to whom the government in particular has not been accountable.

In the United States, marginalization stems from years of state-sanctioned policies, practices, procedures and attitudes that advantage one social group over another. Historically marginalized communities include people of color, Black people, Indigenous people, immigrants, refugees, people with low incomes, people experiencing poverty, people experiencing homelessness or insufficient housing, English-language learners, people with disabilities, people disproportionately affected by climate change impacts, and other communities that are systematically denied full access to rights, opportunities, resources, and power.[2]

There are many complexities, layers, and intersections of these communities. Services and programs for each of the groups listed should be specific to those individuals' needs. However, for the purposes of this Framework, the term **historically marginalized communities** is used to encompass these groups. The task of tailoring services and programs to each of these groups will be part of the implementation of this Framework.

Why Building Electrification?

There are more than 230,000 existing buildings in San José. These buildings typically use two energy sources, electricity and natural gas. San José's primary electricity provider, San José Clean Energy (SJCE), is rapidly increasing the proportion of renewable energy sourced for San José's electricity supply, ensuring that electricity use gets cleaner and results in fewer GHG emissions. "Natural" gas, however, is a fossil fuel composed mainly of methane that is burned directly within buildings and is currently responsible for 19 percent of community-wide GHG emissions. In San José, natural gas is primarily used in buildings to generate heat, provide hot water, dry clothes, and heat gas stoves and ovens. Natural gas (also referred to in this Framework as "gas") was once considered a cleaner alternative to more polluting energy sources such as coal, but even with advances in the efficiency of gas appliances, it remains a large and increasing source of GHG emissions in San José (see Chapter 1, Figure 4). Although gas appliances and distribution networks can be made more efficient, because it is a fossil fuel, natural gas will never be a zero-emissions source of energy. In addition to producing GHG emissions, burning natural gas within buildings is linked to negative health outcomes, including asthma and respiratory illness, as well as dangerous fires and explosions such as the 2010 gas pipeline explosion in San Bruno, California.[3,4]

To achieve carbon neutrality and improve indoor health and safety, fossil fuel systems in buildings, including gas-powered water heaters, furnaces, clothes dryers, and stoves, must be replaced with highly efficient electric alternatives – a process referred to as **building electrification**. The most promising technologies for building electrification, such as heat pumps and induction cooking (described in more detail in Chapter 1), already exist in the marketplace to achieve these goals.

As electricity becomes cleaner through programs like San José Clean Energy, buildings must move away from burning "natural" gas, a fossil fuel, to using clean, all-electric alternatives to eliminate GHG emissions from buildings and improve health and safety for San José residents.[†],[5]

The upfront costs of these appliances can be higher than the gas-powered alternatives in the U.S. However, due to their efficiency and potential to eliminate building emissions, new all-electric appliances can also result in operational cost savings, and are becoming increasingly common and affordable. These appliances can also improve indoor air quality and provide more comfortable heating and cooling by allowing for greater temperature control. To ensure that no one is left behind in the transition to safer, cleaner buildings, low-income communities in San José will require funding support for purchasing and installing these appliances. Moderate-income communities will also likely need financial assistance to reach full building electrification goals in the short-term.

† Although oil and gas industry proponents use the term "natural" for gas derived from hydraulic fracturing (fracking), it is not accurate to call it natural. The process of deriving fracked gas creates methane, which is a greenhouse gas that contributes 86 times as much to global warming as carbon dioxide over a twenty year period (United Nations Economic Commission for Europe). Further, fracking is not a natural process as it requires human-made pressurized water systems to free the gas (United States Geological Survey).

How were San José's communities involved in the development of this Framework?

The City recognizes that building electrification could bring both potential benefits and risks to San José communities. Therefore, the City embarked on a "community co-creation" process to ensure that the needs and priorities of San José's communities–particularly those that have been historically marginalized–are included in this Framework.

Community co-creation is a process of deep, iterative collaboration between government staff and community leaders rooted in and accountable to historically marginalized communities. The purpose of community co-creation is to design City policies and programs that simultaneously achieve our climate targets and advance equity. People who have experienced inequities bring critical expertise essential to crafting holistic, effective solutions that achieve our dual climate and equity goals.

For this Framework, the City partnered with two community-based organizations (CBOs) that directly serve, engage with, and represent large, historically marginalized communities in San José:

ICAN, the International Children's Assistance Network, an organization that works closely with Vietnamese families in San José to help foster the next generation to become responsible and caring leaders

Veggielution, an organization based in East San José dedicated to connecting people from several Latino/a/x communities to each other and the land through farming and food

ICAN, Veggielution, technical partners, Upright Consulting Services, the Building Electrification Institute (BEI), and staff from several City departments constituted the co-creation team. The team worked together for over six months to highlight key inequities and opportunities and identify intersections between community priorities and building electrification.

The team identified four focus areas to orient building electrification solutions:

Housing and Energy Costs: Affordability and the housing crisis is one of the biggest challenges facing the city. There is a critical need to ensure building electrification efforts do not contribute further to displacement or increased costs for low- and moderate-income families.

Air Quality and Health: Removing gas appliances from the home improves indoor air quality. Historically marginalized communities are disproportionately impacted by poor air quality and higher rates of asthma. Electrification efforts will help ensure that all communities receive air quality and health benefits.

High Quality Job Opportunities: As building electrification generates jobs and transforms the building-related workforce, the City will seek to ensure high quality job opportunities and that historically marginalized communities have access to those economic opportunities.

Clean and Reliable Energy: Given the increased frequency of disasters caused by climate change, it is important that communities have access to clean backup power and that building electrification strategically contributes to a resilient energy system.

These four focus areas anchor ongoing conversations with the broader San José community and the actions the City has committed to pursuing in this Framework.

It is important to understand the complex inequities that many historically marginalized communities face in San José and the history of policies rooted in systemic racism that created them. These realities have informed the foundation of this Framework, in service of its goal to address climate change more effectively by addressing racial and social equity. **Some of the critical inequities highlighted by community groups during the development of this Framework include:**

- Many families in San José are struggling to make ends meet, as housing prices skyrocket while wages have stagnated over the last decade. These families cannot afford **any** increased costs, upfront or ongoing, that could result from building electrification.
- Historically marginalized communities are already facing a wide range of stressors, including but not limited to: the fight for racial justice; housing and job insecurity; the health and economic impacts of the COVID-19 pandemic; and lack of healthy food options and green spaces. It is critical that building electrification solutions are designed to alleviate these stressors and provide benefits to these communities.
- Information and existing resources about building electrification are not fully reaching San José's historically marginalized communities, often because they are not translated into commonly spoken languages, do not feature culturally appropriate messaging, or are not designed to serve the needs of low-income families. Targeted and deep engagement is needed to bring awareness and access to historically marginalized communities.
- Through the transition to building electrification, the City should consider the lack of capacity that certain communities have to engage with the City and develop more accessible ways to work with the community throughout decision-making processes.

Key Recommendations

Foundational Action #1:

ENGAGE THE COMMUNITY IN THE EVALUATION OF POLICY OPTIONS SUPPORTING BUILDING ELECTRIFICATION

The City may consider policy options to accelerate the electrification of San José's buildings to meet the carbon neutral by 2030 goal. Any policy considerations would allow for public input and involve a broad public engagement process. To meet San José's ambitious climate goals, new policies may be necessary to ensure that building owners transition away from fossil fuels. The City will co-develop any policy options with the community to ensure that any policies brought forward are designed to address the risks and opportunities for historically marginalized communities, consider the needs of all building owners, and support community-identified outcomes within this Framework.

There are a number of examples of building electrification policies for San José to evaluate, including:

Table 1: Examples of Building Electrification Policies

Type of Policy Requirement	Description
Building Performance Standards (BPS)	A BPS can establish targets for buildings to electrify, reduce GHG emissions, or to improve other metrics, by specific dates. To do this, buildings could be required to benchmark their performance over time. Successful BPS policies include complementary support programs and assistance for covered buildings, local workforce, and historically marginalized populations.[6]
Minimum Efficiency Standards for Rentals (MESR)	An MESR policy for existing residential rental properties could require property owners to meet a minimum efficiency standard for their building or unit - thereby incentivizing building electrification - before they can receive and/or renew their rental licenses.[7]
Requirements at the Time of Major Renovation	This policy could provide prescriptive requirements for allowable electric building systems at the time of major renovation of a building.
Requirements at the Time of System Replacement	This policy would regulate which systems are allowable to install at the time of system replacement—such as requiring the installation of appliances powered by electricity instead of gas - and would be enforced through permitting.

Consideration of any of these or other policy options would require additional feasibility, technical, and impact analysis (including legal analysis of the City's authority) and community input.

Community-Driven Actions

The following actions were identified with community input and are meant to guide the City to ensure positive outcomes for historically marginalized communities. **Solutions must be built for communities who face the most barriers to participation in the policymaking process, but who stand to benefit most from equitable building electrification. These solutions will ultimately benefit all residents in San José by making sure that no communities are left behind.**

Foundational Action #2:

INVEST IN SUPPORTIVE PROGRAMS AND RESOURCES TO ENABLE AN EQUITABLE BUILDING ELECTRIFICATION TRANSITION

Streamline electrification retrofits and increase access to existing funding sources by launching a "Retrofit Accelerator" program. A Retrofit Accelerator program can coordinate technical assistance, resources, grants, outreach, and incentives for all San José buildings to streamline their path to electrification. The City will need to design a program that increases access to existing incentives for historically marginalized communities through improved outreach, coordination, and alignment with other programs. The program should also identify new funding streams for these communities, and assist building decision-makers in stacking funding sources to facilitate more holistic retrofits that also address health, safety and resilience.

Lower the cost of building electrification over time. While the City does not have direct control over installation costs, it can support regional market transformation toward electrification cost reductions. This could include improving contractor training and continuing to streamline permit processes to ensure quality installations, as well as investigating beneficial electricity rates for electrified buildings. A significant opportunity to bring down electrification costs at scale is to collaborate with Pacific Gas and Electric (PG&E), SJCE, and other utility partners to strategically target entire streets, blocks, or neighborhoods for electrification, potentially bundling costs and reallocating planned investment in the gas system toward electrification.

Identify new funding sources for building electrification and direct them to historically marginalized communities. While costs of electric appliances may decrease over time, it will still be critical to identify or generate dedicated funding sources and accessible financing solutions that target specific resource-constrained sectors, such as deed-restricted affordable housing, rent-stabilized buildings, small businesses, and low-income or fixed income homeowners, closely coordinating these resources with efforts to ensure affordability for tenants.

The total cost of electrifying all residential buildings in San José is an estimated $2.7 to $4.7 billion (see Figure 1). **This investment would eliminate more than one million metric tons of GHG emissions**, representing 19 percent of San José's community-wide emissions.‡ [8,9] This cost can be shared between federal, state, regional, and local funding sources including incentives, as well as building owners and homeowners themselves, but the City will need to identify funding to support the transition **for building owners of all types**, especially for San José's low-income residents.

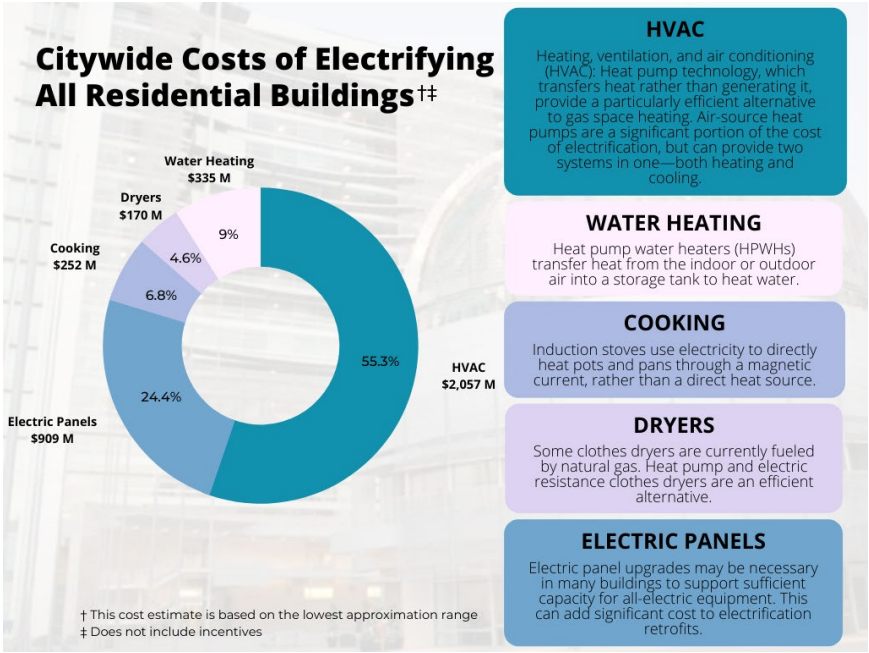

Figure 1: Citywide Residential Building Electrification Costs.[10] See Chapter 5 for further methodology.

Ensure building electrification efforts promote affordability and protect tenants. San José faces an ongoing affordability crisis that is leading to the displacement of many of its long-term residents.[11] It will be critical for the City to consider how to design the Retrofit Accelerator (described above) to offer additional resources to affordable housing, cover upfront costs to low-income tenants, and ensure that all new funding sources prevent or limit the ability for building owners to pass building electrification costs on to low-income residents. Moreover, broader policy efforts may be necessary to strengthen tenant protections across the city so that electrification efforts are not used as cause for rent hikes or evictions. It will be critical for the City to coordinate internally on broader policy efforts to ensure alignment between its housing and sustainability work and to work closely with housing advocates, low-income communities, tenant groups, and others on solutions.

Create a high quality building electrification workforce. The City can provide support toward a goal that jobs created through the transition to building electrification are "high road," defined as jobs with living wages, comprehensive benefits, and opportunity for career advancement (see full definition in Chapter 3, Figure 21). This support could include the creation of labor standards tied to public funding,

regional partnerships to promote high quality job pathways, and further research around the impacts to workers in the gas industry. Additionally, minority- and women-owned contracting firms need greater access to existing and new building electrification programs. The City can offer training to contractors designed for English-language learners and work with existing partners to help connect workers from historically marginalized communities to new, high quality jobs. Given the complicated nature of these multi sectoral solutions, the City can convene a working group with labor partners, workforce advocates, and contractors to further investigate these potential solutions.

Contribute to a resilient grid and a managed transition away from gas infrastructure. The electric grid and natural gas infrastructure extend far beyond the city limits, and the regulations that govern energy system operation are determined at the state level. It is imperative that the City coordinate and partner with PG&E, SJCE, and State agencies to ensure that local electrification promotes grid reliability and flexibility and that there is a managed transition away from the gas network. An opportunity for improving system-wide reliability includes increasing access to grid-interactive appliances to install alongside heat pumps, scaling up demand-response programs to help manage energy demand, and providing clean backup power solutions to communities to use during blackouts. The City can also support the implementation of "Community Resilience Hubs", with a priority in historically marginalized communities, to offer safe spaces during power outages and other disasters.[12]

Foundational Action #3:

CREATE MORE EQUITABLE AND ACCESSIBLE ENGAGEMENT ACROSS THE CITY

Invest in community-led engagement and relationship building. Historically marginalized communities have been excluded from policy decision-making and face many barriers to meaningful engagement. Changing this relationship requires a paradigm shift from traditional outreach methods to consistent, thoughtful, and even compensated engagement initiated by the City. The City can determine how to support CBOs that work closely with historically marginalized communities to serve as liaisons and policy partners. CBOs can be engaged at varying levels and at multiple points in policy and program implementation. Throughout this process, the City will establish transparency within its decision-making.

Coordinate community engagement across City departments. As the City expands its community engagement efforts, it will work to ensure that engagement is not siloed between individual departments. CBOs already receive disjointed project-by-project requests from the City for community feedback, and are looking for opportunities to streamline feedback and ensure it is shared across departments. City staff can work across departments and teams to leverage the learnings and relationships of their colleagues, reduce the burden on community collaborators, and address the inherently complex issues of climate change and equity.

Measure success using community-identified outcomes and metrics. The City will use the community priority outcomes identified in this Framework to guide its metrics of success. This includes prioritizing health and safety outcomes, affordability and housing stability, economic opportunities for historically marginalized communities, and improved energy reliability. Simply achieving electrification in all buildings will not be considered a success if these issues are not improved along the way.

Foundational Action #4:

BUILD A COALITION FOR EQUITABLE BUILDING ELECTRIFICATION

Pursue resources needed to launch an Equitable Building Electrification Task Force that would develop guiding recommendations for the suite of policies and programs necessary to achieve full building electrification. Community wide climate goals will be achievable only if stakeholders and members of the community support the City's actions and can hold the City accountable to achieving equitable outcomes. The Task Force would provide guidance on the set of policies and programs to support the electrification of San José's building stock; public and private investments that are needed for the transition; and advocacy that is required at the state and utility levels. Additionally, the Task Force could help hold the City accountable to the priority outcomes identified by the community as new policies and programs are rolled out. The Task Force should include representatives of historically marginalized communities to ensure that solutions work for all San José residents and workers. The Task Force would be an important first step to ensure accountability and equity in the electrification of San José's building stock.

These key recommendations were identified through a collaborative process rooted in community-identified vision statements and priority outcomes. Together, the actions create a Framework for the City to design and prioritize building electrification solutions that address both climate and equity goals.

Achieving the 2030 Carbon Neutrality Goal

The City passed a resolution to achieve carbon neutrality by 2030 during the development of this Framework. The recommendations above have not been fully analyzed for feasibility to meet this timeline and are not specifically designed to achieve carbon neutrality on a 2030 timeline. Additional planning and stakeholder engagement will be required after the Framework is released to identify the right mix of policies and strategies to meet this accelerated timeframe.

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CHAPTER 1:
INTRODUCTION

The City acknowledges the scientific consensus that human activity is significantly contributing to climate change and that immediate and accelerated action is required to mitigate its worst impacts.[§] San José communities are susceptible to the impacts of climate change, many of which are already felt today, particularly by historically marginalized communities, including vulnerable populations, low-income communities, and communities of color. The City is committed to addressing the urgency of climate change and bringing benefits to residents and businesses by designing and implementing programs and policies with the community to dramatically reduce GHG emissions. Climate Smart San José ("Climate Smart"), approved in 2018, lays out a pathway for combating climate change across many sectors in San José.[13] Towards its Climate Smart goals, the City adopted a requirement for all-electric new construction and established San José Clean Energy (SJCE), which allows the City to move more quickly toward a goal of 100 percent carbon-free power for our community.

In November 2021, the City passed a bold resolution committing to carbon neutrality or "net zero emissions" by 2030, becoming the largest city in the United States to do so. Carbon neutrality means that, within a given year, GHG emissions within the city's jurisdiction are directly eliminated or offset."[§],[14] This resolution, which matches the urgency of the latest climate science and the need to advance action, was passed during the development of this Electrify San José framework ("Framework"). The Framework presents valuable community guidance provided over the course of 2020-2022 and will guide further development of the full suite of programs and policies that may be required to achieve carbon neutrality on a 2030 timeline.

The Framework focuses on one important segment of Climate Smart: reducing GHG emissions from **existing buildings in San José**. To reach the ambitious carbon neutrality and Climate Smart goals, we will need to eliminate the use of fossil fuels in buildings and replace them with clean and efficient electric technologies--a process called building electrification.

The City should seek to identify resources to engage with stakeholders and communities in the development of new programs and policies to electrify buildings; design sustainable revenue streams; and enact protections for San José residents and renters to ensure an equitable transition to building electrification.

§ The International Panel on Climate Change, a United Nations body for assessing the science related to climate change, published the first working group report of the Sixth Assessment Report on Climate Change, focused on the physical science behind climate change. The report states it is "unequivocal" that human activity has influenced the warming of the atmosphere, ocean, and land. It also states that reducing GHG emissions would limit climate change, and that urgent and broad reductions are needed to avoid global temperatures rising to irreversible levels. See the working group report here: https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/.

§ C40 defines carbon offsets as projects developed, funded, or financed that avoid or sequester GHG emissions outside of the city. It defines sequestration as the removal of GHG emissions from the atmosphere and long-term storage in carbon sinks (such as oceans, forests or soils) through physical or biological

Purpose of this Framework

Why did the City create this Framework? What does the City hope to accomplish?

- Identify short- and long-term actions to achieve equitable building electrification
- Identify the concerns and goals of communities concerning building electrification in San José with a focus on residential buildings and on hearing from historically excluded voices
- Demonstrate the City's commitment to improved and expanded community engagement with historically marginalized groups during the development and implementation of new policies and programs

Intended Outcomes

What will the City do with this Framework?

- Establish a community-guided framework to implement the recommended actions and to establish transparency and accountability throughout implementation.
- Provide guidance to co-develop and implement building electrification policies and solutions with the San José community.

Requirements

In November 2021, the San José City Council (the City Council) passed a resolution aiming for a goal of carbon neutrality in San José by 2030. **The Framework itself is not a requirement** for residents to switch existing natural gas-powered appliances for electric alternatives. The City, with community input, will need to consider how to approach building electrification moving forward as it continues to develop plans for accelerating progress toward the carbon neutrality goal.

Climate Smart San José

Climate Smart was approved by the City Council in February 2018. The plan includes goals and milestones that align with the 2016 Paris Agreement, designed to prevent a rise in global temperatures of more than 2°C, to mitigate the negative impacts of climate change. Climate Smart is focused on achieving GHG reductions in energy, water and mobility, and identifies nine key strategies to achieve San José's GHG reduction goals. This Framework builds on strategies 1.1, 2.2, and 3.2, specifically targeting buildings and energy.

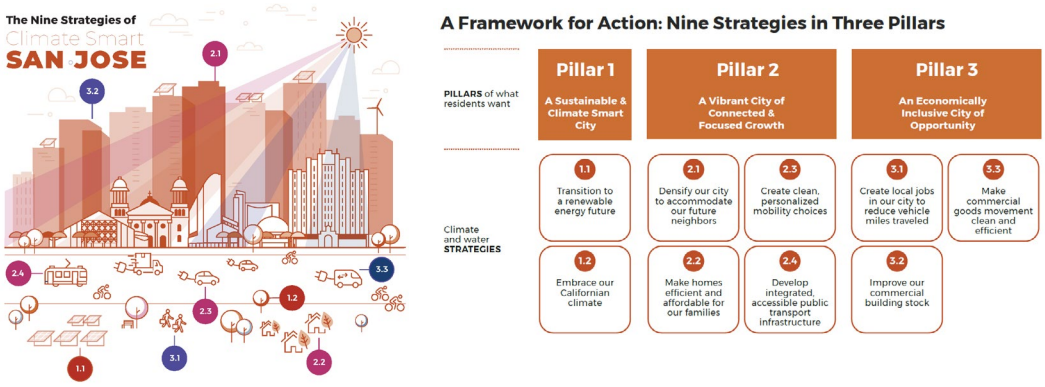


Figure 2: Pillars & Strategies from Climate Smart San José Plan.[15]

Accelerating the goals under Climate Smart, the City also recently passed a resolution establishing a carbon neutrality by 2030 goal, making it the largest city in the U.S. to do so.[16]

With this bold commitment to building electrification, San José joins other leading U.S. cities, including Berkeley, Denver, New York City and Boston, that have already begun work to eliminate GHG emissions from existing buildings. Electrifying buildings in San José will not be a simple transition– but it is a critical opportunity to achieve the City's goals and bring San José residents key benefits, including:

- healthier indoor air quality
- safer homes and businesses
- high quality green jobs
- lower energy costs
- reliable energy supply

Based on extensive community engagement and advising over almost two years, this Framework offers guidance to ensure the benefits of building electrification are distributed equitably across San José.

Why Focus on Buildings?

The “natural” gas we burn within our buildings is a fossil fuel composed mainly of methane, which contributes to climate change and negatively affects human health and safety. In 2019, buildings were the second largest source of San José’s GHG emissions, surpassed only by transportation emissions.[17] Most buildings in San José use a combination of gas and electricity to power all energy needs, from lighting and electronics to heating and cooling. Gas is mainly used to power major appliances including furnaces, water heaters, clothes dryers, ovens and stoves.

Gas Usage in San José Buildings

Gas is currently responsible for approximately 19 percent of San José’s community-wide GHG emissions. In addition, gas usage has been steadily increasing since 2014. The vast majority of gas emissions come from San José’s residential buildings (see Figure 3), particularly heating and hot water. These emissions must be addressed in order to reach San José’s ambitious climate goals.

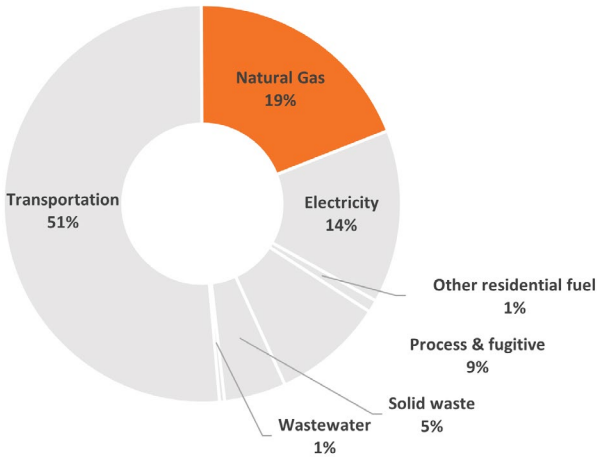


Figure 3: 2019 GHG Emissions in San José by Sector and Fuel.[18]

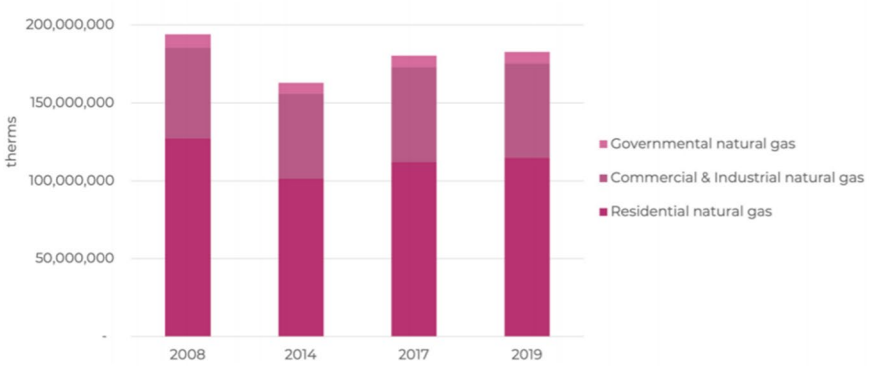


Figure 4: Gas Usage in San José by Building Type.[19]

Gas was once considered a cleaner alternative to dirtier energy sources like coal, but even with advances in the efficiency of gas appliances, gas remains a large and increasing source of GHG emissions in San José (see Figure 4). Although gas appliances and distribution networks can be made more efficient, since gas is a fossil fuel gas it will never be a zero-emissions source of energy. Electricity, on the other hand, is rapidly becoming cleaner through electricity providers like SJCE, and is increasingly generated by solar, wind, and other renewable energy.[20] To achieve carbon neutrality, San José will need to support the transition of gas appliances in buildings to efficient, all-electric options that can take advantage of renewable electricity.

As electricity becomes rapidly cleaner through programs like SJCE, buildings can move away from burning "natural" gas, a fossil fuel, to using clean, all-electric alternatives to eliminate GHG emissions from buildings.[21]

What is SJCE?

SJCE is a local electricity supplier that purchases and generates clean electricity sources on behalf of San José residents. SJCE currently provides three renewable electricity options for customers.

Figure 5: Electricity products offered by SJCE.[22]

How does SJCE work?

Operating out of the City's Community Energy Department, SJCE is governed by the City Council, with input from a Community Advisory Commission. SJCE is one of 23 local community choice aggregation (CCA) programs across California. Pacific Gas & Electric Company (PG&E) remains as the utility that manages billing and physical electricity infrastructure, while SJCE offers clean electricity generation options (see Figure 6). SJCE is also able to provide a variety of energy efficiency, renewable energy and electrification programs to San José residents. For more information, visit www.sanjosecleanenergy.org.

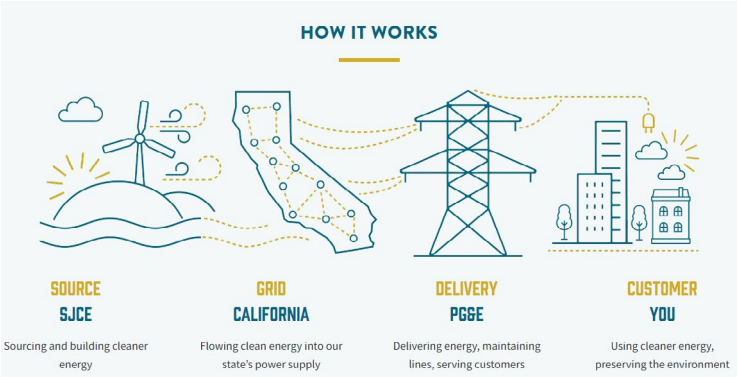


Figure 6: SJCE Energy Process.[23]

What is Building Electrification?

Building electrification refers to replacing fossil fuel systems and appliances (water and space heaters, dryers, stoves, and ovens) with electric alternatives, which are typically much more energy efficient. As the sources for electricity generation become increasingly renewable, using electricity for all building systems is a critical opportunity to phase out fossil fuel use and associated GHG emissions.

Currently, the vast majority of residential buildings use natural gas for space and water heating, and a large portion also use it for cooking.[24] Gas heating systems, such as gas furnaces and boilers, can be converted to high efficiency electric air source heat pumps, which can provide both heating and cooling. Gas water heaters can be replaced with heat pump water heaters. For cooking, gas ranges can be replaced by either induction stoves, which use an electromagnetic field below the surface of the glass cooktop to heat metal pots and pans, or with standard electric ranges. Additionally, gas dryers are also fairly common in San José buildings and can be replaced with heat pump dryers or electric resistance dryers. Commercial buildings can also take advantage of heat pump technology, although there are also more varied technology applications and installation strategies.[25],[26]

What is a Heat Pump?

Heat pump technologies provide a particularly efficient alternative to gas space and water heating. Heat pumps use electricity to pump heat from outdoor air, water, or the ground into an indoor space.¶,[27] The process can also run in reverse to provide cooling by extracting heat from indoors and moving it outdoors. Since heat pumps transfer heat rather than create it, they can achieve efficiencies of 200-300 percent or greater.

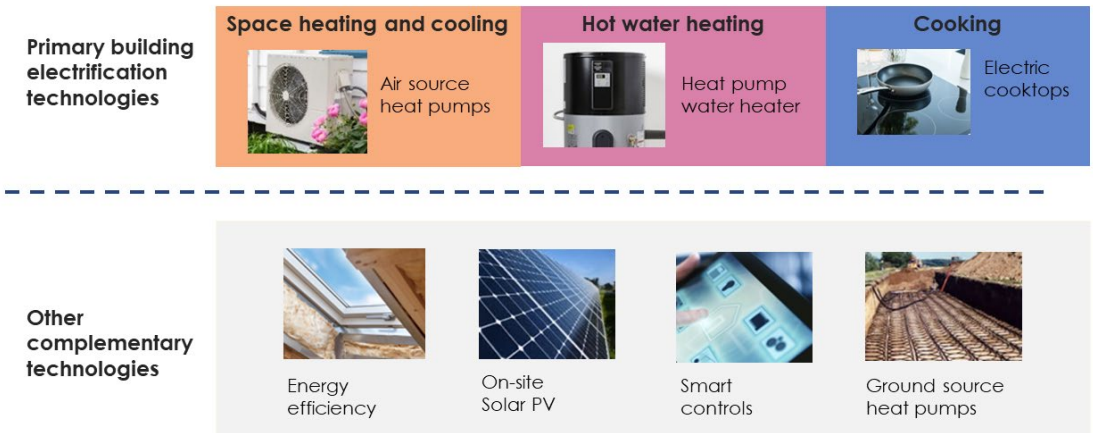


Figure 7: Building Electrification Technologies.[28]

¶ Heat pumps are not a new technology. Refrigerators use a similar process to transfer heat. About 12 percent of U.S. homes currently use heat pumps for their space heating, and in total over 12 million heat pumps are already installed in U.S. homes. Additionally, heat pumps account for over 80 percent of the heating, ventilation, and air conditioning (HVAC) market share in Asia.

Residential Building Electrification Technologies

Air source heat pumps transfer heat from the outside air into a building to provide heating and the reverse to remove heat from inside a building to provide cooling.

Heat pump water heaters (HPWH) transfer heat from the indoor or outdoor air into a storage tank to heat water. HPWHs require significantly less energy than gas water heaters to provide the same amount of hot water. They can be more than 100 percent efficient because they transfer heat instead of generating it.

Induction stoves are cooktops that use electricity to directly heat pots and pans through a magnetic current, rather than a heat source. Benefits of induction stovetops include precise and rapid temperature control, elimination of indoor air pollutants by avoiding fossil fuel combustion, and reduction of fire and burn risk.

Energy efficiency strategies include weatherization, heating distribution improvements, LEDs, and low-flow fixtures. These measures help to reduce energy use from building equipment and appliances.

On-site solar photovoltaics (PV) are installations on or near a building that can provide solar energy to a building. They can offset electricity costs for electricity uses in the building, depending on local net energy metering rules.

Smart controls are devices that automate operations to maximize energy use and cost savings. They offer easier management of backup heating systems and can help owners take advantage of time-of-use electricity rates. Grid-enabled smart controls can also be integrated with the electric grid to allow for active grid management that can help prevent electricity shortages or blackouts.

Ground source (geothermal) heat pumps transfer heat from the ground instead of the air. They can provide whole building heating, cooling and hot water at the highest efficiencies, although they may require much higher installation costs.[29]

San José's Building Stock

What kind of buildings are in San José? How many?

There are approximately 232,500 buildings in the City of San José.

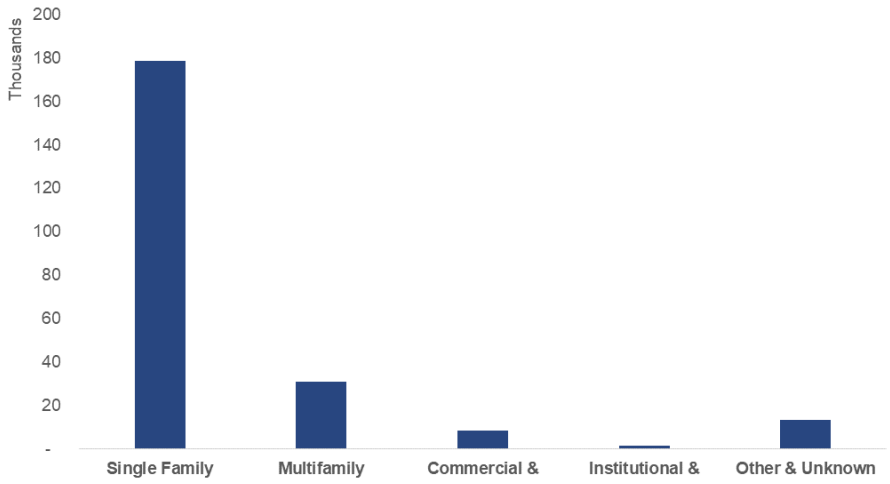


Figure 8: Total number of buildings in San José by building type.**

Most Common Building Types

Single Family Homes

Low-Rise Multifamily Building

Low-Rise Commercial Office

Figure 9: Common Building Types. Low-Rise is defined as one to three stories.††,[30]

** Extracted from the Building Electrification Institute's Building and Housing Stock Analysis completed for the City of San José's Climate Smart staff based on several datasets pulled in 2019. Further information provided in Appendix F.

†† "Other and Unknown" includes vacant buildings, mobile homes, and buildings uncategorized in publicly available data.

San José's Residential Buildings

There are more than 230,000 buildings in San José (see Figure 8). Almost 90 percent of San José buildings are residential, and the vast majority of these are single-family homes. Forty-five percent of San José residents are renters.[31]

> ***Why This Matters:*** *Electrifying San José's buildings will require significant outreach, assistance, and funding for residential building owners and homeowners. Additionally, different building types may need different types of electrification technologies and design solutions. Understanding the most common building types and the strategies to electrify them will better help the City plan for solutions and help building owners identify potential retrofits and incentives.*

How old are homes in San José?

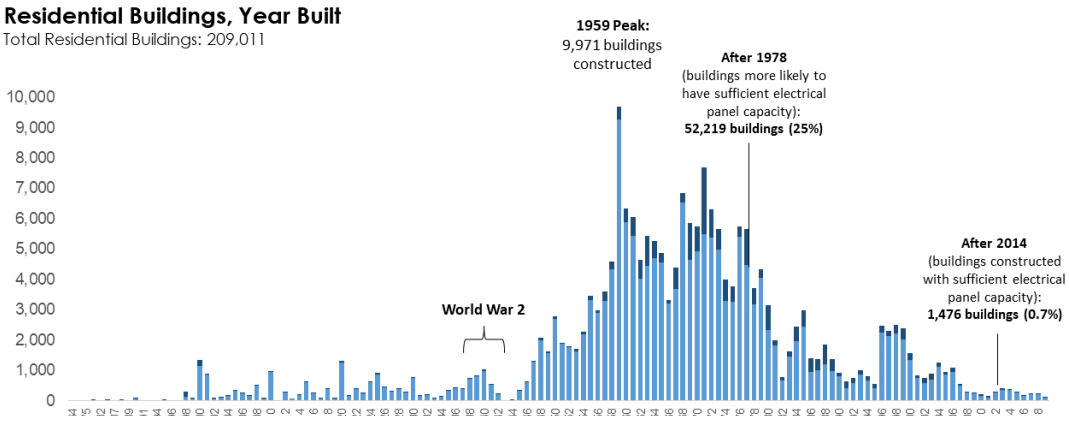


Figure 10: Number of Residential Buildings in San José by Year Built.[#]

Almost 65 percent of single-family homes were built between 1950-1977 and 62 percent of 2+ unit residential buildings were built between 1950-1977.

> ***Why This Matters:*** *An older building stock means that buildings are less likely to be built to energy efficient standards. This can mean that the building is leaky (lets heat out easily), has older appliances, and may need basic repairs or electrical panel upgrades to accommodate all-electric appliances. This can also help identify buildings that are likely to need other health-related upgrades, like mold remediation, proper ventilation, removal of unsafe gas wall heaters, and asbestos removal, which can be addressed when upgrading or electrifying a building.*

[#] Extracted from the Building Electrification Institute's Building and Housing Stock Analysis complete for the City of San José's Climate Smart staff based on several datasets pulled in 2019. Further information provided in Appendix F.

While this Framework considers all of San José's existing building stock**,** including commercial, industrial and residential sectors, it provides specific additional focus on the electrification of existing residential buildings, which include single-family homes, duplexes, and apartment complexes or multifamily buildings. Residential buildings are the largest portion of San José's building stock but they are also important to focus on given the community's concern regarding housing affordability and health concerns associated with the use of gas appliances.

San José enacted its expanded Natural Gas Infrastructure Prohibition Ordinance in 2020, which requires all new buildings to be completely electric beginning in 2021.[32] This Framework is the starting point in identifying actions to support the electrification of San José's existing building stock.

Why Take an Equitable Approach to Existing Building Electrification?

As a result of a long history of racist public policies and systemic discrimination, historically marginalized communities experience disparities in health, wealth, income, mobility and opportunity. Buildings are fundamental to housing; stability; community and social cohesion; health; emergency resilience; and education. Additionally, burning natural gas in homes, schools, and businesses has been linked to a wide range of health concerns that particularly affect children and are disproportionately felt by historically marginalized communities.[33,34] As such, building programs and policies are inherently interwoven with social justice issues and community priorities such as rising costs, gentrification, displacement, and health and safety concerns. In order to address these risks, we must acknowledge that:

- **Historically Marginalized Communities Bear the Biggest Impact of Climate Change:** Historically marginalized communities are those least responsible for climate change in terms of fossil fuel consumption, yet they are hit first and worst by the impacts of climate change and often have the fewest resources and support to recover from extreme weather events, emergencies, loss of energy or road closures, flooding and other impacts.[35] In addition, burning natural gas in homes, schools, and businesses has been linked to a wide range of health concerns that particularly affect children and are disproportionately felt by historically marginalized communities.[36,37]

- **Marginalized Communities Have Historically Been Underrepresented in Policy-Making:** Even as the most impacted stakeholders, historically marginalized communities are seldom consulted to shape climate mitigation and adaptation plans. Without specifically designing plans and policies to benefit communities who need them most, cities will continue to leave people behind and create even greater divisions between those who can adapt to and survive the extreme impacts of climate change. Developing and implementing equitable building

electrification policies requires the unique perspective and expertise of people who have lived experience of existing inequities and are engaged in efforts to address them. Engaging with these communities seeks to bring this expertise to the forefront so that policymakers and impacted communities together can craft holistic, effective solutions that achieve our dual climate and equity goals. *See Chapter 3 for a broader history of how policies and governance were designed to systematically exclude certain communities from accessing resources and generating wealth.*

- **Community Leaders Play a Vital Role in Co-Developing Solutions:** The City will also consider how to lead with equity in these policies, not only to account for current inequalities caused by past policies, but also because the City will not achieve its climate targets by leaving communities behind and without active support from communities of color and low-income communities. Community leaders who have worked alongside City staff and other stakeholders also play a critical role in building support for climate solutions within their constituencies. The Framework, created in partnership with historically marginalized communities in San José, aims to ensure that these communities are not left behind in this transition and that their concerns and priorities are designed into holistic and collaborative solutions.

- **Targeted Solutions for Historically Marginalized Communities Will Benefit All:** Solutions built for communities that face the greatest barriers to engagement, but stand to benefit the most, will ultimately benefit ***all*** residents in San José. Building supportive programs and tailored solutions designed to assist historically marginalized communities first will create resources and systems that can benefit all and solve challenges for others. By designing targeted solutions around shared goals, or "Community Vision Statements" in this Framework, the City can bring the entire community closer to carbon neutrality.[38]

Where is the Community Voice in this Framework?

- Short-term Actions: While developing this Framework, community members brought up specific requests of the City, often about how to properly engage with their communities and how to remove barriers from existing programs and incentives to immediately increase participation.

- Community Vision Statements and Priority Outcomes: The actions in this Framework are organized under the four focus areas identified by the community. Within each focus area is a community vision statement and several desired outcomes, outlining what the City hopes to accomplish through the implementation of this Framework.

- Community Perspectives: Call-out boxes for community perspectives bring direct community voices into this Framework based on conversations and direct feedback received throughout its development process.

Momentum for Building Electrification

Building electrification is a strategy being pursued across the State of California and across the country. This Framework builds on many state and local efforts already underway, several of which are described below. A multitude of policies and programs at the state, regional, and local levels are working in tandem to decarbonize our homes and workplaces and ensure that low-income communities can access energy efficiency and electrification upgrades and clean energy technologies, such as rooftop solar and heat pumps.

Statewide Policies and Research

- **Assembly Bill 3232:** Requires the State to assess the potential for California to reduce building-related emissions by at least 40 percent below 1990 levels by 2030.[39]
- **Building Electrification Technology Roadmap (BETR):** California study focused on accelerating the adoption of highly efficient, electric technologies that displace fossil fuel technologies.[40]
- **Building Energy Efficiency Standards (also known as "Title 24"):** The building code for all new construction in California is updated every three years, integrating requirements around energy efficiency standards, solar and electrification.[41]
- **E3's Residential Building Electrification in California study:** Cost study that analyzes scenarios for retrofitting common California building types to all-electric.[42]
- **Senate Bill 100:** Establishes a goal for 100 percent of California's electricity to be supplied by zero-carbon resources by 2045.[43]
- **Senate Bill 1477:** Requires the California Public Utilities Commission (CPUC) to allocate $50 million yearly from cap-and-trade revenue to support two building electrification programs: the Building Initiative for Low-Emissions Development (BUILD), and the Technology and Equipment for Clean Heating (TECH) program.[44,§§45,¶¶]

Regional Programs:

- **Bay Area Regional Energy Network (BayREN) Programs:** BayREN implements the Home+, Bay Area Multifamily Building Enhancements (BAMBE), and BayREN Business programs, offering rebates and incentives to building owners, businesses and residents.[46,47,48]
- **Financing Programs:** Several programs, such as GoGreen Financing, offer options to finance energy upgrades using low-interest loans, allowing building owners, tenants and businesses to pay off large upfront costs over time.[49]
- **Solar on Multifamily Affordable Housing (SOMAH):** SOMAH provides incentives for solar PV systems on multifamily affordable housing.[50]

§§ The BUILD program will provide incentives that tap into the ingenuity of California's builders to find innovative and low-cost ways to "build clean from the start" and gain market experience to make these technologies common practice in new construction.

¶¶ The TECH program will spur market development for low-emissions space and water heating equipment through upstream incentives, customer education, and contractor training.

- **Switch is On Campaign:** This statewide campaign and outreach effort, led by the Building Decarbonization Coalition, shares the benefits of building electrification and increases awareness of existing rebate programs.[51]

State and regional policies and programs have the ability to shape the market to ensure that more contractors and builders–particularly those who reflect the cultural and linguistic backgrounds of San José's diverse communities–have the training and financial resources to create carbon-free buildings for residents. However, local complementary solutions and initiatives are critical to guide implementation of state policies in local communities. The City already has several initiatives underway to support building electrification.

City Policies:

- **Building Reach Code:** This code goes beyond State building codes by encouraging new buildings to be all-electric or more energy efficient. It also requires electric vehicle (EV) infrastructure and solar readiness in new buildings.[52]
- **Natural Gas Infrastructure Prohibition Ordinance:** This ordinance prohibits new buildings from adding any new natural gas infrastructure, requiring new buildings to be all-electric.[53]
- **Carbon Neutral by 2030 Resolution:** This resolution sets a citywide goal of achieving net-zero emissions by 2030.[54]
- **Energy and Water Building Performance Ordinance (BPO):** This ordinance requires large buildings to report energy usage and perform energy efficiency upgrades, which may include but does not require electrification upgrades.[55]

City Programs + Events:

- **Energy Trainings and Expos:** This program provides homeowners and contractors building electrification information and training on how to properly install all-electric appliances.[56]
- **Induction Cooktop Checkout Program:** This program allows San José residents to borrow an induction cooktop, at no cost, to become more familiar with this electric, safer alternative to gas stoves.[57]
- **Marketing Campaigns:** These campaigns raise awareness about the benefits of switching to electric appliances and provide information about incentive programs, including a *Cooking with Induction* campaign led by SJCE in 2021 and participation in the statewide *Switch is On* campaign in 2021 and 2022.
- **SJCE's Programs Roadmap:** SJCE currently offers and is designing additional program offerings for residents and businesses to support energy efficiency, electrification, and renewable energy. Their Programs Roadmap offers focus areas and guidance for future SJCE program design.[58]

While these state, regional and local building electrification efforts have been successful, many barriers remain to scaling electrification solutions, particularly for historically marginalized communities. Additional strategies explored in this Framework are needed to ensure that these solutions address community needs and focus resources on those who require the greatest support and stand to benefit the most from this transition.

2

CHAPTER 2: COMMUNITY CO-CREATION

The Framework was formed through a "co-creation process" with two community-based organizations (CBOs) that represent key historically marginalized communities in San José. To ensure that equity priorities formed its foundation, the Framework was validated through targeted stakeholder and broader engagement efforts. The City's Climate Smart team embarked on the community co-creation process to ensure that they worked with community members most likely to be impacted by new policies and programs, and who are often excluded from the policymaking process. Recognizing the benefits that could flow to communities from building electrification, as well as the potential risks from poorly designed policies, the team prioritized co-creation over more conventional models of engagement. Traditionally, local governments inform communities about already completed work, leaving little time or opportunity to integrate needed expertise of historically marginalized communities. Framework development also included consultation with technical stakeholders, while maintaining focus on communities that stand to benefit–and potentially be burdened–most.

What is Community Co-Creation and Why Invest in it?

Community co-creation is a process of deep, iterative collaboration between government staff and leaders rooted in and accountable to historically marginalized communities. The purpose of community co-creation is to design City policies and programs that simultaneously achieve climate targets and advance equity.

People who have lived experience of existing inequities have critical expertise that is essential to crafting holistic, effective solutions that achieve our dual climate and equity goals. Community co-creation seeks to bring this expertise to the forefront for better policy. The process requires:

- engaging with community-based organizations (CBOs) or community leaders early in the planning process;
- dedicating resources (including staff time and funding) to and maintaining flexible timelines to allow for relationship building;
- acknowledging harmful histories between government and historically marginalized communities;
- taking the time for building the capacity of local CBOs and leaders; and
- sharing decision-making with those partners.

The intended result is improved working relationships between policymakers and their communities to design effective and equitable policies.

Community co-creation is an integral part of the City's broader effort to address systemic inequities in institutions, public processes and the distribution of resources.*** These efforts are directly aligned with the commitment made in the City's 2019 Climate Emergency Resolution:

*** City efforts around equity include (but are not limited to: City Council Study Sessions on Equity, including Memo from City Manager on Equity Review of Operating Budget (https://www.sanjoseca.gov/home/showdocument?id=58618), creation of an Office of Racial Equity (https://www.sanjoseca.gov/your-government/departments-offices/office-of-the-city-manager/office-of-racial-equity). , and participation in the Government Alliance on Race & Equity (www.racialequityalliance.org).

> **"The City of San José commits to prioritize the equitable and active engagement of environmental justice communities who have traditionally borne the brunt of environmental degradation…in planning, policy, program development and delivery so that environmental policies benefit all communities in the City."[59]**

Community groups throughout the U.S. have long been advocating for greater transparency and access to the policymaking process, commonly referencing the motto, **"Nothing about us without us."**

The community co-creation process was an integral component in the development of all of the proposed actions in this Framework. The Framework is meant to be just the beginning of an ongoing connection between the City and marginalized communities to center equity in all of the City's climate actions, and for climate action to function as a pathway to addressing urgent inequities in San José.

Committing to the deeper partnerships and shared decision-making inherent in community co-creation is a relatively new practice for local governments. However, co-creation is a practice rooted in U.S. participatory democracy and is increasingly advanced by leading racial justice organizations.[†††] The work in San José was influenced by the Community Engagement Philosophy developed by SOMOS Mayfair, a local organization working in East San José.[60] In addition, this process was designed with close guidance from equity experts, including Upright Consulting Services and Emerald Cities Collaborative, who were involved in similar initiatives in Portland and San Francisco.[61,62]

Co-Creation Partners

The City partnered with two organizations, the International Children's Assistance Network (ICAN) and Veggielution, to develop the foundation of this Framework. These organizations work directly with community members in the Vietnamese and Latino/a/x communities, respectively, representing a wide group of people with varying histories, cultures, and needs. Both ICAN and Veggielution provide direct services for community members, but also have experience as trusted liaisons between community members and local government on a variety of projects. Their networks provided opportunities to directly gain feedback from community members on building electrification efforts. The co-creation team, including ICAN staff, Veggielution staff, cross-departmental City staff, and a group of technical partners, attended six months of bi-weekly workshops designed toward mutual learning. City staff and technical partners brought expertise around building electrification and potential benefits and concerns, and the CBOs brought their expertise and viewpoints around community needs and priorities.

[†††] Some critical resources that helped frame why a co-creation process is necessary to successful climate policies include: The Equitable Building Electrification: A Framework for Powering Resilient Communities by the Greenlining Institute (https://greenlining.org/publications/reports/2019/equitable-building-electrification-a-framework-for-powering-resilient-communities/) and The Spectrum of Community Engagement to Ownership by Facilitating Power (https://movementstrategy.org/resources/the-spectrum-of-community-engagement-to-ownership/).

Co-Creation Partners

ICAN, the International Children's Assistance Network, an organization that works closely with Vietnamese families in San José to help foster the next generation to become responsible and caring leaders. In addition to outreach to the Vietnamese community, they also provide humanitarian, educational, and social services to assist bi-cultural families. ICAN participated in this co-creation process to ensure the Vietnamese community are not left behind in this transition nor left out of the decision-making process.

Veggielution, an organization based in East San José, is dedicated to connecting people from several Latino/a/x communities to each other and the land through farming and food. They own and run an urban farm, and provide the community with several programs to advance food justice. Veggielution participated in this co-creation process to strengthen their successful outreach efforts with East San José residents and highlight their voices and needs in City decision-making.

Identifying Intersections

Co-creation discussions with ICAN and Veggielution began first with identifying the most prevalent concerns in their communities in advance of discussions about building electrification. This helped the team make relevant connections from these community leaders' concerns to energy and buildings.

The co-creation partners and their constituents brought up a wide range of challenges their communities face:

- Access to basic City services
- Green spaces
- Healthy food
- Quality jobs
- Community health and mental health
- Safety
- Racial justice
- Language barriers
- Neighborhood cleanliness
- High cost of living
- Housing crisis, affordability and displacement
- Impacts of the COVID-19 pandemic

Building electrification solutions must be designed to alleviate the above stressors and to benefit these communities.

The co-creation team then connected community concerns to potential opportunities or risks that could be improved or exacerbated by new building electrification policies or programs. These concerns and opportunities informed the four key focus areas for the Framework:

Housing and Energy Costs: Affordability and the housing crisis is one of the biggest challenges facing the city. There is a critical need to ensure building electrification efforts do not contribute further to displacement or increased costs for low- and moderate-income families.

Air Quality and Health: Removing gas appliances from homes improves indoor air quality. Historically marginalized communities are disproportionately impacted by poor air quality and higher rates of asthma. Electrification efforts will help ensure that all communities receive air quality and health benefits.

High Quality Job Opportunities: As building electrification generates jobs and transforms the building-related workforce, the City will seek to ensure high quality job opportunities and that historically marginalized communities have access to those economic opportunities.

Clean and Reliable Energy: Given the increased frequency of disasters caused by climate change, it is important that communities have access to clean backup power and that building electrification strategically contributes to a resilient energy system.

Broader Stakeholder Engagement

In addition to the co-creation process, the City conducted a broader community engagement process to validate identified priorities and potential solutions. The City hosted a number of forums to engage with housing and environmental advocates, organizations that serve historically marginalized communities, and labor stakeholders to ensure the Framework was accepted by many diverse groups (see Appendix D for a full list of stakeholders). These forums were facilitated by Winter Consulting, a local consulting firm that focuses on equity and stakeholder engagement.[63] In addition, City staff hosted several webinars, inviting neighborhood associations, City Council leadership groups, and more, to provide information and gather input from the City's broader community. As part of this iterative process, community voices and concerns were proactively documented and integrated into the Framework (see Appendix D for a summary of community feedback).

Figure 11: Concepts Developed During Community Engagement Process.

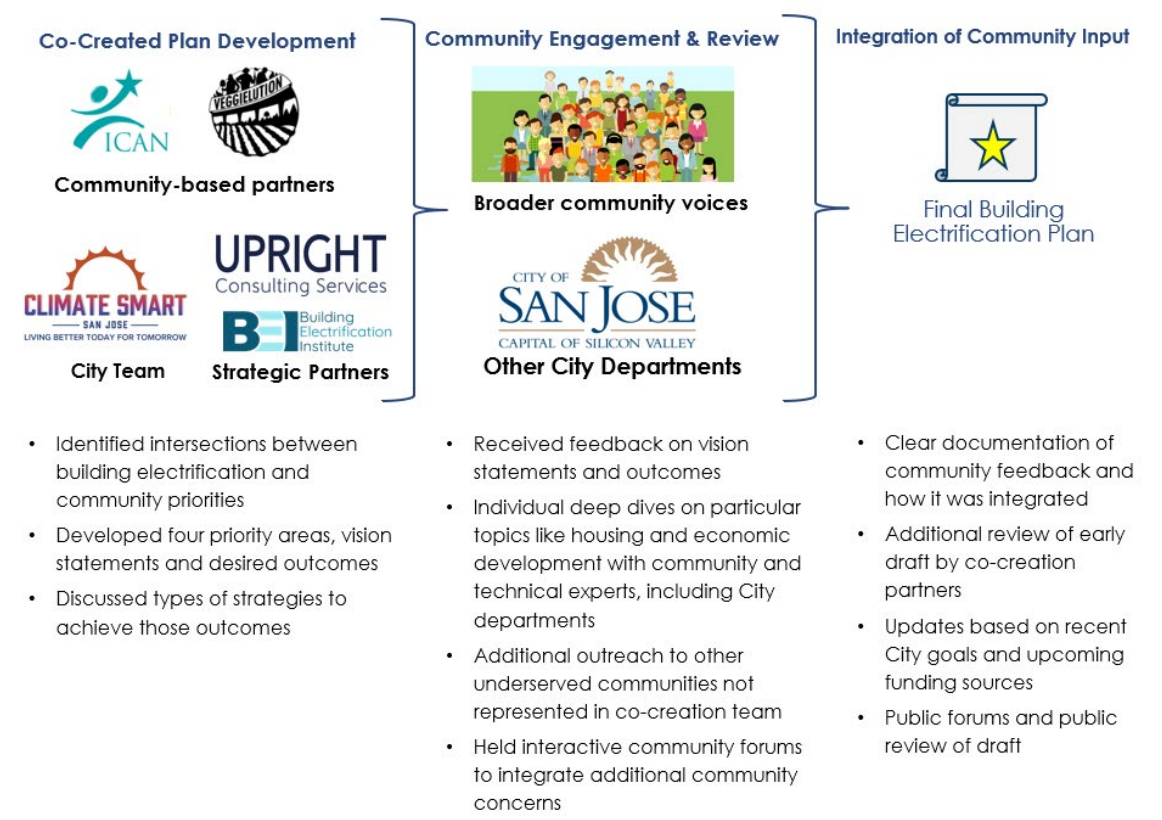


Figure 12: Phases of Community Engagement Process.

For more details about the co-creation process and lessons learned, see Appendix C.

CHAPTER 3:

SOCIAL AND RACIAL EQUITY IN SAN JOSE

Electrification policies and programs should be based on an analysis of building typology, energy systems, and the lived experiences and concerns of the people who live, work and play in those buildings. To do so, the work must be anchored in a sophisticated understanding of social and racial equity issues facing the residents of San José.

Racial Demographics

San José residents are largely people of color. Almost 70 percent of the population is Asian. Hispanic, or Latino/a/x. The groups are not homogenous and climate initiatives should account for different racial inequities within each subgroup.

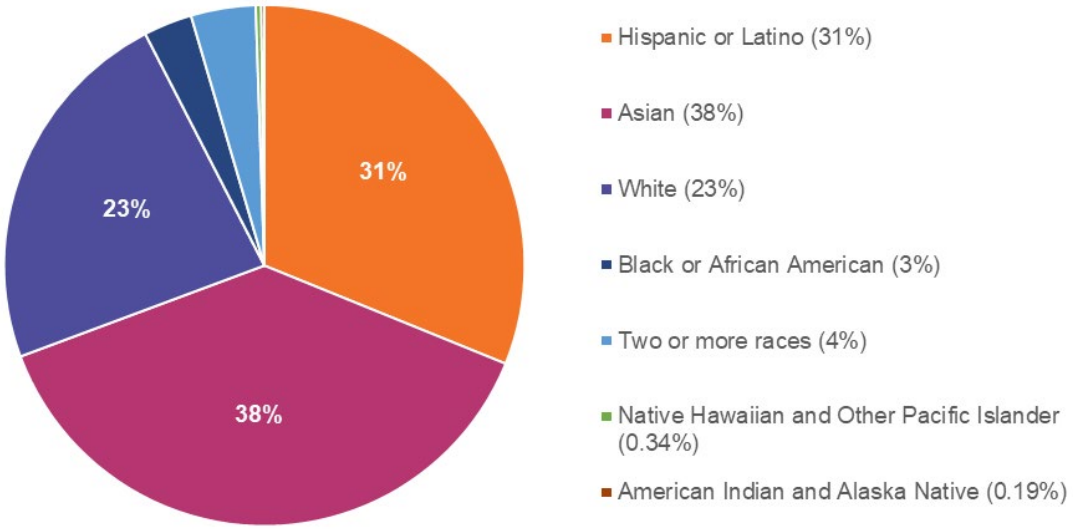


Figure 13: Racial Demographics of San José, 2020.[64]

San José's population is about 31 percent Hispanic or Latino/a/x and 38 percent Asian, with an estimated 10 percent of the total population speaking Vietnamese.[65,66] These groups represent a large and important part of San José, and were a critical reason for the City's partnership with ICAN and Veggielution for the Framework as co-creators. The task of designing bold and innovative policies to equitably address climate change will benefit from input from San José's resilient and empowered communities of color, who are already leading creative, bottom-up solutions.

Structural Inequality in Sustainability Programs

A long history of racist policies and racial discrimination within all forms of government continues to affect the well-being of many communities. One such policy was "redlining," in which federal lending agencies gave neighborhoods in major cities, including San José, a race-based classification system to encourage investment in predominantly white communities, and to **discourage, and in some cases prohibit, investment in communities of color.**

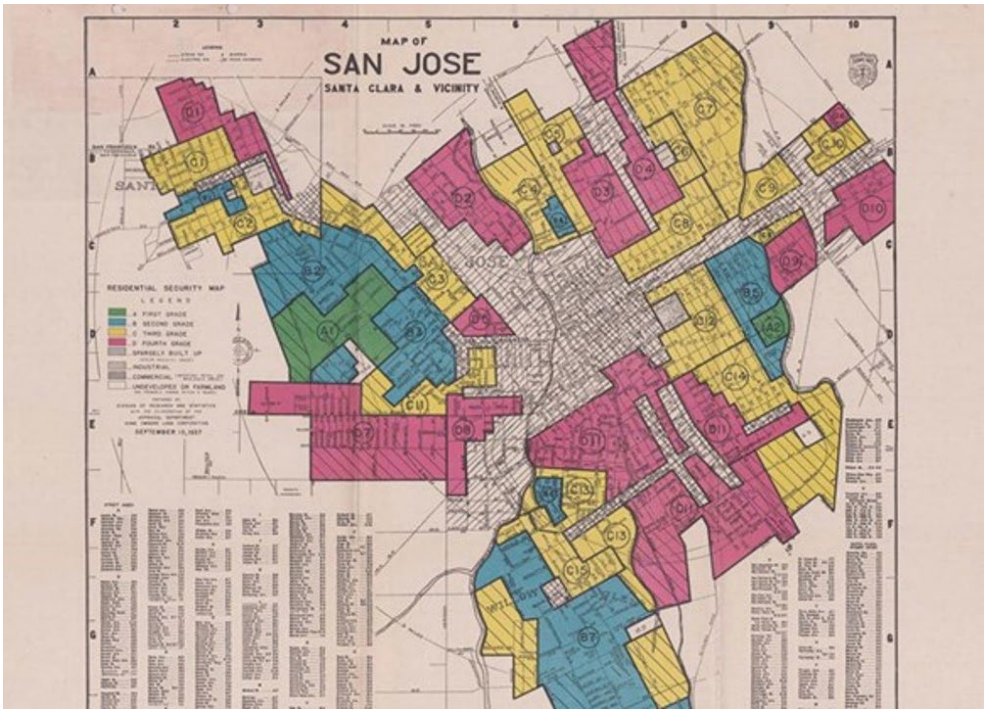


Figure 14: Redlining Map of San José (1935-1940). Robert K. Nelson, LaDale Winling, Richard Marciano, Nathan Connolly, et al., "Mapping Inequality."[67]

This system was used to segregate communities by prohibiting loans and therefore home ownership to people of color in areas with mostly white residents. Redlining forced residents of color into disinvested areas, often near industrial sites, power plants and other sources of pollution. For example in Figure 14, in the northeast D10 section that is coded red, the description records state that this is where the largest Latino/a/x community lived, and explicitly remarks, "From a racial standpoint, this area is extremely undesirable."[68] The additional notes on the "detrimental influences" of this redlined section include that it is subject to flooding. However, in the southern B7 section coded green, notes on "favorable influences" states, "Homogeneous development. Zoned single-family residential. No social or racial hazards. Sewers in process of installation." Despite the fact that this rating system was created in the 1930s, the classifications were used to inform investments by private lenders well into the 1980s. The resulting neighborhoods still highly correlate with social inequality today, including income, health outcomes, property values, and pollution burden.[69]

Advancing equity means working to repair the impacts of past harms. Understanding the history of redlining, additional discriminatory policies like the G.I. Bill, racist lending practices, and the current impacts of these activities is critical to designing building electrification strategies that address inequities.[70]

Often designed regionally, energy efficiency programs typically include many barriers to participation for historically marginalized communities. The co-creation team identified examples of these barriers, including:

- Strict timelines for program participation
- Language barriers in program outreach
- Lack of available contractors rooted in these communities
- Program design that prevents participation from renters
- Ineffective or inappropriate communication channels (such as outreach conducted solely online)
- Outreach materials or program content that is not culturally competent

In addition, clean energy technology and energy efficiency programs often include rebate-based incentives for which homeowners and building owners must front the cost and get refunded later. This is a significant barrier for many people. Incentives also may not cover the entire cost of home energy upgrades, limiting participation even further.

Internet Access

Internet access is not a guarantee for all households. Some communities may need additional targeted outreach on available programs, which are often complex. This is just one reason why traditional energy upgrade programs struggle to reach all communities and end up reaching the more wealthy and resourced areas. The City is actively addressing this issue through the Digital Inclusion Fund, working to provide internet access to low-income residents.[71]

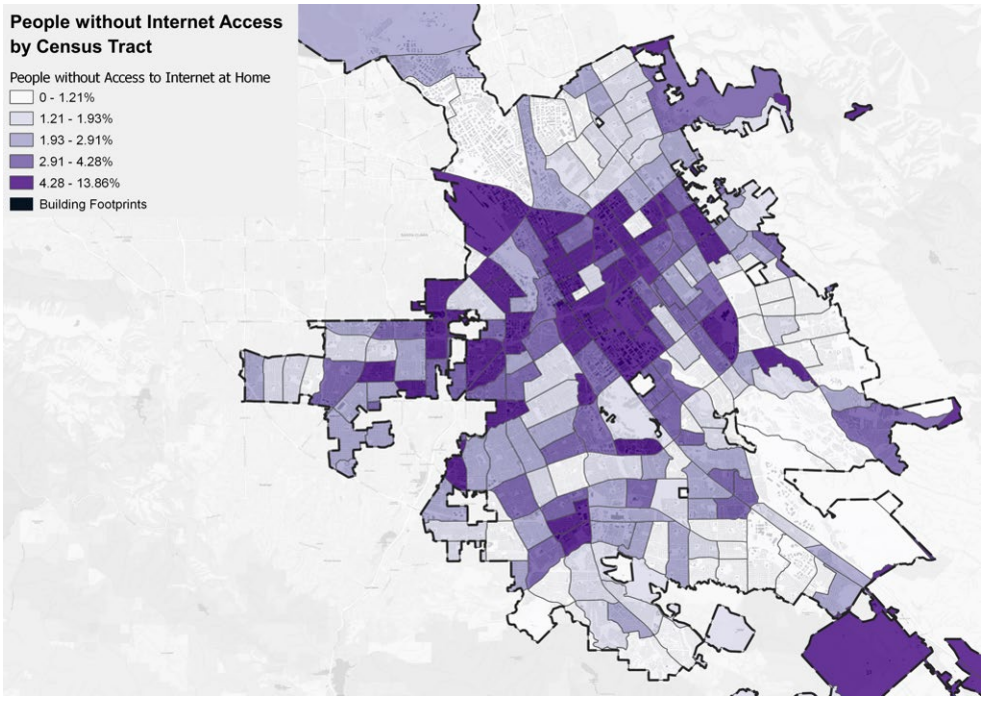


Figure 15: People without Internet Access Map.[72]

Community Perspectives: The co-creation consultants emphasized that many people within the Vietnamese community were left behind in the transition to the internet. In addition to making sure this doesn't happen in the transition to electrification, it may also be a community priority to ensure greater access to the internet and its benefits.

Intersections with Building Electrification and Community Concerns

The framing of actions and recommendations in this Framework are based on the following four key focus areas, determined by challenges and opportunities identified during the co-creation process. Before introducing these recommendations, it is important to understand the existing inequities that historically marginalized communities experience in each of these areas and the inherent risks that building electrification may pose, described below.

Energy and Housing Costs

High Quality Job Opportunities

Air Quality and Health

Clean and Reliable Energy

Housing and Energy Costs

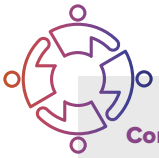
There is a clear intersection between building electrification and the cost of housing and energy because electrifying buildings will require significant upgrades to homes and businesses and may change the way residents and businesses use energy. The new costs of building upgrades create a risk that those costs will be passed on to tenants or that small business or low- and moderate-income homeowners must cover costs they cannot afford. Moreover, depending on the specific building scenario, some electrification upgrades may lead to energy bill increases (see Chapter 5 and Appendix E for more information).

In San José:

- **There are approximately 132,000 renter-occupied residential units in the city, housing the 45 percent of residents that are renters.** Renters are particularly vulnerable to housing and rental cost increases.[73]
- **30 percent of rental units (approximately 39,000 units) are rent stabilized**, meaning they are subject to the City's Apartment Rent Ordinance (ARO), which limits the percentage by which rents can increase annually (see callout).‡‡‡
- **13 percent of rental units (approximately 17,000 units) are regulated or subsidized affordable housing units**, which means that they have received local, state, and/or federal subsidies in exchange for providing housing for income-qualified families and individuals.[74]
- **The remaining 58 percent of rental units (roughly 76,000 units) are market rate**. Market rate units housing lower-income individuals and families may be at risk for continued affordability in San José because they have no regulations to protect tenants against significant rental cost increases.

The City has several affordable housing and tenant protection laws in place, including:

- Apartment Rent Ordinance (ARO), also known as "rent control," which limits the annual rent increase to 5 percent in apartment buildings built before 1979 with three or more units.
- Tenant Protection Ordinance, which limits the ability[75] of multifamily building owners to terminate tenancy.[76]



Community Perspectives: While San José has some housing protections in place, housing advocates believe they are insufficient to protect tenants from displacement or pass-through costs from building electrification. Current laws do not protect all renter households, and for those they do protect, caveats may exempt costs for certain capital improvements from their protection.

Housing Cost Burden

San José and the entire Bay Area are in the midst of an extreme housing and affordability crisis. Currently, 57 percent of San José renters are extremely rent burdened, meaning they pay over 50 percent of their income on rent, leaving little room for essentials such as food, medicine, or utilities. There are currently no neighborhoods in San José that are considered affordable for a family supported by two minimum wage jobs (see Figure 16 below).[77] These housing conditions can lead to overcrowded units, overworked families, and other mental health and safety risks.

Requiring or even encouraging investments in building electrification runs the **risk of increasing housing costs for renters,** because landlords may recoup the costs of these investments by increasing rents

‡‡‡ Rent stabilized buildings (buildings subject to the Apartment Rent Ordinance described on page 38) are also allowed to increase rents to recoup the cost of certain capital improvements. This means that electrification retrofits could still pose a threat to affordability even in rent stabilized housing.

on their tenants. Upgrades can also pose other risks to renters such as unfair evictions or harassment. Moreover, there are many **low-income homeowners or homeowners on fixed incomes who cannot afford to upgrade their homes,** even for essential repairs. Building electrification policies and programs need to consider risks to increased cost and rents due to building upgrades. If residents can no longer afford their homes or are unfairly evicted, the current rates of gentrification and displacement in San José will be exacerbated. Moreover, residents could be displaced and relocate further away, increasing commutes and thus air pollution, ultimately undermining progress toward achieving San José's climate goals.

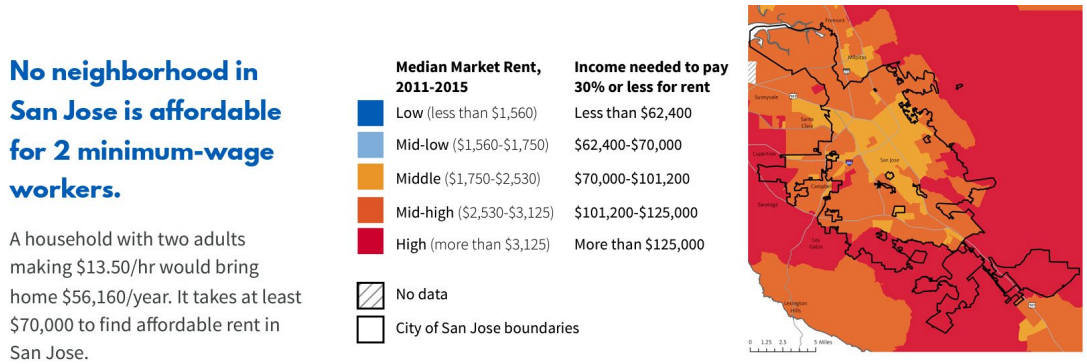


Figure 16: Median Market Rent Map of San José (2011-2015).[78]
Image Credit: Working Partnerships USA

Energy Burden (Utility Bills)

Many families in San José are already struggling to pay their utility bills. Eleven percent of San José households have a high energy burden, which means they spend above 6 percent of household income on utility bills, while 6 percent of households have a severe energy burden, meaning they spend above 10 percent of household income on utility bills.[79] While many electrification upgrades will lower energy bills, in some cases electrification can increase energy costs for residents (see Chapter 5). For many San José residents, higher energy bills would mean additional sacrifices, such as sufficient heating or cooling. **It is critical that building electrification does not exacerbate housing and energy unaffordability in San José, particularly for those who are already struggling to remain in their homes and in the city.**

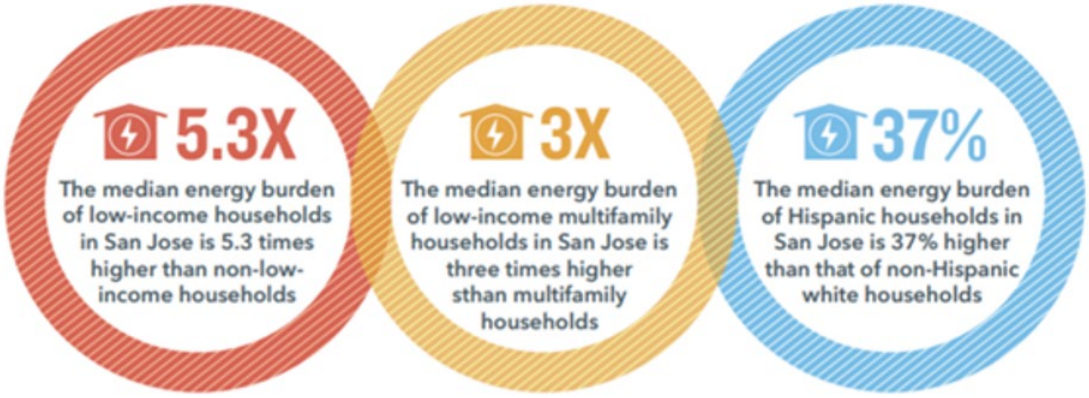


Figure 17: Energy Burden Statistics. Energy burden is the proportion of a household's income to the amount spent on utilities. Spending 6 percent of household income on utilities is considered a "high energy burden."[80]
Image Credit: ACEEE

Air Quality and Health

Air quality and public health are additional community priorities that intersect with building electrification. Replacing gas appliances with all-electric versions will reduce both indoor and outdoor air pollution. Moreover, heat pump technology provides high efficiency cooling in addition to heating, which can help mitigate a community's health effects during increasingly hot summers, in heat waves, or during wildfire smoke days.

San José residents are **concerned about outdoor air quality.** More frequent smoky days from the California wildfire season have increased air quality concerns, and in San José, pollution from highways and industrial sites disproportionately affect low-income communities (see Figure 18 below). Vulnerable populations living in areas of higher air pollution are already experiencing disproportionately negative health outcomes, such as higher rates of asthma (see Figure 19).

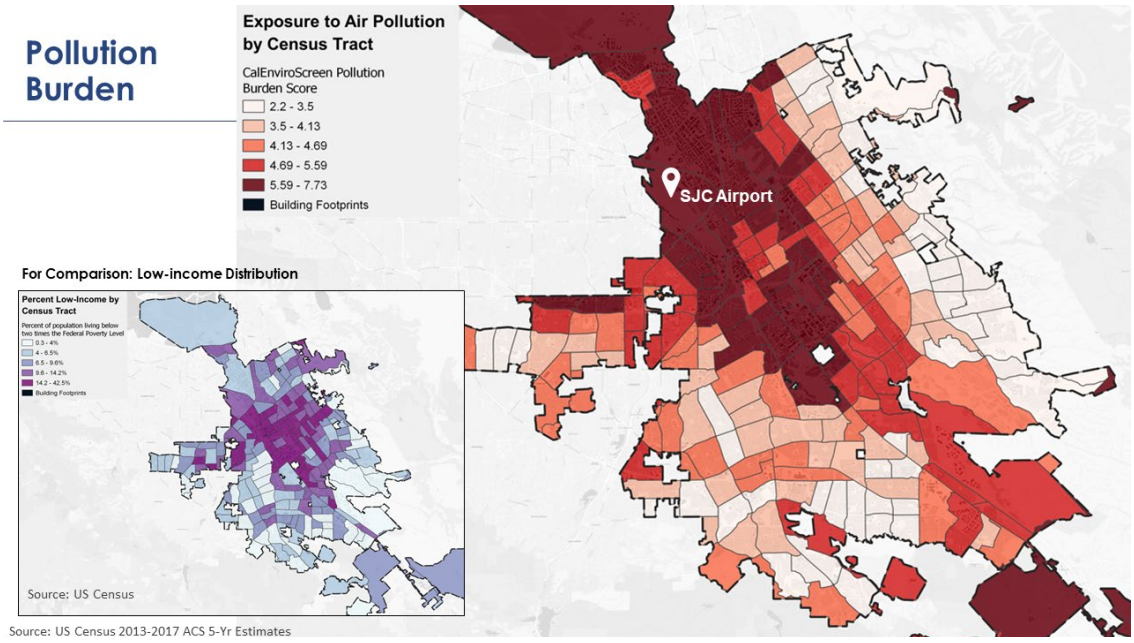


Figure 18: Pollution Burden Map.[81]

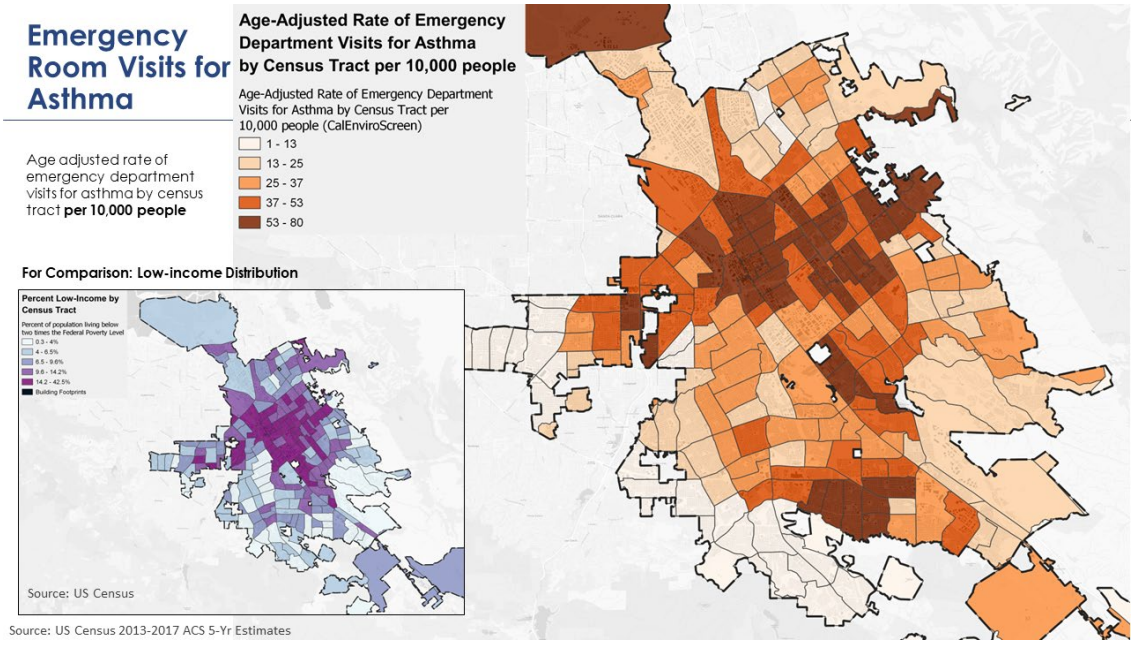


Figure 19: Emergency Rooms Visits for Asthma Map.[82]

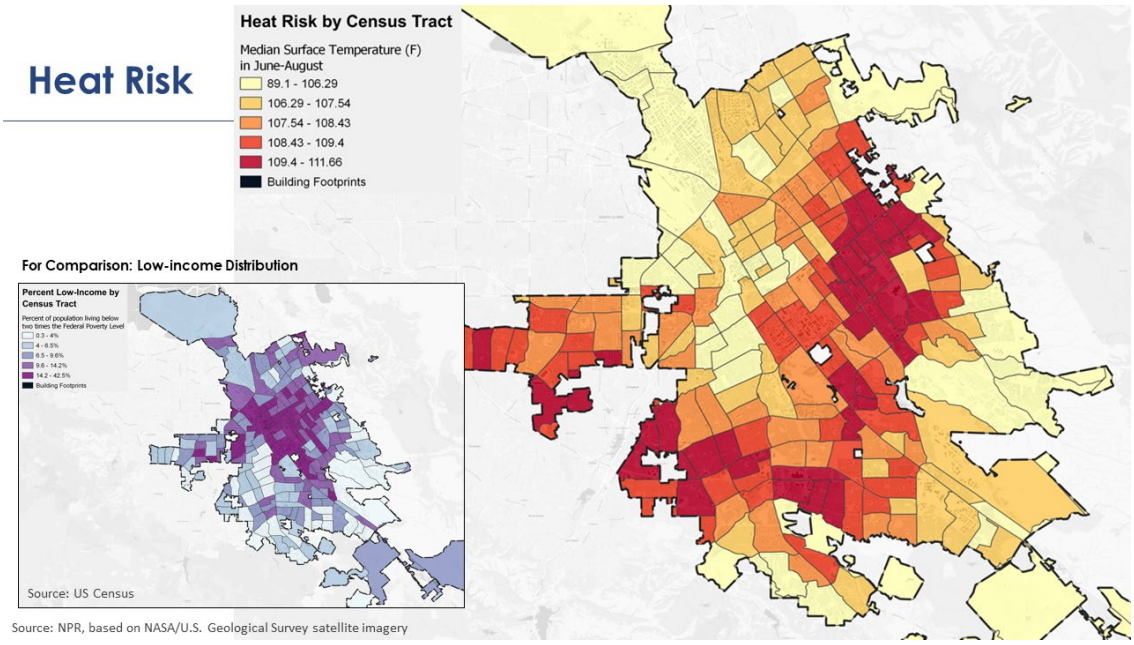


Figure 20: Heat Risk Map.[83]

Extreme heat also exacerbates poor air quality. The greatest impacts are felt in communities of color, particularly in East San José where there is less tree canopy to mitigate urban heat (see Figure 20). When a heat wave and high smoke overlap at the same time, opening windows to cool a house can bring harmful pollutants into the home. Many families throughout San José are **not able to purchase air conditioning or air filters** for their homes, given the high cost and lack of space to locate them, and therefore have insufficient ventilation systems to cool their homes and protect their indoor environments from smoke pollution. This is especially concerning as climate change is expected to increase the frequency of both heat waves and wildfires.

Awareness around **indoor air quality**–or the level of air pollution inside buildings–is currently low but increasing in San José communities. Existing research points to clear **negative health impacts from gas stoves and appliances polluting indoor air**.[84] As this research is more widely shared, communities are likely to become increasingly concerned about the compounding effects of gas pollution inside the home and air pollution outside. Poor indoor air quality and negative health impacts related to gas appliances are also disproportionately felt in low-income communities, where housing units are likely to be smaller, have older and less efficient appliances, and lack adequate ventilation.

Community Perspectives: Air quality is not always the first aspect of health that comes to mind for communities. Air pollution may not be visible and the health impacts are not always felt immediately. However, many communities are very concerned about the disproportionate health impacts they see around them, including inequitable access to green spaces, healthy food, mental health services, and opportunities for being active. When communicating about the health impacts of air pollution to certain communities, it can be important to acknowledge that this is one of many health concerns they face.

High Quality Job Opportunities

San José is the biggest city in Silicon Valley, home of huge technological advances and wealth. However, many longtime San José residents who are not working in the tech industry have seen their living costs skyrocket without a proportional wage increase. In the Bay Area, the top tenth of earners make an average of 12.2 times more than those at the bottom tenth.[85] The emerging electrification field will require a large, well-trained workforce to support building electrification in San José. Building electrification is an opportunity to utilize intentional planning and policymaking to create new, well-paying jobs and economic opportunities, particularly for historically marginalized communities who are often exploited for cheap labor or left out of the workforce entirely.

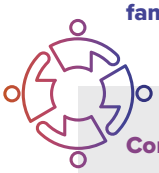
Currently, the contractor market for small residential buildings and homes tends to have more "low road" jobs, with low wages, minimal benefits and temporary jobs. These jobs typically have no connections to training opportunities or workforce development pathways, resulting in lower skilled work and limited career mobility.[86] In particular:

- One-quarter of jobs within the statewide construction sector are currently low-wage jobs, in which workers earn less than two-thirds of the median full-time wage in California.[87]
- Within the total low-wage workforce in California, 76 percent are workers of color and 40 percent are immigrants.[88]
- Many small minority-owned contracting businesses face significant barriers to winning contracts in San José, including limited language resources, lack of training availability, and significant requirements for local incentive programs which make it difficult to become "qualified" contractors.

Figure 21: Description of High Road and Low Road Jobs.[89]

Meanwhile, the larger commercial and institutional building market tends to offer more "high road" job opportunities (also referred to as "high quality jobs"), which are characterized as jobs with family-sustaining, living wages, comprehensive benefits; and opportunity for career advancement (see Figure 21). These inequitable conditions make it critical to pursue policies that encourage market transformation toward high quality residential contractor jobs and support the growth of minority- and women-owned businesses. It is also essential to ensure that these jobs and business opportunities are accessible to people who have been historically underrepresented, such as women, people of color, immigrants, veterans, and recently incarcerated individuals.

Workers who currently participate in the natural gas industry are concerned about what will happen to their jobs in the transition away from fossil fuels. Their fears are valid and a just transition for these workers will be necessary. Identifying the right mix of policies and strategies to ensure that these workers are included will require deep stakeholder engagement and strategy building with labor and workforce partners. A workforce development working group will be critical to develop an equitable set of strategies in this sector. As new investments flow to building electrification and other infrastructure needs throughout San José, it is essential to continue to evaluate and update labor standards to create **jobs that allow working families to live and thrive in San José.**



Community Perspectives: Many contractors from immigrant communities are ready and eager to participate in the retrofit market and the economic opportunities that will come from building electrification. However, it remains difficult for immigrant communities to find training designed for English-Language Learners (ELLs). It can also be difficult to participate in training given the cost of missed work and the need to find parental or child care. These barriers should be considered when designing offerings to train contractors on new technologies. San José's local workforce development board and program, work2future, should consider providing assistance to these individuals through the Workforce Innovation Opportunity Act, which provides free training for Santa Clara County residents to update their work skills. Work2future should also consider partnering with agencies to provide training to ELL participants.

Clean and Reliable Energy

As the community transitions to all-electric buildings, making sure residents have access to clean and reliable energy sources is essential. While moving away from fossil fuels is critical to preventing the worst climate change outcomes, it is also important to ensure that maintaining reliable power is of equal priority, particularly for vulnerable communities. Concerns about power reliability have grown since PG&E's Public Safety Power Shutoffs (PSPS) began, where parts of the city's electricity are proactively shut down to mitigate wildfire spread (see Figure 22 for recent 2019 PSPS event coverage areas, although outage areas reduced in 2020). As California wildfire seasons worsen due to climate change, **power outages could become more frequent.** Energy infrastructure and building systems should be designed to address both wildfire safety and energy reliability concerns simultaneously.

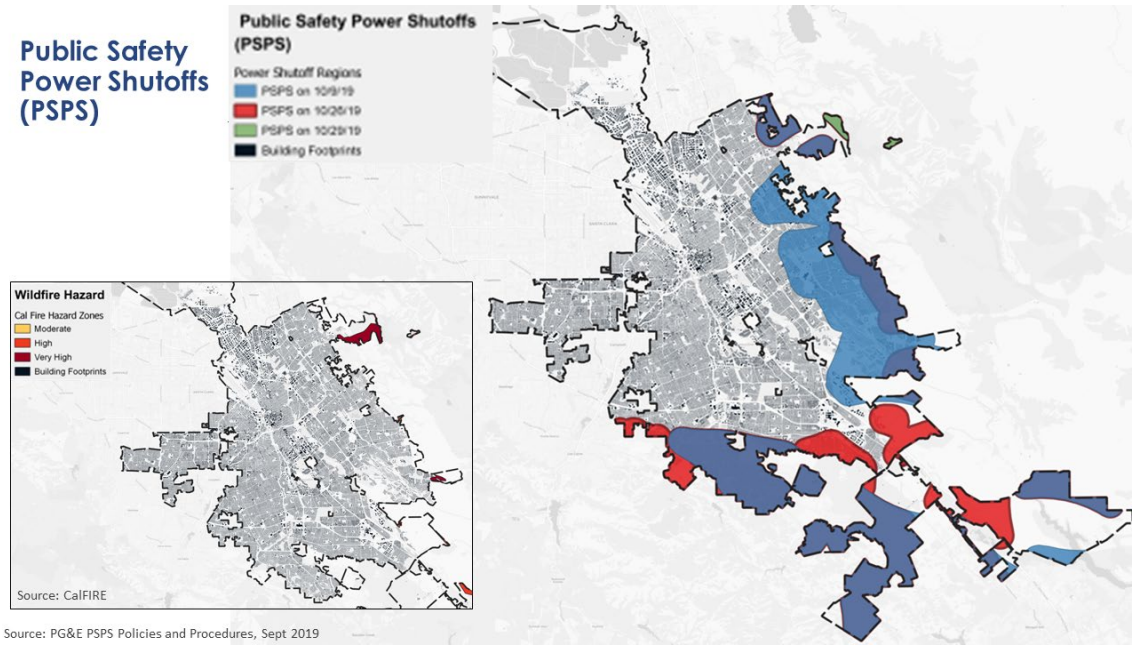


Figure 22: Map of regions affected by Public Safety Power Shutoffs in 2019.[90]

A power outage can have serious consequences for vulnerable community members, such as seniors and those who rely on electricity for medical needs. For these and other residents, reliable backup power is essential. Today, many facilities and residents' primary option is to purchase diesel backup generators, which can produce significant localized air pollution. In addition, power outages often occur during extreme heat events, making electricity to run air conditioning units increasingly critical. A lack of air conditioning during high heat events has increased negative health risks, such as muscle cramps, dizziness, throbbing headache, nausea or vomiting, or fainting, particularly for young children, senior residents, low-income communities, and communities of color.[91] Heat pumps can provide high efficiency air conditioning, which can help reduce electric loads on the grid to help prevent blackouts, particularly when paired with grid-enabled controls that help manage loads. Heat pumps can also be installed with backup power, such as solar PV and on-site battery storage, to ensure they continue operating even during blackouts in homes. The City can also continue investing in community cooling centers, additional trees, and other potential heat mitigation strategies to help reduce the impacts of extreme heat events in San José.

Overarching Concerns

In addition to the four focus areas related to building electrification, CBOs highlighted the following overarching feedback that will influence how to engage with communities to further develop and implement the actions in this Framework:

- Community residents need more clarity on accessing basic City services and how to receive individual assistance.
- There is a desire for the City to include beautification upgrades, such as planting more trees, addressing trash, and removing abandoned cars, to instill pride and a sense of community. However, it is critical that these upgrades occur in tandem with protections against gentrification and displacement.
- Community members would like to see more investment in community spaces in need of upgrades, such as libraries and community centers, where they already access services.
- There is a need for streamlined discussions between City staff and CBOs so that community members can have an active voice in decision-making, with less of a burden to give urgent or rushed input on a project-by-project basis. *For more details on community engagement needs for Framework implementation, see Chapter 6.*

The following chapter (Chapter 4) will provide further analysis of each priority area and its intersection with building electrification actions.

4

CHAPTER 4:
EQUITABLE BUILDING ELECTRIFICATION FRAMEWORK

The Approach to Electrifying San José Buildings

Electrifying existing buildings in San José will require a significant shift from "business as usual." This includes a societal shift in technologies, markets, consumer demand, workforce, community education, laws and institutions, all of which were historically designed around the use of fossil fuels. With intentional planning, such a transition can deliver benefits to communities, including: lower energy and housing costs; improved air quality and health; enhanced energy reliability; and the creation of thousands of high quality jobs for workers. However, without intentional design, this transition could exacerbate existing inequities, particularly for historically marginalized communities. The City will thoughtfully implement a wide range of solutions, incorporating ongoing guidance from marginalized communities, to ensure that the benefits of building electrification are equitably distributed.

The City may need to consider policy options to accelerate the electrification of San José's buildings by the City's 2030 carbon neutrality goal date--any such considerations will allow for public input and involve a broad public engagement process. San José has paved the way by enacting its Building Performance Ordinance, requiring buildings to track and report their energy usage, and implement energy efficiency improvements.[92]

Any potential policies must be carefully designed to avoid community-identified risks, and **new investments and funding must be available to ensure equitable implementation**. The costs of electrifying all residential buildings in San José by 2030 will be substantial–totaling an estimated $2.7 to $4.7 billion (see Chapter 5, Figure 26). It will be critical to prevent these costs from being passed to those who can least afford them, including low-income residents, renters, and small businesses. **Outreach, education, and other supportive programs to help building owners comply with any new requirements will be critical to success.** Such programs will streamline the compliance process for building owners and make sure that under-resourced buildings gain access to available funding. Flexibility in any policies being considered is also key to ensure technical and financial feasibility for all types of buildings.

Moreover, these efforts should be **coordinated with State policymakers and regulators** at the California Public Utilities Commission (CPUC), PG&E, and SJCE; otherwise, rapid transition to building electrification could result in additional unintended and inequitable consequences at the utility scale. Substantial reductions in gas usage are expected to mean significantly higher gas rates for those remaining on the gas network. Without adequate planning, gas rates could increase by tenfold or more by 2050, with low-income customers the most likely to remain on the gas network and experience these impacts.[93] A more prudent path forward would be one of targeted electrification or "strategic decommissioning," in which **entire areas of the gas network are decommissioned and electrified**, thus reducing costs by avoiding ongoing gas maintenance costs and also mitigating the potential impacts from rising gas rates. Figure 23 below depicts this targeted approach, which has the potential to coordinate necessary infrastructure changes if carefully designed and scaled.

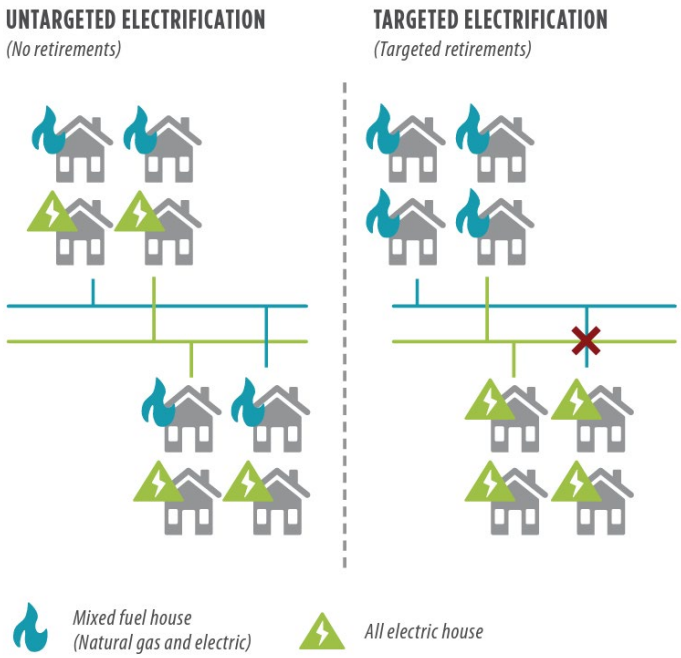


Figure 23: Approaches to Neighborhood-Level Electrification. Untargeted electrification (left) shows a scenario where buildings electrify one at a time, requiring gas infrastructure for remaining customers. Targeted electrification (right) shows a scenario where gas infrastructure could be eliminated if entire neighborhoods or segments electrify together. From "California's Gas System in Transition: Equitable, Affordable, Decarbonized and Smaller." E3, Gridworks, September 29, 2019.[94]

Considerations for Neighborhood-Level Approaches

Targeted electrification pilots are being explored in several urban areas, but many regulatory and financial questions and potential barriers remain. Questions include: how can avoided utility gas investments be used to subsidize electrification; how to identify cost-effective sites; and how to work with customers who wish to remain on gas service. Additionally, any pilot located in a historically marginalized community would need strong protections for tenants and significant funding to cover any unexpected costs. It would also be critical to incorporate health and safety upgrades into pilot programs. Addressing these priorities could require additional funding sources that would need to be paired with utility investments.

Finally, **new programs and policies should be designed closely with communities, particularly those who are typically left out of the policymaking process**. Such communities already suffer the worst health and economic realities (see Chapter 3), and could be put at greater risk if their needs are not prioritized. As such, this Framework can be only the first step in a sustained effort to develop the right mix of policies, programs, and funding mechanisms for building electrification--an effort that includes broader community engagement and prioritizes ongoing engagement with San José's historically marginalized communities.

An entire landscape of support must accompany any potential policies to ensure the intended outcomes are reached, without overburdening building owners or leaving behind or further harming historically marginalized communities. This landscape of City policies, programs, and other supporting efforts must include:

Outreach and Engagement: Targeting outreach and engagement to expand awareness and access to existing resources for historically excluded communities, build trust and knowledge about the benefits of electrification, and share decision-making power with historically marginalized communities.

Research and Analysis: Providing critical research on building electrification retrofit strategies, costs, and benefits.

Pilot Projects: Designing pilot projects to provide proof of concept case studies to increase understanding of the implications and feasibility of innovative electrification retrofit and policy solutions.

Protections: Enacting, enforcing, and advocating for protections for communities vulnerable to negative impacts and providing proactive support to bring all the benefits of electrification to these households.

Programs and Funding: Designing tailored programs and new funding sources to provide holistic assistance to communities that cannot afford electrification to ensure the transition does not exacerbate existing inequities.

Advocacy: Advocating for changes to state policy and utility regulations that will be necessary to support a wide-scale and equitable transition to building electrification in San José and beyond.

Community-Driven Framework for Equitable Building Electrification

The community identified four community focus areas that intersect with building electrification. Supportive programs and investments that the City develops must be designed to achieve positive outcomes across these four focus areas. The actions are thus organized around these focus areas and a community-identified vision for each.

How to Read this Chapter:

Throughout the development of this Framework, the City and community together crafted the following framework to identify actions aligned with community priorities:

Foundational Actions are overarching strategies required to achieve the City's dual climate and equity goals.

Community Focus Areas orient actions around community priorities.

Energy and Housing Costs

High Quality Job Opportunities

Air Quality and Health

Reliable Energy

Community Vision Statements provide an ultimate vision of what success may look like for each community focus area related to building electrification.

Priority Outcomes to achieve the community vision and Actions that will support each outcome are designated as:

Short-term actions directly requested by the community and centered around unlocking existing support, incentives, and information for historically marginalized communities

Long-term actions representing more complex approaches that must be further developed alongside the community.

FOUNDATIONAL ACTIONS

Foundational Action #1:

ENGAGE THE COMMUNITY IN THE EVALUATION OF POLICY OPTIONS SUPPORTING BUILDING ELECTRIFICATION

The City commits to co-developing potential building electrification policy options in partnership with communities.

New policies may be necessary to enable San José to transition away from fossil fuels in existing buildings to clean sources of energy. The City will evaluate a broad range of policy options, some of which would encourage electrification and others that would institute some form of requirement. A summary of existing building policy examples that require electrification at the city level are included below in Table 2. These policies are relatively rare, complex, and often do not address all building types. Consideration of any potential requirements would involve board public engagement and seek to minimize the financial burden on home and building owners. The City should work with community members, particularly members from historically marginalized groups, to identify an appropriate set of policies that will address all building sectors, and co-design policies alongside the community-driven actions below to ensure beneficial outcomes for all.

Table 2: Examples of Building Electrification Policies

Policy Type	Description	Examples of Implementation
Building Performance Standards (BPS)	A BPS can establish targets for buildings to electrify, reduce GHG emissions, or to improve other metrics, by specific dates. To do this, buildings could be required to benchmark their performance over time. Successful BPS policies include complementary support programs and assistance for covered buildings, local workforce, and historically marginalized populations.[95]	New York City, NY Washington, DC Boston, MA St. Louis, MO
Minimum Efficiency Standards for Rentals (MESR)	An MESR policy for existing residential rental properties could require property owners to meet a minimum efficiency standard for their building or unit - thereby incentivizing building electrification - before they can receive and/or renew their rental licenses.[96]	Burlington, VT Boulder, CO Ann Arbor, MI
Requirements at Time of Major Renovation	This policy could provide prescriptive requirements for allowable electric building systems at the time of major renovation of a building.	Vancouver, BC (under development) *Note that this is currently under discussion by Bay Area CCAs, which cannot enact or enforce this law, but could help support implementation in cities.
Requirements at the Time of System Replacement	This policy would regulate which systems are allowable to install at the time of system replacement - such as requiring the installation of appliances powered by electricity instead of gas - and would be enforced through permitting.	Vancouver, BC (under development)

Consideration of any of these or other policy options would require additional feasibility, technical, and impact analysis (including legal analysis of City authority) and community input.

It is important to note that requirements applicable to building owners in San José may also emerge from outside of the City government. For example, local regulatory agencies are already considering appliance emission standards that would, likely in a phased approach, limit the ability to purchase some natural gas appliances due to their air pollutant emissions profile.[97,98]

Foundational Action #2:

INVEST IN SUPPORTIVE PROGRAMS AND RESOURCES TO ENABLE AN EQUITABLE BUILDING ELECTRIFICATION TRANSITION

The City commits to providing resources and supportive programs to help building owners and homeowners electrify.

To help accelerate the transition to building electrification in San José, the City should seek to provide various forms of support to all building owners. **A key recommendation of this Framework is to launch a "Retrofit Accelerator" program, which will serve as a one-stop shop for technical assistance, resources, grants, outreach, and incentives for all San José buildings to plan their path to electrification.** The City should seek to help building owners of all types in every part of the city with electrification. The City will design the program to ensure increased access to incentives for historically marginalized communities, which can be achieved through improved outreach, coordination, and alignment with other programs.

To ensure this program is successful, it will be critical to identify and/or create dedicated funding sources and accessible financing solutions that are targeted to specific resource-constrained sectors, such as deed-restricted affordable housing, rent stabilized buildings, small businesses, mobile home parks and low-income or fixed-income homeowners. **This funding should be closely coordinated with efforts to ensure housing affordability, protect tenants, and facilitate more holistic retrofits that also address health, safety and resilience.**

Case Study: The Denver Climate Protection Fund and Energize Denver Performance Requirements

Denver, Colorado has led the way in developing a suite of policies, programs, and dedicated funding necessary to transition its building stock away from fossil fuels. In November 2020, Denver voters approved a ballot initiative to create an estimated $40 million annual Climate Protection Fund that will be funded by a dedicated sales tax increase.[99] The **Climate Protection Fund** will be used to make the needed investments in Denver's climate initiatives, with half of the funding directed to communities of color, under-resourced communities, and communities most vulnerable to the impacts of climate change. The **Energize Denver Task Force** developed recommendations (adopted by the City Council in 2021) for the design of a building performance policy and supporting incentives and technical assistance programs for existing buildings.[100] Incentives and programs will be funded by the Climate Protection Fund and will prioritize investments to under-resourced buildings to improve health and equity, create jobs, and lower GHG emissions.[101] Denver is now working to design a new technical assistance and incentive program for building electrification, and will be using a community co-creation process to ensure that the program serves the needs of its under-resourced communities.

HOUSING AND ENERGY COSTS

How can electrification reduce housing, energy, and living costs to allow San José's historically marginalized communities to stay and thrive in the city?

The Challenge

The upfront cost of electrification in homes and businesses will require a significant investment. Building electrification costs will vary depending on building size, vintage, existing appliances and more (for a detailed cost analysis for common residential homes in San José, see Chapter 5). Many families in San José are struggling to make ends meet as housing prices skyrocket while wages have stagnated over the last decade. These families cannot afford any increased costs, upfront or ongoing, that could result from building electrification. It will be important to ensure that energy bills do not increase for low-income residents. Fortunately, cost analysis shows that bills will be lowered for an average residential building under current rates.

Likewise, it is extremely important to minimize any upfront costs of building electrification to small businesses and low-income families and individuals. Available incentives can help bring down installation costs for all-electric appliances.[102] However, information and existing resources about building electrification are not fully reaching San José's historically marginalized communities, often because they are not translated into commonly spoken languages, do not feature culturally-appropriate messaging, or are not designed to serve the needs of low-income families. Targeted and deep engagement is needed to increase participation and access by historically marginalized communities.

As electrification technologies are adopted in more buildings, costs are likely to decrease, improving the economics of electrification over time. However, external investments may still be required to cover the costs for historically marginalized communities. With those investments, the City can evaluate how best to ensure that landlords do not unfairly pass on costs to their tenants, or be allowed to evict their tenants to raise rents and recover some of the improvement costs. In addition, opportunities should consider how to stack funding sources to address health, safety, and basic repair upgrades likely to be needed before electrification upgrades.

Community Perspectives: Many families and individuals cannot afford to pay a single dollar more on housing payments or utilities without it coming from other critical needs like healthcare and food. In addition, renters and homeowners on fixed incomes, such as seniors or people with disabilities, will need financial assistance to electrify their homes. Community stakeholders feel strongly that there must be a commitment to financial assistance for upgrades in low-income communities at risk of displacement. Without it, building electrification policies will exacerbate an already dire situation for many of San José's communities.

Community Vision Statement: The transition to electrification in San José buildings is affordable and accessible to all residents and workers and helps reduce energy and housing-related costs.

It will be critical to develop a suite of supportive programs, policies, and funding sources to ensure that any potential policies do not raise energy or housing costs for low-income residents and small businesses.

Priority outcome Short-term action Long-term action

Outcomes and Actions

HEC-1 Priority Outcome: Building electrification reduces energy and housing costs and tenants are not adversely affected. Programs provide funding for any increased costs to those who cannot afford building electrification upgrades. Electrification costs for typical San José buildings are projected to be economical and will result in lower overall energy bills. However, many San José residents cannot afford the installed costs of electric equipment, even if upgrades prove to be a cost effective investment over time. Certain buildings will need external investment for these costs, paired with protections for low-income tenants to ensure that they are not displaced. Additionally, building owners and homeowners need guidance on how to navigate the process of electrifying their buildings.

HEC-1.1 Provide more information on the costs of building electrification. Sharing lessons learned from early projects helps inform future projects and keeps costs down.

- Create an online Zero Carbon Hub that serves as the City's central information location for Climate Smart and building electrification resources. The Zero Carbon Hub would serve as a one stop shop for San José residents, bringing together information about incentives, financing options, technical assistance resources, and current program offerings.
- Share and interpret case studies and customer economic analyses (see analysis in Chapter 5). Publish documentation of challenges and solutions online. Discuss them with affordable housing developers and building professionals to inform future projects and share potential cost implications with community members.Documentation can include tracking of municipal all-electric retrofits and new construction.
- Assess and share existing cost planning tools to help guide economic decision-makers in replacing a specific appliance, assessing electric capacity needs, or planning to electrify an entire building over time.
- Ensure that all new programs or pilots track data on the cost impacts by types of tenants, owners, and decision-makers.

HEC-1.2 Launch a "Retrofit Accelerator" program, designed to streamline building retrofits and ensure that building owners can access existing incentives and funding. The building electrification upgrade process can be complicated and building owners may not know how to access funding or assistance. The City can build on the Zero Carbon Hub (see action HEC-1.1) where building decision-makers can access individualized support and technical assistance for the building retrofit process and identify incentives, grants, and other financing products to help cover the costs. This Retrofit Accelerator program should be designed with community input to address the unique needs of under-resourced buildings, mobile home parks, and historically marginalized communities. It will also be critical to work with regional and utility partners to ensure San José community priorities can be integrated into program offerings.

HEC-1.3 Expand awareness of and access to existing rebate programs through the Retrofit Accelerator program model (see action HEC-1.2).

- Conduct targeted outreach to low-income and fixed-income renters and homeowners about existing income-qualified programs such as utility bill discount programs (see Program Spotlight below), PG&E's Energy Savings Assistance Program[103], and the statewide Low-Income Weatherization[104] and Weatherization Assistance programs.[105] For more information on low-income programs, visit SJCE's Discount Programs webpage.[106]
- Work with local CBOs to promote BayREN, SJCE, and PG&E rebate programs like Home+, to ensure that more diverse communities can access these incentives.
- Streamline permits for electrification measures where possible. Evaluate permitting fee schedules and explore reducing permit fees for electric appliances so they are more equivalent to permit fees for gas appliances.
- Provide assistance in applying to programs for historically marginalized communities, given that many barriers to entry still exist, including language.

Program Spotlight: Low-Income Utility Bill Discounts

PG&E's California Alternate Rates for Energy (CARE) Program provides a monthly discount of 20 percent or more on gas and electric rates for income-qualified homes. Both individuals and groups of people living in single-family homes or multifamily housing may be eligible. PG&E's Family Electric Rate Assistance (FERA) Program provides monthly discounts up to 18 percent on just electricity rates for income-qualified groups of three or more. SJCE's Solar Access and SJ Cares programs offer additional discounts for CARE and FERA customers.

Currently, more than 1.4 million PG&E customers are enrolled in CARE and FERA.[107] More information is available at CAREandFERA@pge.com, or at 1-866-743-2273.

Community Perspectives: During the Framework's co-creation process, ICAN was actively working to enroll Vietnamese American residents in BayREN programs for homeowners through the Air Quality Ambassadors program. The suggestions from this program demonstrate the practical ingenuity of the Ambassadors working on the ground, as well as the value of input directly from renters and residents.

One challenge the Ambassadors faced was the severe lack of Vietnamese contractors available. Community members stressed that there is a need for contractors to reflect their community, to ensure that trust and understanding can be shared to move forward in the program. In addition, electrification education for Vietnamese American contractors is essential. The co-creation team's coordination to connect with Vietnamese American contractors is ongoing.

Additional suggestions identified through the Ambassador program included:

- More funding and financing options are needed in existing incentive programs
- Applications must be made less time consuming and less confusing to navigate
- More programs should be targeted toward renters and multifamily buildings
- More information should be shared with community members on how to reduce electricity bills
- Information and referrals are needed to help find contractors who speak specific languages

HEC-1.4 Identify sustainable funding sources and accessible financing options to unlock financial feasibility of electrification for more community members and building owners, particularly in historically marginalized communities. With any new policies under consideration, the City should consider whether it should be paired with funding to ensure that building owners can comply and prevent costs from being passed on to low-income residents or small businesses. Where possible, it will be key to leverage and build upon existing funding programs to avoid administrative costs of launching new programs.

Identify existing, sustainable funding sources for both low-income homeowners and renters. Analyze these sources for critical gaps in services. Funding sources may include those from local, regional, state and federal governments, as well as from private and philanthropic entities. It will be critical to identify both building electrification-specific funding as well as more holistic funding sources, such as those meant to support affordable housing, health, and resilience needs, as well as covering relocation costs incurred and assistance needed during building electrification upgrades.

Identify new sources of funding that address critical gaps in existing funding sources to ensure that holistic support and incentives are available for equitable electrification. An increasing number of cities are launching local climate action and equity funds to ensure adequate public investment

to achieve their goals, including Berkeley, Denver, and Portland. See below for a case study on Portland's Clean Energy Community Benefits Fund and page 49 for a case study highlighting Denver's Climate Protection Fund.

Promote existing financing options like REEL, and explore scalable offerings like Tariffed On-Bill Financing.[108,§§§109]

Advocate for a state-level building decarbonization and managed gas transition plan to reduce public subsidies to fossil fuel infrastructure and direct state and utility investments to electrification.

Equity Considerations: New funding sources will be particularly important to meet community needs and priorities under new policies. In addition to funding for upgrades, funding may also be needed to cover temporary displacement costs and utility bill assistance for low-income residents. Energy bill assistance may be needed for buildings where tenants pay electricity bills only, and therefore may experience cost increases. The TECH program provides incentives directly to contractors, distributors and/or manufacturers of heat pump appliances to incentivize availability and reduce costs for the community without requiring a complex rebate process.

Case Study: City of Portland's Clean Energy Community Benefits Fund

In 2018, voters in Portland, Oregon passed a retail tax, the Clean Energy Community Benefits Fund, which is estimated to raise between $45-$60 million dollars every year for climate action that advances racial and social justice.[110] This tax specifically applies to large retailers that are not headquartered in Portland and that make more than $1 billion in gross sales nationally, such as Target, Walmart, and Best Buy. Examples of projects include clean energy funding, job training programs, and green infrastructure projects. All funding prioritizes Portland's underserved populations and neighborhoods, including communities of color and low-income residents.

HEC-2 Priority Outcome: Electrification policies and programs support affordable and stable neighborhoods for San José communities. Protecting housing that is currently affordable to residents in San José, either as a result of deed restrictions or through unregulated market conditions, will be essential. Prioritizing deed-restricted and low-cost housing for upgrades will help preserve affordable housing stock while also ensuring that historically marginalized communities receive electrification benefits.¶¶¶

§§§ Tariffed On-Bill Financing refers to a mechanism where utilities can invest in energy upgrades in a home or building and tie the cost recovery to the energy meter rather than to individuals or organizations, as in typical financing. This innovative solution is not a traditional loan and may be a solution to finance efficiency, solar, and electrification projects in more accessible ways that align financial repayment requirements with energy bill outcomes.

¶¶¶ Low-cost housing refers to housing that receive no direct subsidies, but are still affordable to lower-income individuals, including rent-stabilized units. These buildings can be at high risk of rent increases due to electrification retrofits, since landlords are likely to pay for the upgrades by increasing rents, and there are few regulations to protect against substantial increases.

Three Pillars of Affordable Housing

Electrification alone cannot solve the affordability crisis, but can align with these key pillars of affordable housing, known as "the Three P's":[111]

- **Protect tenants:** Different cities have different sets of regulations meant to protect tenants from harassment and evictions. San José has a Tenant Protection Ordinance that limits the percentage by which rents can increase annually, however, the ordinance does not protect all residential units in San José. It is important to pair any building electrification policies and programs with tenant support, engagement, education, and ultimately legal protections to ensure that building upgrades do not cause evictions, harassment, or an unaffordable increase in rent that could exacerbate displacement pressures.
- **Preserve existing affordable housing:** Existing affordable housing may be either deed-restricted or currently affordable to residents based on existing market conditions. Both types of affordable housing must be preserved by extending current affordability agreements for deed-restricted units as well as incentivizing currently uncovenanted housing to come under deed restriction regulations.
- **Produce more affordable housing:** The Bay Area must continue to build additional housing that is accessible to people from all socioeconomic backgrounds. In San José, nearly all new construction is already required to be all-electric, which has been shown to be cheaper to build than mixed-fuel buildings. Increasing the pace and scale of new affordable and middle income housing development will create more housing supply, helping to lower housing costs, while also creating more all-electric housing across the city.

HEC-2.1 Pair electrification and energy efficiency funding with affordable housing preservation programs, tailored to individual needs and funding constraints of different housing stock types, such as deed-restricted affordable housing and low-cost housing, including "naturally occurring affordable housing" (NOAH) and rent-stabilized properties.

HEC-2.2 Identify solutions to avoid pass-through costs of upgrades to low-income renters, with specific solutions for low-cost housing.

HEC-2.3 Create affordability and tenant protections within a "Retrofit Accelerator" program. As new policies are developed, tenants may be particularly at risk of unfair evictions, harassment, and housing or energy bill cost increases as a result of building upgrades. Ensuring sufficient funding, support, and coordination with tenants and low-income homeowners will be key to mitigating or avoiding negative impacts.

Explore how to include tenant protections and affordability requirements tied to funding sources offered through a "Retrofit Accelerator" program (see action HEC-1.2).

- Coordinate potential opportunities for tenant outreach, such as hotlines for tenants to lodge complaints if building owners harass or raise costs for them.
- Identify solutions to avoid pass-through costs of upgrades to renters, with specific solutions for uncovenanted low-cost housing.

Equity Considerations: As new policies are developed, it is important to remember that small businesses may also be tenants within larger buildings. Many small businesses cannot afford any rise in rents and may need tailored support, culturally competent outreach, and dedicated assistance in navigating discussions with building owners and decision-makers while upgrades take place.

HEC-3 Priority Outcome: Electrification costs come down over time. The installation costs for heat pump technologies, including air source heat pumps and heat pump water heaters, are typically higher than their gas counterparts, such as gas furnaces and water heaters (although there are several whole home scenarios that make it cost-effective, see Chapter 5). In addition, electricity rates are significantly higher than gas rates, and while the ultra-high efficiency of heat pumps usually delivers energy bill savings despite these rates, it is important to consider how future utility rate changes may affect the costs of electrification.

HEC-3.1 Invest in existing training programs to provide comprehensive contractor training to ensure quality installations, which can help avoid increased energy bills or maintenance costs by ensuring appliances are installed properly. This also promotes fair pricing for all heat pump installations. To ensure these trainings are accessible, they should be offered in a range of languages, times, and locations. The City can also partner with organizations to create standards or certifications for contractors for whole home electrification or appliance installations.

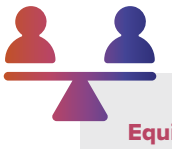
HEC-3.2 Identify and explore solutions to scale electrification that may reduce installation costs for electric technologies and upgrades. Several examples to explore include:

- Partner with regional efforts to pilot bulk purchasing programs for electrification appliances to bring down appliance costs. Collection of additional information on residential electrical panel capacity may be needed to identify bulk purchase and installation opportunities for contractors, multifamily property owners, and homeowners.
- Pilot a “targeted electrification” or “strategic decommissioning” project with PG&E to avoid planned gas infrastructure upgrades and unlock investments for electrification upgrades. These efforts would align with the City’s “Zero Emissions Neighborhoods” (ZEN) concept, where various upgrades to streets, businesses, and homes would be clustered in certain geographic areas.

HEC-3.3 Consider changes to electricity rate design that benefit residential and commercial customers who electrify. Electricity and gas rates will affect customer

energy bills and the overall cost-effectiveness of building electrification upgrades. Due to the complicated nature of rate design, it will take careful consideration and research to ensure positive outcomes. As part of this measure, the City can also consider providing adequate resources to ensure low income customers have equitable or enhanced access to programs and services to electrify. The City can also join or support state and local advocacy organizations who are already engaged in this work.

HEC 3.4 Evaluate the need to update San José's Building Performance Ordinance, which currently *tracks* energy and water usage in large buildings and requires energy efficiency actions, to understand the efficacy of requiring fuel switching or emission reductions that work towards the carbon neutrality goal. Integrate building electrification as a key pathway. *Similar ordinances have now passed in Boston,[112] St. Louis,[113] NYC,[114] and Washington DC.[115]*



Equity Considerations: Significant funding will be needed for complementary programs dedicated to helping under-resourced buildings electrify. Tenant protection mechanisms will also need to be in place, especially if it requires significant building-level investment that could be passed on to renters.

For a consolidated view of all proposed actions and policies, along with additional considerations, please refer to Appendix B.

Achieving the 2030 Carbon Neutrality Goal

The City passed a resolution to achieve carbon neutrality by 2030 during the development of this Framework. The recommendations above have not been fully analyzed for feasibility to meet this timeline and are not specifically designed to achieve carbon neutrality on a 2030 timeline. Additional planning and stakeholder engagement will be required after the Framework is released to identify the right mix of policies and strategies to meet this accelerated timeframe.

Impacts to Housing and Energy Costs: This carbon neutrality goal means that building policies must be considered on a significantly quicker timeline and supportive programs will be needed to assist building owners with their electrification upgrades. Additionally, where the City has authority, it should try to tie funding assistance with tenant protections that prevent harassment, evictions, and major housing or energy cost increases.

AIR QUALITY AND HEALTH

How can electrification improve air quality, safety, and health outcomes for San José residents and workers?

Building electrification would help to reduce air pollution from gas appliances. However, ensuring an equitable transition will require dedicated funding and technical support, particularly for buildings located in historically marginalized communities, to ensure that residents of these buildings will benefit from the health impacts of building electrification upgrades.

The Challenge

Air quality, both indoor and out, is critical to the health and wellbeing of all residents and workers in San José. Outdoor air pollution primarily results from passenger cars, commercial vehicles, and industrial sites. These sources of air pollution are more heavily regulated by existing laws, such as the federal Clean Air Act. Sources of indoor air pollution are not currently regulated but also have major potential impacts on health. Given that Americans spend about 90 percent of our time indoors, it is particularly critical to address indoor air quality.[116] Moreover, low-income communities and communities of color experience higher rates of both indoor and outdoor pollution as a result of decades of discriminatory policies and city planning.[117]

Gas appliances in the home are a major source of indoor air pollution. Gas stoves, water heaters and furnaces release pollutants that include nitrogen oxide, carbon monoxide, formaldehyde, and fine particulate matter that get trapped in the home, particularly in buildings without proper ventilation. These pollutants can cause asthma and respiratory illness, heart failure, headaches, brain damage and more. Gas stoves in particular pose an increased threat to elders, children and those with pre-existing health conditions. Children living in a home with a gas stove are up to 42 percent more likely to develop asthma symptoms.[118,119,120] These risks are even higher for low-income residents, who tend to live in smaller, more crowded units with older ventilation systems and appliances.[121] Replacing gas appliances with clean, electric options such as heat pump technology and induction stovetops can improve indoor air quality, especially when paired with weatherization, proper ventilation and air filtration solutions in retrofits.

Community Perspectives: Community members from many backgrounds mentioned the cultural importance of the kitchen and the stove. For many families, the stove is a gathering place, and food is what brings people together. Cultural traditions and culinary techniques passed down may often be associated with cooking over an open flame or with special equipment. Even with the health benefits of switching to an electric cooktop and oven, communities may struggle to adapt these important cultural aspects to new technologies. The City acknowledges these important cultural aspects and is dedicated to working closely with communities to deliver culturally appropriate messaging, assistance, and alternatives to families in need of healthier indoor air.

Community Vision Statement: All San José community members have access to clean and healthy indoor air quality in their homes and businesses.

Priority outcome Short-term action Long-term action

Outcomes and Actions

AQH-1 Priority Outcome: Community members understand indoor air pollution sources, health risks, and strategies for improving health and safety. Because of the serious nature of health impacts from indoor pollution, the City cannot wait to address poor indoor air quality. Education and awareness must be raised about the impact of gas appliances on our health and what can be done to address it. Reaching low-income communities will require going beyond the usual channels of communication and working with local community leaders and trusted messengers.

AQH-1.1 Invest in community-led outreach efforts to impacted communities and integrate information on electrification.

Fund CBOs to design culturally appropriate outreach campaigns about building electrification in the historically marginalized communities they work closely with, leading with health benefits. Dedicate City staff time and resources toward supporting this community-led outreach.

Equity Considerations: When designing outreach, the City can work in partnership with CBOs that provide direct services to historically marginalized communities. CBOs and their constituencies can better understand the type of messaging that will resonate with community members and which communication channels will reach certain communities. Traditional outreach (such as City press releases, City Council meetings, or content that is posted entirely online) is often oriented toward communities that are already engaged with the public sector. Many historically marginalized communities are left behind.

Case Studies: Equitable Community Outreach

It is important to hear directly from community members and leaders about which platforms are used by the community.

One promising model for community-led outreach to historically marginalized communities is already underway in San José. The **Air Quality Youth Ambassador Program Pilot** was designed through a partnership between ICAN and the Bay Area Air Quality Management District (BAAQMD). This model trained and funded Vietnamese youth to be a conduit of information to members in their community on air quality and building electrification. The Ambassadors answered homeowner questions and helped residents navigate incentive applications for existing programs. The program aligns with input from our co-creation team, who identified air quality and health as a critical messaging strategy that would resonate with their communities.

Another example of community-designed outreach is **Solar Access**, a program that offers low-income customers who live in Disadvantaged Communities (DACs) a 20 percent discount on solar energy. The City partnered with ICAN, Alviso Community Fund, and Mujeres Empresarias Tomando Acción (META) to support outreach efforts in English, Spanish, and Vietnamese. Through extensive phone banking by these community groups, as well as trilingual mailers, this time-intensive but highly effective program served more than 600 low-income customers and over 50 percent of customers enrolled spoke a language other than English (predominantly Vietnamese).

AQH-1.2 Advocate for health messaging in outreach for existing building electrification programs, and ensure that information on health benefits and resources reach historically marginalized communities.

- Integrate health messaging, leading with community priorities and concerns and tailoring it for historically marginalized communities, into existing City-run or City-driven campaigns such as the City's Climate Smart Challenge.[122,123]
- Improve the City's Induction Cooktop Checkout Program by incorporating suggestions from community members below.[124]

Community Perspectives: When discussing promotion of the City's Induction Cooktop Checkout Program with community groups, specific barriers to participation were identified that the City could improve upon. The community suggested:

- Increase the number of pickup locations to be closer to historically marginalized communities
- Extend the time period allowed for checkout
- Include air quality monitors and adapter plates in the checkout program[****]
- Include resources about adapter plates for certain pots and pans, and information on cookware that will work on induction stoves
- Include culturally competent information around cooking practices such as options for woks, usage of induction cooktop for hot pot, or alternatives for charring tortillas

AQH-1.3 Provide opportunities to improve community understanding of air quality in the home.

Partner with research organizations and local CBOs to pilot a program that provides air quality monitoring devices to households to increase understanding of the impact of gas appliances in the home, and how to mitigate impacts.[125]

Include education about air quality in contractor training and information sharing by City departments (such as the Permit Center), including messaging that contractors can share with their customers. See action HQJ-2.3 for further opportunities related to contractor training.

AQH-2 Priority Outcome: Harmful sources of indoor air pollutants are significantly reduced. The best way to reduce indoor air pollution from gas appliances is to replace them with electric options. However, ensuring an equitable transition will require dedicated funding and technical support for buildings in low-income communities and communities of color. Short-term actions will focus on relieving the communities most impacted by poor air quality without passing on upgrade costs to those least able to afford them.

AQH-2.1 Improve existing rebate programs to address air quality outcomes and incorporate health messaging.

Coordinate with BayREN, SJCE, and PG&E program implementers to integrate air quality measures such as air quality testing, air filtration, and ventilation systems. Connect CBOs with program implementers to create program materials with culturally competent messaging about health and air quality, with particular focus on induction cooking.

**** Induction stoves require magnetized pots and pans to work properly. However, adapter plates are available to ensure other types of cookware can be used, heating the plate instead of the pot directly. This can be a temporary or seldom used solution, as it may diminish the efficiency of the induction technology.

AQH-2.2 Design a "Retrofit Accelerator" program that can also support health and safety upgrades in buildings alongside electrification, prioritizing funding and assistance for middle- and lower-income households.

Develop a program model that will help building owners stack several funding sources so that health and safety upgrades can be integrated into building electrification retrofits, particularly for low-income homeowners and multifamily buildings with low-income tenants.

Coordinate with existing rebate program implementers to ensure they dedicate resources to reaching low-income communities.

Integrate air filtration and ventilation upgrades into the services offered by the Retrofit Accelerator program (see action HEC-1.2). Provide information to participants about how to maintain their ventilation and filtration systems so that clean indoor air quality can be maintained even during wildfire season and on high smoke days.

Provide assistance to small- and medium-sized businesses to access existing rebate programs. Expand awareness of existing commercial programs, with dedicated resources for small- and medium-sized businesses and sectors highly impacted by poor indoor air quality. These programs include, but are not limited to:

- *Santa Clara County Healthy Nail Salon Program*[126]
- *Santa Clara County Green Business Program*[127]
- *Go Green Small Business Financing Program*[128]
- *BayREN Small and Medium Business Program*[129]
- *BayREN Business Microloans Program*[130]

Dedicate technical support for small- and medium-sized food service businesses to convert their commercial kitchens to all-electric technologies. Restaurants, cafeterias, catering companies, and other food service businesses may need assistance adjusting to new induction stove technologies and needed kitchen retrofits to ensure their businesses are not disrupted or detrimentally affected.

Community Perspectives: Members of the Vietnamese community expressed concern about insufficient ventilation systems in nail salons, where workers are often exposed to harmful chemicals and noxious fumes. Close work with these building owners, businesses, and workers will be needed to find solutions to protect workers and jobs, while delivering cleaner indoor air through efficient heat pump technology and improved ventilation systems. Community members expressed a desire for close coordination with Vietnamese CBOs to help thoughtfully improve health and working conditions for this highly impacted sector, including potential coordination with Santa Clara County's Healthy Nail Salon Program. For more information, visit: www.cpd.sccgov.org/programs-and-services/healthy-nail-salon-program/

AQH-2.3 Support regional and State policy efforts to enact appliance emissions standards that will eventually phase out gas appliances and to require a statewide all-electric new construction code, including those of the California Energy Commission (CEC), CPUC, BAAQMD, and CARB. Although San José has already enacted a citywide all-electric new construction requirement, state and regional requirements will provide even greater air quality benefits and will help support the growing local market for building electrification. Additionally, the City and its partners should advocate for funding and technical support paired with these requirements to ensure an equitable regional and statewide transition.

AQH-2.4 Research additional requirements and measures to mitigate industrial GHG emissions, particularly in historically marginalized communities. Industrial emissions are often hard to address through traditional energy efficiency measures and electrification can be challenging for some specialized industrial processes. However, this sector must be addressed as it contributes to climate change and poor air quality, often disproportionately impacting communities of color.

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Achieving the 2030 Carbon Neutrality Goal

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Impacts to Air Quality Actions: It takes time and complex coordination to ensure that programs are delivering the promised health, air quality, and safety benefits to tenants, and that negative consequences are successfully mitigated or avoided. An accelerated timeline will require coordination of several funding sources to address health and safety upgrades alongside electrification, as well as follow-up with tenants and owners to continuously improve program delivery. The City will need to accelerate work toward these outcomes to achieve its 2030 target.

HIGH QUALITY JOB OPPORTUNITIES

How do we build an inclusive electrification workforce of the future? How do we ensure that electrification jobs are of high quality?

Significant electrification trends are already taking off in the market, and state and local policies and programs will continue to drive significant demand for building electrification upgrades. Given this, building electrification also has the potential to create many construction and retrofit job opportunities for San José workers. The City can bring additional benefits to the San José community by ensuring that opportunities represent high quality, well-paid jobs by working with partners to train the workforce. To ensure that these benefits are shared equitably, the City can help historically marginalized communities gain access to new job opportunities. As this transition evolves, the City can also help gas industry pipefitters and workers train for new careers in electrification.

The Challenge

Achieving San José's ambitious building electrification goals require a highly-skilled and trained workforce and will bring many jobs and economic opportunities to San José communities. The City can employ a thoughtful planning process so that the new jobs created are high quality and accessible to all communities.

The process of expanding the needed highly skilled and trained workforce will require strong, interdisciplinary partnerships with public agencies, labor advocates and unions, workers, and employers to build trust and coordinate effectively over the long term. Ultimately, a variety of strategies are needed to equitably distribute the benefits of an expanding workforce.

Moreover, as the regional transition away from gas occurs over the long term, local workers in the gas industry will be impacted. San José does not have direct control over the transition plan for these workers; however, ensuring that they are protected will be an essential component of any equitable transition to building electrification. The City should consider support for employers, unions, and other relevant entities as they work on a just plan that includes transitioning workers in the gas industry over to comparable employment opportunities. Investments in water and sewer pipeline infrastructure could also provide additional high-skilled job opportunities for pipefitters.[131] Regional partners will need to invest significantly more effort in developing solutions, and the City should be at the table advocating for equitable outcomes.

Community Perspectives: When asked about how the City can support the growth of high quality jobs, labor groups suggested developing workforce labor standards. A workforce labor standard might include: hiring opportunities for apprentices (especially for targeted workers); a certified payroll records requirement; or, improving the City's prevailing wage requirement.

The City can influence the labor market in a variety of ways. By incorporating skills and labor standards into public investments or projects, it can promote a minimum level of job quality, including considerations concerning wages, health benefits, safety standards, skills qualifications, training, and more. The City may also explore how to attach requirements to new funding sources that could help increase equitable access to jobs for people who have been historically underrepresented, such as women, people of color, veterans, and previously incarcerated individuals.

Community Vision Statement: Workers from all San José communities are empowered to participate in and lead the transition to building electrification, through high quality, sustainable jobs.

Priority outcome Short-term action Long-term action

Outcomes and Actions

HQJ-1 Priority Outcome: Electrification programs include workers and contractors who reflect and are from San José communities. There is no guarantee that communities of color, immigrants, and low-income communities will be able to participate in the new green workforce.[††††,132] There are still many barriers that prevent equal access to high quality jobs and job growth in these communities. To be equitable, San José should work to have an electrification workforce that reflects the diverse community within the city.

HQJ-1.1 Assist contractors from historically marginalized communities to become qualified contractors for existing electrification incentive programs.

- Advocate for program implementers to conduct stakeholder research on barriers to entry (such as language barriers to training, licensing, and exams), and work with them to remove barriers.
- Ensure City-led, funded, or promoted training is accessible by offering it in a range of languages, times, and locations.
- Work with partners to integrate building electrification into curricula at local vocational schools or high school career technical education (CTE) courses.
- Work with work2future and other workforce groups to connect graduates of local workforce development programs that serve communities of color to existing electrification employers.

†††† The example of the solar industry shows that participation of people of color in the industry lags for the overall American workforce in several demographic areas. Notably, women make up 47 percent of the overall U.S. workforce, but only 25 percent of the U.S. solar workforce. Black or African American and Hispanic workers are under-represented in the energy sector as well.

Community Perspectives: CBOs advocated for more communication and assistance for small contractors from historically marginalized communities.‡‡‡‡,[133] While these contractors have an interest in expanding their work to support residential building electrification, many barriers still exist that prevent them from entering this market. Barriers include limited language resources, lack of training availability, and significant requirements for local incentive programs.

HQJ-2 Priority Outcome: New programs and policies generate local, high quality jobs. City investments in building electrification should prioritize high quality jobs, with living wages and benefits for workers, where feasible. Solutions should be applied across all environmental investments, including transit, water infrastructure, and more. Additionally, City programs can encourage or require high quality job agreements with employers, including living wages, benefits, job security, and access to career growth, similar to the City's existing Project Labor Agreement for public works projects over $3 million.

HQJ-2.1 Build relationships with labor unions and advocates, workers, and employers. Discuss workforce needs and develop strategies for an equitable transition with those who will be most impacted and those who will be required to implement changes.

Establish a workforce development working group to support the growth of high quality building electrification jobs in San José. The working group would include a mix of labor organizations, contractors, the local workforce development board, career technical training organizations, and CBOs focused on workforce development. The working group would evaluate potential strategies to support high quality employment opportunities with career growth, explore strategies to minimize the impact from potential job losses, and ensure that the local labor force is properly trained and prepared to adjust in response to job growth.

‡‡‡‡ Targeted workers include but are not limited to: current or former unhoused individuals, veterans, formerly fostered youth, under or unemployed individuals, low-income populations, or previously incarcerated people.

HQJ-2.2 Participate in regional efforts to promote the creation of high quality jobs. A regional "High-Road Training Partnership" initiative is already underway to identify pathways to improve job quality for building electrification workers in the San Francisco Bay Area, funded by the California Workforce Development Board.[134]

HQJ-2.3 Invest in existing training partnerships to provide comprehensive contractor training to ensure quality installations. In addition to their benefits in bringing down electrification costs (see action HEC-3.1), such training partnerships provide an opportunity for local communities of color to access electrification job opportunities. The City can also partner with organizations to create standards or certifications for contractors for whole-home electrification or appliance installations. Requiring training or certifications for workers can help align curriculums and pre-apprenticeship programs with workforce needs and labor market demand, while also ensuring the completion of high quality work necessary for delivering on our climate goals.

HQJ-2.4 Improve permit compliance (i.e. obtaining the required permits for electrification upgrade work) so that all-electric technologies may be installed safely and efficiently. Permit compliance helps make sure that qualified contractors are hired and compensated for high quality work, rather than the lowest price, thereby helping to create better quality jobs.

To work toward these goals, the workforce development working group may evaluate or consider:

- The feasibility and implications of a workforce labor standard for building electrification work
- The need for a jobs analysis to understand how building electrification work will impact the local job market in San José, utilizing labor market information
- Coordination between other City departments to inform the need for building electrification jobs or trainings
- The need for a workforce transition strategy to support groups that may be negatively impacted by the growth of building electrification work
- Opportunities and training resources to support contractors and individuals from historically marginalized communities who are interested in working in building electrification
- How to seek out new funding and make sure that it goes toward high quality jobs

HQJ-3 Priority Outcome: Fossil fuel job losses are minimized, and pipefitters and workers in the gas industry are able to participate in the new workforce opportunities.

HQJ-3.1 Advocate to the State and PG&E for thoughtful planning and engagement to ensure that pipefitters and workers in the gas industry are protected and can participate in the transition to all-electric buildings or other comparable workforce opportunities.

Advocate for funding and strategic planning to assist in retraining and protection efforts for pipefitters and workers in the gas industry. Statewide and regional support will be needed to potentially retrain workers into other jobs in the energy infrastructure, construction, or other comparable sector. For those who cannot be retrained, protections may be needed such as pension security, bridges to retirement, wage guarantees, and other safety net measures. It is critical to plan ahead for job impacts.

HQJ-3.2 Identify further policies and programs with labor and workforce stakeholders to mitigate negative impacts to pipefitters and workers in the gas industry.

For a consolidated view of all proposed actions and policies, along with additional considerations, please refer to Appendix B.

Achieving the 2030 Carbon Neutrality Goal

The City passed a resolution to achieve carbon neutrality by 2030 during the development of this Framework. The recommendations above have not been fully analyzed for feasibility to meet this timeline and are not specifically designed to achieve carbon neutrality on a 2030 timeline. Additional planning and stakeholder engagement will be required after the Framework is released to identify the right mix of policies and strategies to meet this accelerated timeframe.

Impacts to Workforce Development: The City will need to establish new partnerships and relationships that support the creation of a high-skilled workforce to meet the demand for electrification retrofits, ensure that workers will be employed in high quality jobs, and identify any needed measures to address impacts to existing pipefitters and workers in the gas industry. It is essential that labor and workforce partners be included in the work to make sure that historically marginalized communities can access these new jobs.

CLEAN AND RELIABLE ENERGY

How do we make sure that San José residents, especially the most marginalized, have reliable access to energy as climate change impacts worsen?

Reliable energy is and will be critically important, particularly for vulnerable communities such as seniors and those who rely on electricity for medical needs. Additionally, reliable electricity will become increasingly important for air filtration during smoky days, and during hotter summers and more intense heat waves. State agencies, the California Independent System Operator (CAISO), PG&E, and other supporting parties are already planning for California's building and transportation electrification transition and will continue working to ensure reliable energy. The City will continue to work with PG&E and other relevant agencies to support this work.

The Challenge

As San José buildings transition to clean and efficient electricity, it is imperative that the electricity system remains reliable. The impacts of climate change are already causing disruption of energy service. More frequent and extreme heat events are increasing the need for air conditioning, and proactive outages to avoid wildfires (known as Public Safety Power Shutoffs) are driving the need for backup power in homes and critical facilities. Backup power is especially important for community members who rely on electricity for life-saving medical equipment or medication refrigeration. Today, the most financially viable option for many is to purchase unhealthy diesel backup generators.

If implemented alongside careful strategies for strengthening the electric grid and providing backup power, all-electric buildings can improve these reliability issues. For example, a solar PV system paired with a battery ("solar + storage") can provide clean and more affordable energy every day, and can also be designed to function during a power outage. As the cost of battery storage comes down, this technology can be applied to individual homes, public access buildings, and critical facilities that provide important services during extreme weather, after disasters, and during power outages. Prioritizing the needs of such critical public facilities and the homes of vulnerable populations will be critical during the transition to carbon neutrality.

In addition, because air-source heat pump systems can provide both heating and cooling, building electrification can provide a reliable new source of indoor cooling for many residents. Many homes in San José have window air conditioning units or may lack air conditioning altogether, which is increasingly dangerous to residents' health as summers grow hotter and heat waves become more intense. This danger is particularly present for vulnerable residents such as children, seniors, and others with underlying medical conditions. Heat pumps provide more efficient cooling than typical air conditioners and can also be grid-enabled to help manage system-wide energy loads and prevent blackouts. San José residents who currently lack sufficient cooling are likely to have lower or moderate incomes, so making sure that these residents have access to cooling will require directing funding and tailoring programs to their needs.

Community Perspectives: During the development of this Framework, community members raised the point that many communities feel trust and safety in knowing their gas systems will work during a power outage and that they can still cook and heat their homes. Additionally, many communities perceive gas to be a trusted backup source of heat when the electric grid is down and sometimes rely on ovens and stoves to heat spaces and water (which can create unsafe and unhealthy conditions in the home). It is important to note that the gas system is just as susceptible to the impacts of climate change as other sources. Experts suggest it will be more cost effective to invest in the reliability of one infrastructure system--the electric grid--than trying to harden two separate systems to the growing impacts of climate change. Simi[135]lar trust will need to be built for all-electric homes to help community members feel comfortable transitioning away from gas appliances.

Community Vision Statement: San José has access to clean and reliable electricity and options for backup power, particularly in vulnerable communities, and residents have reliable access to cooling.

Priority outcome Short-term action Long-term action

Outcomes and Actions

CRE-1 Priority Outcome: Residents and businesses have access to safe spaces during extreme weather events and power outages. Community spaces that offer resources such as refrigeration, charging stations, heating, and cooling must be made available during extreme weather, after major natural disasters and during power outages. People who cannot stay in their homes during outages must have reliable locations where they can shelter and avoid potential health and safety risks. Instead of fossil fuel-based generators, clean backup power options should be available for critical services.

CRE-1.1 Create Community Resilience Hubs to provide safe and comfortable spaces for residents to access during emergencies. San José community center buildings already offer vital assets to residents during all kinds of emergencies, including serving as heating or cooling centers, clean air centers, evacuation centers for fires, floods and gas leaks, and more. These buildings play a critical role and further investment should be identified to ensure that they have clean backup power, filtered air, and cooling through heat pump systems.

Conduct a study to assess backup power options at potential Community Resilience Hubs that could combine heat pump retrofits for heating and cooling. Analysis should prioritize community buildings located in historically marginalized communities. Some studies are already underway that includes a feasibility analysis of microgrids--a set of multiple buildings that are able to use renewable energy even when the electric grid is down.

Conduct additional community engagement about the services that would be most needed by nearby communities during extreme events. Integrate the data into programming offered at Resilience Hubs. Coordinate these efforts with disaster preparedness work led by the Office of Emergency Management.

Identify funding for needed electrification upgrades to Resilience Hubs, as well as funding to train and support community leaders and groups that help operate these buildings as critical facilities during extreme events.

Community Perspectives: Many community members mentioned a preference for sheltering at home during power outages, particularly during the COVID-19 pandemic. However, if WiFi were available at familiar, trusted community spaces located nearby, community members may be more likely to go and access the other services offered. It is important to work with local CBOs to select locations that would be utilized by historically marginalized communities. Community groups have suggested that free WiFi should be integrated into all of these resilience solutions. It is already provided at many community centers during emergencies along with water, activities and charging stations.

CRE-1.2 Contribute to the creation of a resilient electric grid. Work collaboratively with CPUC, PG&E, CAISO and other utility partners to identify measures that will ensure that the electric grid can accommodate the additional load from electrification.

Identify programs and policies with utility partners that promote grid resilience--including demand response, high-efficiency appliances, energy efficiency, grid-interactive technology and battery storage--and integrate into offerings of existing or new programs.

Incorporate resilience and energy reliability opportunities in future policies to ensure backup power options are powered by clean energy.

CRE-2 Priority Outcome: Increase access to renewable energy, cooling, and clean energy storage options for homes and businesses. More buildings in San José should have access to the benefits of renewable energy, such as solar power, in addition to clean backup power options.

CRE-2.1 Improve and expand existing programs to help building owners install renewable energy, cooling, and clean energy storage options.

Coordinate with program implementers to expand awareness of existing resiliency and backup power programs and dedicate resources for historically marginalized communities. This work will include coordination between SJCE, Grid Alternatives, and implementers of the CPUC's Self-Generation Incentive Program.

CRE-2.2 Help building owners access resources and assistance for upgrades by developing a "Retrofit Accelerator" program.

Incorporate renewable energy and clean energy storage options into a "Retrofit Accelerator" program (see action HEC-1.2) to increase resilience to extreme events and provide backup power, in addition to supporting electrification efforts.

Conduct outreach concerning electricity reliability and promote information on actions to take during a power outage in an all-electric home. Such outreach could be implemented through an interdisciplinary team including the Office of Emergency Management, cross-departmental communication teams and local CBOs that work with historically marginalized communities.

Explore clean energy storage funding opportunities to make clean backup options affordable, particularly for affordable housing, assisted living facilities, mobile home parks (that experience a high rate of power outages and have unique utility structure to consider), and individual residents who depend on electric medical equipment. A Retrofit Accelerator program (see action HEC-1.2) could help direct building owners and decision-makers to these funding opportunities.

CRE-2.3 Develop a holistic approach to addressing the impacts of extreme heat.

Conduct stakeholder engagement to identify priority needs and concerns in partnership with multiple City departments.

Develop a plan to comprehensively address extreme heat through a set of cross-sectoral efforts such as increasing urban tree canopy, investing in green infrastructure, and prioritizing building electrification funding and assistance to those who need cooling.

For a consolidated view of all proposed actions and policies, along with additional considerations, please refer to Appendix B.

Achieving the 2030 Carbon Neutrality Goal

The City passed a resolution to achieve carbon neutrality by 2030 during the development of this Framework. The recommendations above have not been fully analyzed for feasibility to meet this timeline and are not specifically designed to achieve carbon neutrality on a 2030 timeline. Additional planning and stakeholder engagement will be required after the Framework is released to identify the right mix of policies and strategies to meet this accelerated timeframe.

Impacts to Reliable Energy: It will be critical for the City to increase coordination across departments on resilience measures for extreme heat, high smoke days, Public Safety Power Shutoffs, and other extreme events where residents may struggle to access critical services. Given the increasing frequency and intensity of these types of events, the City can improve energy resiliency by increasing access to renewable energy and battery systems. In addition, the City will need to coordinate closely with PG&E and potentially advocate to regulators to ensure the grid can adapt to the accelerated timeline for building electrification and simultaneously provide power reliability.

What can you do...

While many electrification solutions require systematic changes, individuals can feel empowered to take action in the following ways to be a part of the solution.

For All Residents (including renters)

Easy Actions	Description
Ventilate your kitchen	If using a gas stove, always turn on the ventilation hood or open windows while cooking to reduce harmful air pollution. Learn more about the health impacts of using gas in the home.
See if you're eligible for San José Clean Energy (SJCE) discounts	Reach out to SJCE to see if you're eligible for income-qualified monthly discounts on your electricity bills.
Sign up for a Green House Call	Rising Sun offers no cost Green House Calls which include LED light bulbs, smart power strips, high efficiency kitchen and bathroom faucet aerators, high efficiency showerheads.
Try out induction cooking	Check out an induction cooktop for free through the City's Induction Cooktop Checkout Program or purchase one. Try it out for yourself and test out your recipes and dishes on this new, healthier way of cooking.
Learn about the Climate Smart Challenge	Join the City's Climate Smart Challenge and learn how to save energy, money and reduce your carbon footprint by taking action.
Take a deeper dive	**Description**
Upgrade your power source	Make a bigger impact by upgrading to San José Clean Energy's TotalGreen option to get 100% of your electricity from renewable energy sources like solar and wind for just $4 more per month for the average home.
Adapt your energy schedule	Take advantage of time of use rates to lower your electricity bill. Time of use rates offer lower rates during "off-peak hours" and higher rates during "peak" hours.
Monitor your home's air quality	Get an air quality monitor to learn how healthy the air is in your home.
Learn about benefits and incentives to switching to electric	Check out the Switch Is On to learn more about the benefits of switching to electric and about incentives available near you: https://www.switchison.org/
Weatherize your home	One of the most cost effective energy saving measures is to add insulation and seal air leaks in your home, called "weatherization". You can save from 5-15% of your home heating and cooling bills by simply plugging holes.
Build a career in electrification	Learn more about careers in building electrification. Reach out to the work2future.org for information on programs available to enter the workforce. If you are a contractor that can install a heat pump or heat pump water heater, you may be able to earn incentives for installation through TECH Clean California.

...As a homeowner

Easy Actions	Description
Pursue air quality improvements	If you're not in a position yet to replace your gas appliances and stove, ask a contractor about adding air filters to the systems. Inquire about proper ventilation regulations for the technologies installed.
Turn down your water heater temperature	Water heating is typically the second largest energy expense in homes. Turn down your water heater temperature by a few degrees to save money and make your home more energy efficient.
Take a deeper dive	**Description**
Learn about benefits and incentives to switching to electric appliances	Check out BayREN, PG&E, and SJCE's rebates and incentives, and ask the Home Energy Advisor about how you can access these rebate programs to install electric appliances
Learn about benefits and incentives of improving efficiency of your appliances	Energy efficient appliances will lower electricity bills and make electrification easier in the future. Look out for discounts for high efficiency appliances from SJCE's upcoming residential energy efficiency program.
Replace gas appliances with electric ones	Talk to a contractor and make a plan to replace your gas furnace, water heater, stove, and other appliances with electric options. Check out https://www.switchison.org/ for a list of contractors that can install electric appliances.

CHAPTER 5:

5 THE COST OF RESIDENTIAL BUILDING ELECTRIFICATION

Given that residential buildings make up 90 percent of San José's building stock (and generate 34 percent of San José's GHG emissions from buildings), this sector presents a significant opportunity to reduce GHG emissions, achieve operational cost savings, and improve building quality. During this Framework's stakeholder engagement process, many residents expressed interest and concern regarding the cost of home electrification. Chapter 5 summarizes a modeling analysis of upfront and operational costs and savings associated with transitioning all of San José's residential buildings from gas to electricity. Modeling with regard to the average San José home was included due to the high level of community interest in this topic and the potential impact on San José's low-income homeowners and renters. Modeling is based on the best available data specific to San José and the Bay Area; see Appendix E for the full analysis and methodology.

Upfront Costs to Electrify Our Homes

Full home electrification would involve installing the following electric appliances instead of gas appliances:

- Induction or electric resistance stove and oven
- Heat pump HVAC (heating, ventilation, and air conditioning)
- Heat pump water heater
- Heat pump or electric resistance clothes dryer

For homes that have most or all of their systems powered by gas, a complete switch to electric appliances may also require an upgrade to the home's central electrical panel.

The cost of electrifying a specific home will depend on many variables including building size, building age, energy efficiency of the home, age and type of existing appliances, and more. The analysis summarized here was based on 2019 market conditions and used a residential building electrification study conducted by E3 to estimate the average upfront cost of home electrification in San José.[136] The customer economics analysis estimates that for an average San José home:

- Fully electrifying a single-family home would cost $26,000-$31,000 while fully electrifying a multifamily unit would cost $21,000-$25,000. These figures include a panel upgrade, and do not consider incentives or rebates.
- Assuming a single-family home installs central cooling, the installation cost for priority systems (HVAC and hot water) are 14-17 percent less than a retrofit to a new gas appliance plus central cooling. HVAC and hot water systems are priority systems because they make up the majority of both energy use and installation costs.
    - Fully electrifying a single-family home would cost $3,000-$4,000 more than replacing all gas appliances with new gas appliances, when including a panel upgrade.
    - Fully electrifying a multifamily unit would cost $6,000-$10,000 more than replacing all gas appliances with new gas appliances, when including a panel upgrade.
    - The total capital costs of fully electrifying all residential buildings in San José would be approximately $3.8 billion (ranging from $2.7 to $4.7 billion).

The analysis assesses the cost difference between replacing all appliances with new gas appliances compared with replacing it with efficient electric appliances (including a panel upgrade) for single-family and low-rise multifamily homes (see Appendix E for images of these typical building types in San José).

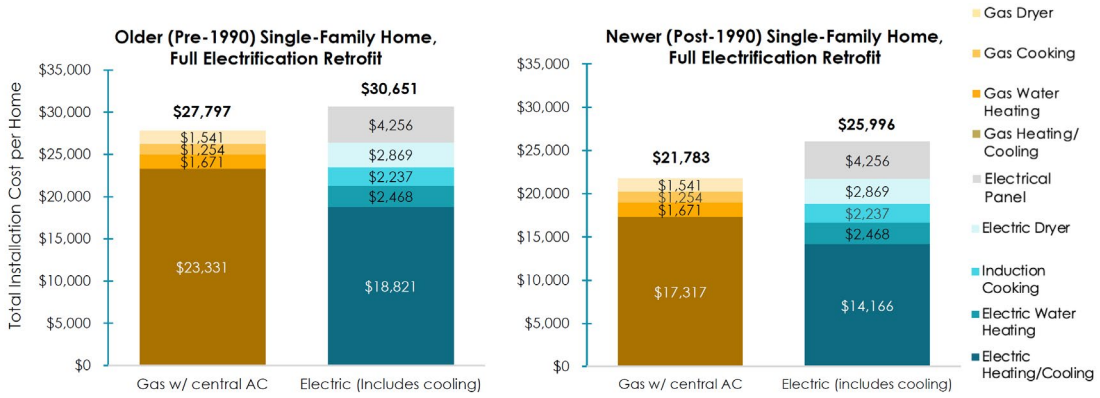


Figure 24: Installation Costs for Single-Family Homes with Central Air Conditioning.

The following analysis compares a home that installs all new gas appliances as well as central cooling ("gas with central AC" bar), compared to a home that installs a heat pump system that provides both heating and cooling ("electric" bar). The cost of full electrification retrofit is $3,000-$4,000 higher than a retrofit to new gas appliances. These costs do not include rebates and incentives.

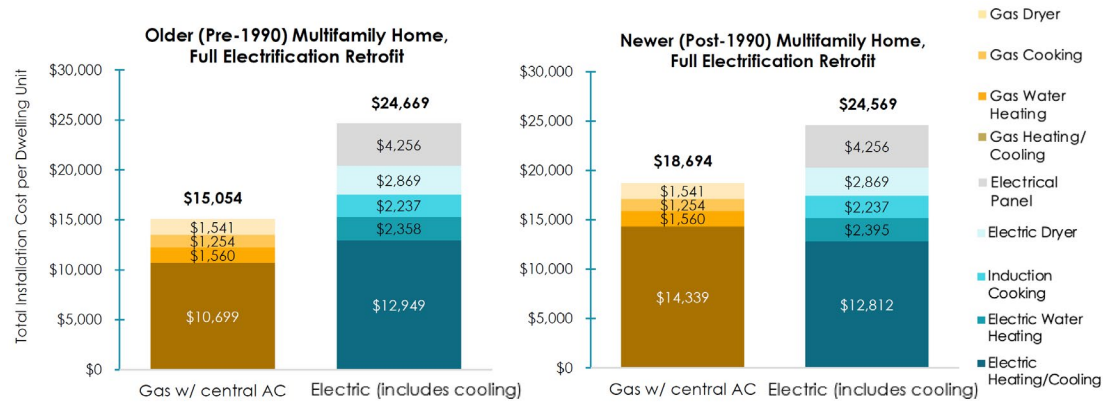


Figure 25: Installation Costs for Multifamily Buildings with Central Air Conditioning.

Comparing a multifamily building that installs all new gas appliances as well as central cooling ("gas with central AC" bar), with a building that installs a heat pump system that provides both heating and cooling ("electric" bar), the cost of a full electrification retrofit is $6,000-$10,000 higher than a retrofit to new gas appliance per unit. Assuming that a multifamily home installs central cooling, the cost of full electrification retrofit is $6,000-$10,000 higher than a retrofit to new gas appliances. These cost comparisons do not include rebates and incentives.

Funding Assistance for Electrification Retrofits

While no or low-cost funding options for electrification will change over time, significant incentives are currently available that can bring down the cost of individual appliances or full home electrification[137], including:

- Up to $11,500 in incentives for single-family homes
    - Heat pump water heater: $500-$4,100
    - Heat pump for space heating and cooling: $1,000-$4,000
    - Induction Stove: $300
    - Clothes dryer: $300
    - Panel upgrade: $2,800
- Up to $8,100 in incentives for multifamily buildings per unit
    - Heat pump water heater: $700-$3,100
    - Heat pump for space heating and cooling: $300-$3,000
    - Induction stove: $350
    - Clothes dryer: $250
    - Panel upgrade: $1,400

In addition, there are a number of programs that can implement electrification and efficiency improvements at low- or no-cost for low-income residents (visit SJCE's Discount Programs webpage for more information).

Operational Cost Impacts

Operating costs are the costs of running appliances and are captured on utility bills. Operating costs can vary based on several variables including:

- Utility rates (comparing gas and electric rates as well as electric rate schedules such as time-of-use),
- Efficiency of the appliance (e.g. older versus newer),
- heating and cooling loads (which can be reduced by increasing the energy efficiency of the home),
- On-site renewable energy (solar photovoltaic),
- Behavior of residents, and
- Outdoor temperature.

The customer economics analysis shows that full electrification of an average home in San José may save up to $1,000 per year with solar, while others may see a cost increase of up to $240 per year without solar. One of the variables that influences operational costs is whether a home is comparing new gas appliances and central air conditioning to electrification, versus window air conditioning units, which remain much less expensive to operate. Homes that electrify instead of installing two systems (new gas appliances and central cooling) will see greater bill savings from electrification (heating and cooling from one heat pump system).

Additional Cost Considerations

Additional variables may significantly improve the operational cost benefits of home electrification. While these variables are still evolving, residents should take particular note of:

- **Time-of-Use (TOU) Electric Rates:** TOU rates provide an opportunity for cost savings when electric appliances can be programmed to run during off peak hours, when electricity is cheapest. Most SJCE residential customers are already on a TOU rate. The CPUC has directed electric utilities, including SJCE, to transition all residential customers to TOU rates. For more information, visit: https://sanjosecleanenergy.org/tou/.[138]
- **Rooftop Solar:** Onsite solar can significantly reduce cost. The addition of onsite solar PV may offer annual energy bill savings, and when paired with battery storage can improve energy resilience during a power outage.

Total Residential Building Electrification Costs

The total upfront cost of electrifying all residential buildings in San José by 2030 is estimated to total $2.7 to $4.7 billion (see Figure 26 below and Appendix E for more information). This range is based on an incremental cost (the additional cost required to electrify compared to a like-for-like gas appliance replacement) for those systems that will reach the end of their useful life by 2030, and the total costs for systems that will need to be replaced before the end of their useful life. Overall, replacing current HVAC systems with high efficiency heat pumps will be the largest cost, followed by electric panel upgrades, which will be necessary in many buildings to have sufficient electrical capacity for all-electric appliances. These costs can be covered through both public and private investments; however new funding sources will almost certainly be required to support building electrification upgrades, especially for low-income individuals and affordable housing. Building electrification **would eliminate 1.05 million metric tons of GHG emissions**, representing 19 percent of San José's community-wide emissions, and equivalent to taking 400,000 gasoline-powered cars off the road.

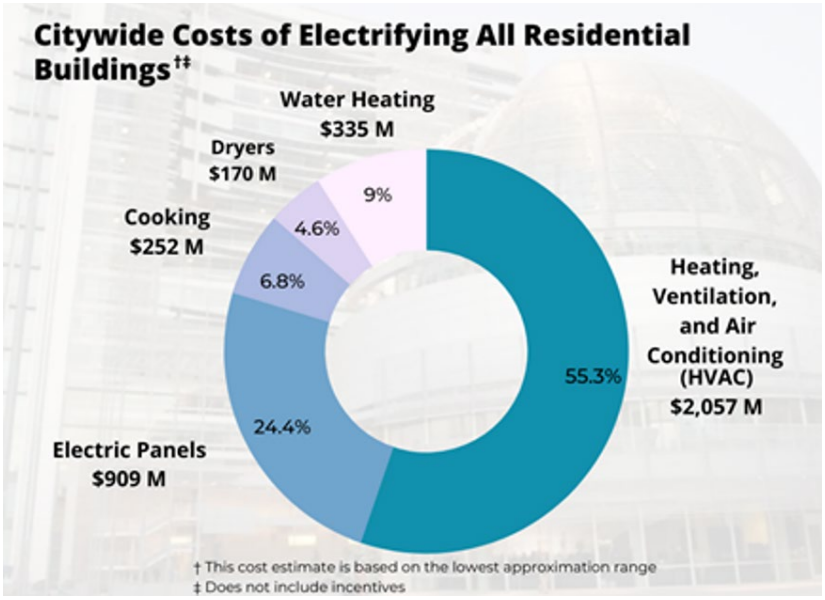


Figure 26: Citywide Residential Building Electrification Costs.[139]

While building electrification will require a significant investment, it is one of the fastest and most cost-effective ways to reduce GHG emissions and reach San José's carbon neutrality goals. Updating and electrifying our homes and businesses will also bring important additional benefits to building occupants such as improved indoor air quality and increased energy reliability. In considering other options, the cost of alternative pathways like renewable natural gas is more expensive–approximately four times as much and would require overcoming significant practical challenges.[140]

The cost of inaction is far higher than investing in electrification. Not taking action means that natural gas appliances will continue to be installed in homes and businesses, resulting in GHG emissions for years to come. The State of California is already moving towards electrification. As more buildings electrify, the shrinking number of natural gas customers will be left bearing the costs of the entire gas infrastructure system. Moreover, the societal and public health cost of relying on natural gas systems will continue to impact our most vulnerable communities, which already bear the brunt of environmental pollutants and climate change impacts. Electrification will protect our most vulnerable communities from these additional costs and burdens, and will benefit society as a whole.

6

CHAPTER 6:
COMMITMENT TO ONGOING COMMUNITY ENGAGEMENT

This Framework is the result of many conversations with CBOs that represent historically marginalized communities, housing advocates, workforce partners, and others who have all dedicated time and energy to building a holistic and inclusive strategy for San José's transition to building electrification. However, the work with the community does not end with the Framework. The City understands the importance of closely partnering with community groups, particularly those groups that work closely with historically marginalized communities, to include voices that must be represented but are too often left out in policy design and implementation.

Even well-intentioned policy can cause harm and exacerbate the challenges facing historically marginalized communities today, including: disproportionate pollution burdens; rising housing and living costs; depressed wages; and ongoing racial discrimination. This Framework lays out an electrification approach and set of actions for the City to pursue. However, ongoing collaboration and consultation with historically marginalized communities and the broader community will be critical to designing specific proposed policies and ensuring that potential risks are mitigated and benefits flow to these communities. Therefore, the City is committed to the following:

Foundational Action #3:

CREATE MORE EQUITABLE AND ACCESSIBLE ENGAGEMENT ACROSS THE CITY

The City commits to improved coordination between City departments to streamline community outreach where possible and synchronize cross-departmental programs to support actions identified in the Framework.

At a minimum, the Environmental Services Department will collaborate with the following departments:

- Housing Department, Community Energy Department, PBCE and OED on development of building electrification policies and affordability efforts
- Office of Emergency Management on integration of clean, backup power options and resilience to disasters
- Office of Economic Development and Housing Department for workforce-related policies

In addition, the City will need to provide culturally competent outreach to historically marginalized communities. Materials must be translated into multiple languages, including short-term outreach on existing program offerings and longer-term resources available through the Retrofit Accelerator program (see action HEC-1.2), as well as materials and meeting information for the Equitable Building Electrification Task Force.

Additional outreach platforms including social media, WhatsApp, community meetings and phone banking should be utilized to conduct outreach directly to community members, particularly when a new program or policy is being designed. Partnering with CBOs that work with historically marginalized groups is critical to outreach success; however, many CBOs are often understaffed and overburdened. The City will need to consider how to resource and support community engagement, including designing a range of accessible opportunities for community members to provide input throughout the decision-making process. Streamlined and formalized community engagement is critical to establishing transparency, including clear communication about timelines, barriers and how solutions built with community input will be integrated into formal plans.

Foundational Action #4:

BUILD A COALITION FOR EQUITABLE BUILDING ELECTRIFICATION

The City commits to pursuing the resources needed to launch an Equitable Building Electrification Task Force (Task Force) that would develop guiding recommendations for the suite of policies and programs necessary to achieve full building electrification.

The Task Force would include a diverse set of San José stakeholders, including representatives from historically marginalized communities, so that solutions are designed to work for all San José residents and workers. It may cover multiple topics, including: affordable housing; public health and air quality; job creation and workforce development; energy system transition; and energy reliability. The task force should be fully representative of the city and include building owners of all types throughout San José.

Key Task Force outcomes can include:

- Provide direction on potential policies to enable and encourage building electrification. The Task Force should explore policies for difficult-to-electrify building sectors such as industrial buildings, as well as smaller buildings not covered by San José's Building Performance Ordinance and single-family homes.
- Identification of key equity considerations for policy development, as well as regulations and solutions for mitigating risks and ensuring equitable outcomes.
- Guidance for the development of supporting programs and actions to make sure that technical and financial assistance are available to all San José buildings and stakeholders, particularly under-resourced buildings.
- Identification of the suite of public and private funding sources that will be necessary to electrify all buildings in San José.
- Recommendations for advocacy at the utility and state level to ensure that infrastructure can support widespread building electrification while minimizing costs and disruptions.
- Co-developed key performance indicators (KPIs) for future programs and policies, including both qualitative and quantitative metrics of success that build on community priorities identified in the Framework.

The City commits to these foundational actions to continue its equitable and community-driven process to design and implement the transition to all-electric buildings. The City acknowledges that this work is just beginning, and that a successful transition is much more likely when all stakeholders have a meaningful say in program and policy design.

7

CHAPTER 7:
CONCLUSION

There is no silver bullet to electrify buildings in San José, and certainly none to do so equitably. This transition is likely to be a multi-pronged approach: incentives as well as requirements, statewide coordination as well as community-led local outreach, and specific solutions that are first piloted and then scaled. The City can play a critical role in coordinating these efforts and ensuring consistent and accountable input from the community to meet the priority outcomes identified in this Framework. With San José's City departments, stakeholders, community leaders, and residents working together, a truly equitable transition is possible that will create healthier and more livable communities, better paying jobs and economic opportunities, and a sustainable and prosperous future for all.

REFERENCES

1 A Resolution of the Council of the City of San José Setting a Goal of Achieving Carbon Neutrality by 2030 and Reaffirming the City Council's Commitment in the City of San José Climate Emergency Resolution, Resolution No. 80284 § (2021). https://sanjose.legistar.com/LegislationDetail.aspx?ID=5204553&GUID=22D9938A-92B9-4EF3-B7F1-1C8765BB1E36&Options=ID%7cText%7c&Search=carbon.

2 Adapted from "Equity and Buildings: A Practical Framework for Local Government Decision Makers." Urban Sustainability Directors Network, American Cities Climate Challenge, Emerald Cities Collaborative, and Upright Consulting Services, June 2021. https://www.usdn.org/uploads/cms/documents/usdn_equity_and_buildings_framework_-_june_2021.pdf.

3 Logue, Jennifer M., Neil E. Klepeis, Agnes B. Lobscheid, and Brett C. Singer. "Pollutant Exposures from Natural Gas Cooking Burners: A Simulation-Based Assessment for Southern California." *Environmental Health Perspectives* 122, no. 1 (January 2014): 43–50. https://doi.org/10.1289/ehp.1306673.

4 Aas, Dan, Amber Mahone, Zack Subin, Michael Mac Kinnon, Blake Lane, and Snuller Price. "The Challenge of Retail Gas in California's Low-Carbon Future - Technology Options, Customer Costs, and Public Health Benefits of Reducing Natural Gas Use." California Energy Commission, April 2020. https://www.energy.ca.gov/publications/2019/challenge-retail-gas-californias-low-carbon-future-technology-options-customer.

5 Aldrich, Bob, Susanne Garfield-Jones, Lana McAllister, Carol Robinson, Carolyn Walker, and Michael Wilson. "Ventilation and Air Quality in New California Homes with Gas Appliances and Mechanical Ventilation." Berkeley, CA: Lawrence Berkeley National Laboratory, March 2020. https://www.energy.ca.gov/sites/default/files/2021-05/CEC-500-2020-023.pdf.

6 Network, Urban Sustainability Directors. "Urban Sustainability Directors Network." Accessed February 4, 2022. https://www.usdn.org/projects/building-performance-standards.html.

7 Petersen, Alisa, and Radhika Lalit. "BETTER RENTALS, BETTER CITY." Basalt, CO: Rocky Mountain Institute, May 2018. https://rmi.org/wp-content/uploads/2018/05/Better-Rentals-Better-City_Final3.pdf.

8 "City of San José 2019 Inventory of Community-Wide Greenhouse Gas Emissions." San José, CA: City of San José, April 2021. https://www.sanjoseca.gov/home/showpublisheddocument/72119/637556292242730000.

9 U.S. Environmental Protection Agency. "Greenhouse Gas Equivalencies Calculator." https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

10 Building Electrification Institute. "San José Customer Economics Analysis." 2022. See Appendix E for full analysis.

11 Citywide Anti-Displacement Strategy. "Citywide Anti-Displacement Strategy | City of San José." Government. Accessed February 4, 2022. https://www.sanjoseca.gov/your-government/departments-offices/housing/resource-library/housing-policy-plans-and-reports/citywide-anti-displacement-strategy.

12 USND. "Resilience Hubs." Accessed February 17 2022. http://resilience-hub.org/.

13 Climate Smart San José. "Climate Smart San José | City of San José." Government. Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/environment/climate-smart-san-jos.

14 Page 14, "Defining Carbon Neutrality for Cities and Managing Residual Emissions| Cities' Perspective & Guidance." C40 Cities | New York City Mayor's Office of Sustainability, April 2019. https://c40-production-images.s3.amazonaws.com/researches/images/76_Carbon_neutrality_guidance_for_cities_20190422.original.pdf.

15 "Climate Smart San José | A People-Centered Plan for a Low-Carbon City." City of San José. Accessed February 11, 2022. https://www.sanjoseca.gov/home/showpublisheddocument/32171/636705720690400000.

16 Resolution No. 80284 § (2021). https://sanjose.legistar.com/LegislationDetail.aspx?ID=5204553&GUID=22D9938A-92B9-4EF3-B7F1-1C8765BB1E36&Options=ID%7cText%7c&Search=carbon.

17 "City of San José 2019 Inventory of Community-Wide Greenhouse Gas Emissions." San José, CA: City of San José, April 2021. https://www.sanjoseca.gov/home/showpublisheddocument/72119/637556292242730000.

18 "City of San José 2019 Inventory of Community-Wide Greenhouse Gas Emissions." City of San José, April 2021. https://www.sanjoseca.gov/home/showpublisheddocument/72119/637556292242730000.

19 "City of San José 2019 Inventory of Community-Wide Greenhouse Gas Emissions." City of San José, April 2021.

20 San José Clean Energy. "San José Clean Energy." Accessed February 3, 2022. https://sanjosecleanenergy.org/.

21 "San José Clean Energy."

22 "San José Clean Energy."

23 "San José Clean Energy."

REFERENCES

24 Commission, California Energy. “2019 California Residential Appliance Saturation Study (RASS).” California Energy Commission. California Energy Commission, current-date. https://www.energy.ca.gov/publications/2021/2019-california-residential-appliance-saturation-study-rass.

25 Berkeley Lab. “Commercial and Industrial Building Heating and Cooling”. Accessed February 16, 2022. https://ees.lbl.gov/commercial-industrial

26 American Council for an Energy Efficient Economy (ACEEE). “Electrifying Space Heating in Existing Commercial Buildings: Opportunities and Challenges”. https://www.aceee.org/research-report/b2004

27 “San José Clean Energy.”

28 Building Electrification Institute. “Building Electrification 101 Presentation.” Accessed February 7, 2022. https://www.beicities.org/be-resources.

29 “Building Electrification 101 Presentation.”

30 Building Electrification Institute. “Building and Housing Stock Analysis.” 2020. See Appendix F for full analysis.

31 “U.S. Census Bureau QuickFacts: San José City, California.” Accessed February 3, 2022. https://www.census.gov/quickfacts/sanjosecitycalifornia.

32 City of San José, CA «Prohibition of Natural Gas Infrastructure in Newly Constructed Buildings», San José Municipal Code. *Ord. 30502, § 1, adopted Dec. 15, 2020*

33 “Existing Buildings | California Air Resources Board.” Accessed February 3, 2022. https://ww2.arb.ca.gov/our-work/programs/building-decarbonization/existing-buildings/.

34 RMI. “Gas Stoves: Health and Air Quality Impacts and Solutions.” Accessed February 3, 2022. https://rmi.org/insight/gas-stoves-pollution-health/.

35 Goldstein, Benjamin, Dimitrios Gounaridis, and Joshua P. Newell. “The Carbon Footprint of Household Energy Use in the United States.” *Proceedings of the National Academy of Sciences* 117, no. 32 (August 11, 2020): 19122–30. https://doi.org/10.1073/pnas.1922205117.

36 “Existing Buildings | California Air Resources Board.” Accessed February 3, 2022. https://ww2.arb.ca.gov/our-work/programs/building-decarbonization/existing-buildings.

37 RMI. “Gas Stoves: Health and Air Quality Impacts and Solutions.” Accessed February 3, 2022. https://rmi.org/insight/gas-stoves-pollution-health/.

38 Powell, John A., Stephen Menendian, and Wendy Ake. “Targeted Universalism | Othering and Belonging Institute.” Haas Institute for a Fair and Inclusive Society at UC Berkeley, May 2019. https://belonging.berkeley.edu/targeted-universalism.

39 Commission, California Energy. “Building Initiative for Low-Emissions Development Program.” https://www.energy.ca.gov/programs-and-topics/programs/building-initiative-low-emissions-development-program/.

40 New Buildings Institute. “Building Electrification Technology Roadmap (BETR).” Accessed February 3, 2022. https://newbuildings.org/resource/building-electrification-technology-roadmap/.

41 Commission, California Energy. “Building Energy Efficiency Standards - Title 24.” California Energy Commission. California Energy Commission, current-date. https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/.

42 Street, Montgomery, and San Francisco. “Consumer Economics, Greenhouse Gases and Grid Impacts.” Greenhouse Gases, 2019, 167.

43 Commission, California Energy. “2021 SB 100 Joint Agency Report, Achieving 100 Percent Clean Electricity in California: An Initial Assessment.” California Energy Commission. California Energy Commission, current-date. https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity/

44 “Bill Text - SB-1477 Low-Emissions Buildings and Sources of Heat Energy.” Accessed February 3, 2022. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1477.

45 Commission, California Energy. “Building Initiative for Low-Emissions Development Program.” California Energy Commission. https://www.energy.ca.gov/programs-and-topics/programs/building-initiative-low-emissions-development-program.

46 “Multifamily Property Owners | Bay Area Regional Energy Network.” Accessed February 3, 2022. https://www.bayren.org/rebates-financing/multifamily-property-owners/.

47 “Single-Family Homeowners | Bay Area Regional Energy Network.” Accessed February 3, 2022. https://www.bayren.org/how-get-started/single-family-homeowners/.

48 “Small and Medium Businesses | Bay Area Regional Energy Network.” Accessed February 3, 2022. https://www.bayren.org/rebates-financing/small-medium-businesses/.

REFERENCES

49 "Homepage | GoGreen Financing." Accessed February 3, 2022. https://gogreenfinancing.com/.

50 "SOMAH | Solar on Multifamily Affordable Housing." Accessed February 3, 2022. https://calsomah.org/.

51 "Make the Switch to an All-Electric Home | The Switch Is On." Accessed February 3, 2022. https://switchison.org/.

52 "San José Reach Code | City of San José." Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/2019-reach-code-initiative/.

53 "News Release: With Expanded Natural Gas Ban, San José Electrifies New Buildings and Leads Toward Green Future." Accessed February 3, 2022. https://www.sanjoseca.gov/Home/Components/News/News/2210/4699.

54 "City of San José to Pledge Carbon Neutrality by 2030 | News | City of San José." Accessed February 3, 2022. https://www.sanjoseca.gov/Home/Components/News/News/3546/4699.

55 "Energy and Water Building Performance Ordinance | City of San José." Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/energy-and-water-building-performance-ordinance/.

56 "Education Programs | City of San José." Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/environment/energy/energy-efficiency-workshops-classes/.

57 "Induction Cooktop Checkout Program | City of San José." Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/induction-cooktop-checkout-program/.

58 San José Clean Energy. "Programs Roadmap." Government, March 2021. https://sanjosecleanenergy.org/wp-content/uploads/2021/03/Roadmap_March-2021.pdf.

59 Liccardo, Sam, Councilmember Sergio Jimenez, Councilmember Raul Peralez, Councilmember Magdalena Carrasco, and Councilmember Dev Davis. Subject: Climate Emergency Resolution, Pub. L. No. 19–837, 7 (2019). https://sanjose.legistar.com/View.ashx?M=F&ID=7699947&GUID=67146566-8468-4E30-8A52-3BA523D8D555%20.

60 "SOMOS Mayfair Community Engagement Philosophy," July 2018. https://static1.squarespace.com/static/59c2ef99e5dd5b9e02e383e7/t/5cd09edbf9619a8727e03e5e/1557176027639/SOMOS+Community+Engagement+Philosophy.pdf.

61 Climate Equity and Community Engagement Toolkit (Emerald Cities Collaborative) "Emerald Cities Collaborative Official Website | Emeraldcities.Org." Accessed February 3, 2022. https://emeraldcities.org/.

62 Smart City PDX. "Smart City PDX Tests New Model for Engaging Community Leaders, Equity Experts — News." Accessed February 15, 2022.

63 Winter Consulting Group. "Winter Consulting Group," Accessed February 9, 2022. https://www.winterconsultants.com.

64 U.S. Census Bureau. Racial Demographics of San José, 2020. https://data.census.gov/cedsci/table?g=1600000US0668000&tid=DECENNIALPL2020.P2 (Accessed on February 16, 2020).

65 U.S. Census Bureau. Racial Demographics of San José, 2020.

66 U.S. Census Bureau, 2019 American Community Survey 1-Year Estimates.

67 Robert K. Nelson, LaDale Winling, Richard Marciano, Nathan Connolly, et al., "Mapping Inequality," American Panorama, ed. Robert K. Nelson and Edward L. Ayers, accessed February 8, 2022, https://dsl.richmond.edu/panorama/redlining/#loc=13/37.328/-121.947&city=san-jose-ca.

68 Robert K. Nelson, LaDale Winling, Richard Marciano, Nathan Connolly, et al., "Mapping Inequality,"

69 CalEPA. "Pollution and Prejudice." ArcGIS StoryMaps, August 17, 2021. https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5.

70 McKenna, Cyd. "The Homeownership Gap : How the Post-World War II GI Bill Shaped Modern Day Homeownership Patterns for Black and White Americans." Thesis, Massachusetts Institute of Technology, 2008. https://dspace.mit.edu/handle/1721.1/44333.

71 San José Digital Inclusion Partnership. "San José Digital Inclusion Partnership." Accessed February 3, 2022. https://www.sjdigitalinclusion.org/.

72 "Building and Housing Stock Analysis".

73 Economic Roundtable. "Outcomes from Rent Stabilization in San Jose." November 2019. https://economicrt.org/wp-content/uploads/2019/11/ERt-San-Jose-ARO-Update-2019-FINAL.pdf

REFERENCES

74 City of San Jose. “Affordable Apartments in San Jose.” September 2021. https://www.sanjoseca.gov/home/showpublisheddocument/77066/637671226674570000

75 Apartment Rent Ordinance, San José Municipal Code. Ord. 30032 § 1 § 17.23 Parts 1-9 (2017). https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT17BUCO_CH17.23REDIMEARDWUNEXMOMOPA.

76 Tenant Protection Ordinance, San José Municipal Code. Ord. 30032. § 1 § 17.23.177 Part 12 (2017). https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT17BUCO_CH17.23REDIMEARDWUNEXMOMOPA_PT2DE_17.23.177TEPROR.

77 Working Partnerships USA. “When Renters Rise, Our City Thrives,” April 2018. https://www.wpusa.org/files/reports/WhenRentersRiseOurCityThrives.pdf.

78 Working Partnerships USA. “When Renters Rise, Our City Thrives,” April 2018.

79 “Energy Burdens in San José.” American Council for an Energy-Efficient Economy. Accessed February 11, 2022. https://www.aceee.org/sites/default/files/pdfs/aceee-01_energy_burden_-_san_jose.pdf.

80 “Energy Burdens in San José.” American Council for an Energy-Efficient Economy.

81 “Building and Housing Stock Analysis.”

82 “Building and Housing Stock Analysis.”

83 “Building and Housing Stock Analysis.”

84 RMI. “Gas Stoves: Health and Air Quality Impacts and Solutions.” Accessed February 3, 2022. https://rmi.org/insight/gas-stoves-pollution-health/. “Gas Stoves: Health and Air Quality Impacts and Solutions.” Rocky Mountain Institute, 2020.

85 Bohn, Sarah, and Tess Thorman. “Income Inequality in California.” Public Policy Institute of California, January 2020. https://www.ppic.org/publication/income-inequality-in-california/.

86 Inclusive Economics with support from the American Cities Climate Challenge. “High Road Workforce Guide for City Climate Action.” Accessed February 7, 2022. https://inclusiveecon.com/high-road-workforce-guide-for-city-climate-action/.

87 UC Berkeley Labor Center. “Low-Wage Work in California.” Accessed February 4, 2022. http://laborcenter.berkeley.edu/low-wage-work-in-california/.

88 UC Berkeley Labor Center. “Low-Wage Work in California.”

89 Inclusive Economics, 2020.

90 “Building and Housing Stock Analysis.”

91 Cardoza, Jacqueline E., Carina J. Gronlund, Justin Schott, Todd Ziegler, Brian Stone, and Marie S. O’Neill. “Heat-Related Illness Is Associated with Lack of Air Conditioning and Pre-Existing Health Problems in Detroit, Michigan, USA: A Community-Based Participatory Co-Analysis of Survey Data.” International Journal of Environmental Research and Public Health 17, no. 16 (August 2020): 5704. https://doi.org/10.3390/ijerph17165704.

92 City of San José. “Energy and Water Building Performance Ordinance.” Environmental Services Department. Accessed February 16, 2022. https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/energy-and-water-building-performance-ordinance

93 “California’s Gas System in Transition | Equitable, Affordable, Decarbonized and Smaller.” Gridworks, September 29, 2019. https://gridworks.org/wp-content/uploads/2019/09/GW_Calif-Gas-System-report-1.pdf.

94 (“California’s Gas System in Transition | Equitable, Affordable, Decarbonized and Smaller” 2019)

95 Network, Urban Sustainability Directors. “Urban Sustainability Directors Network.” Accessed February 4, 2022. https://www.usdn.org/projects/building-performance-standards.html.

96 Petersen, Alisa, and Radhika Lalit. “Better Rentals, Better City.” Basalt, CO: Rocky Mountain Institute, May 2018. https://rmi.org/wp-content/uploads/2018/05/Better-Rentals-Better-City_Final3.pdf.

97 Bay Area Air Quality Management District. “Rules 9-4 and 9-6 Building Appliances.” Accessed February 8, 2022. https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances.

98 Hicks, Austin, and Ariel Fideldy. “Draft 2022 State Strategy for the State Implementation Plan.” California Air Resources Board, 2022. https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf.

REFERENCES

99 "Climate Protection Fund." Accessed February 3, 2022. https://www.denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Climate-Action-Sustainability-Resiliency/Climate-Protection-Fund.

100 ("Climate Protection Fund" n.d.)

101 Denver | The Mile High City. "Energize Denver Task Force." Government. Accessed February 3, 2022. https://www.denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Climate-Action-Sustainability-Resiliency/High-Performance-Buildings-Homes/Energize-Denver-Task-Force.

102 City of San José. "Building Electrification and Electric Vehicle Charging Infrastructure Rebates and Incentives." https://www.sanjoseca.gov/home/showpublisheddocument/81656/637789738614600000.

103 Pacific Gas and Energy Company. "Apply for a Monthly Discount through CARE and FERA." Accessed February 3, 2022. https://www.pge.com/en_US/residential/save-energy-money/help-paying-your-bill/longer-term-assistance/care/care.page?WT.mc_id=Vanity_carefera.

104 California Department of Community Services and Development. "Low-Income Weatherization Program." Government. Accessed February 7, 2022. https://www.csd.ca.gov/Pages/Low-Income-Weatherization-Program.aspx.

105 California Department of Community Services and Development. "Weatherization Assistance Program." Government. Accessed February 7, 2022. https://www.csd.ca.gov/Pages/Residential-Energy-Efficiency.aspx.

106 San José Clean Energy. "Discount Programs." Accessed February 16, 2022. https://sanjosecleanenergy.org/discount-programs/#toggle-id-12.

107 Pacific Gas and Energy Company. "Apply for a Monthly Discount through CARE and FERA." Accessed February 3, 2022. https://www.pge.com/en_US/residential/save-energy-money/help-paying-your-bill/longer-term-assistance/care/care.page?WT.mc_id=Vanity_carefera.

108 Family Home Improvements. "What Is the REEL Program?" Accessed February 4, 2022. https://familyhomeimprovements.net/what-is-the-reel-program/.

109 "Issue Brief: Low-Income Energy Efficiency Financing through On-Bill Tariff Programs | Clean Energy for Low-Income Communities Accelerator." United States Department of Energy, May 2019. https://betterbuildingssolutioncenter.energy.gov/sites/default/files/IB%20L-I%20EE%20Financing%20through%20On-Bill%20Tariffs_Final_0.pdf.

110 Portland.gov. "About PCEF." Accessed February 9, 2022. https://www.portland.gov/bps/cleanenergy/about.

111 "Detailed Descriptions of Anti-Displacement Strategy Recommendations." City of San José, August 10, 2020. https://sanjose.legistar.com/View.ashx?M=F&ID=8772030&GUID=CABC65D7-A63C-4E4B-9010-6A2ED1D7E3BC.

112 Boston.gov. "Building Emissions Reduction and Disclosure," September 29, 2021. https://www.boston.gov/departments/environment/building-emissions-reduction-and-disclosure.

113 "City of St. Louis's Energy Benchmarking Ordinance." Accessed February 4, 2022. https://www.stlbenchmarking.com/Building-Energy-Performance-Standards.

114 NYC Sustainable Buildings | NYC.gov. "Local Law 97 - Sustainable Buildings." Government. Accessed February 4, 2022. https://www1.nyc.gov/site/sustainablebuildings/ll97/local-law-97.page.

115 Department of Energy and Environment | DC.gov. "Building Energy Performance Standards (BEPS) | Ddoe." Government. Accessed February 4, 2022. https://doee.dc.gov/service/building-energy-performance-standards-beps.

116 Zhu, Yifang, Rachel Connolly, Yan Lin, Timothy Mathews, and Zemin Wang. "Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California – Center for Occupational and Environmental Health." UCLA Department of Environmental Health Sciences Research, April 2020. https://coeh.ph.ucla.edu/effects-of-residential-gas-appliances-on-indoor-and-outdoor-air-quality-and-public-health-in-california/.

117 Aldrich, Bob, Susanne Garfield-Jones, Lana McAllister, Carol Robinson, Carolyn Walker, and Michael Wilson. "Ventilation and Air Quality in New California Homes with Gas Appliances and Mechanical Ventilation." Berkeley, CA: Lawrence Berkeley National Laboratory, March 2020. https://www.energy.ca.gov/sites/default/files/2021-05/CEC-500-2020-023.pdf.

118 Aldrich et al. 2020

119 Buonocore, Jonathan J., Parichehr Salimifard, Drew R. Michanowicz, and Joseph G. Allen. 2021. "A Decade of the U.S. Energy Mix Transitioning Away from Coal: Historical Reconstruction of the Reductions in the Public Health Burden of Energy." Environmental Research Letters 16 (5): 054030. https://doi.org/10.1088/1748-9326/abe74c.

REFERENCES

120 Seals, Brady, and Andee Krasner. “Gas Stoves: Health and Air Quality Impacts and Solutions.” Rocky Mountain Institute, Physicians for Social Responsibility, Mothers Out Front, Sierra Club. Accessed February 3, 2022. https://rmi.org/insight/gas-stoves-pollution-health/.

121 Aldrich et al. 2020

122 “Make the Switch to an All-Electric Home | The Switch Is On.” Accessed February 3, 2022. https://switchison.org/.

123 Climate Smart San José. “Climate Smart San José | City of San José.” Government. Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/environment/climate-smart-san-jos.

124 “Induction Cooktop Checkout Program | City of San José.” Accessed February 3, 2022. https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/induction-cooktop-checkout-program.

125 City of San José. “Building Electrification”, “Resources Section”, “Health Impacts Flyer. Accessed February 16, 2022. https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/climate-smart-san-jos/existing-building-electrification

126 Santa Clara County Consumer Protection Division. “Healthy Nail Salon Program - Consumer Protection Division - County of Santa Clara.” Government. Accessed February 7, 2022. https://cpd.sccgov.org/programs-and-services/healthy-nail-salon-program.

127 California Green Business Network. “California Green Business Network.” Accessed February 7, 2022. https://greenbusinessca.org/SantaClaraCounty.

128 GoGreen Financing. “Financing for Small Business Energy Efficiency Projects.” Accessed February 7, 2022. https://gogreenfinancing.com/smallbusiness.

129 “Small and Medium Businesses | Bay Area Regional Energy Network.” Accessed February 3, 2022. https://www.bayren.org/rebates-financing/small-medium-businesses.

130 Mission Asset Fund. “BayREN Business Microloans Are 0 percent Interest Loans to Help You Buy Energy-Saving Lights and Appliances for Your Business.” Accessed February 7, 2022. https://www.missionassetfund.org/bayren/.

131 Jones, Betony, Jason Karpman, Molly Chlebnikow, and Alexis Goggans. “California Building Decarbonization Workforce Needs and Recommendations.” UCLA Luskin Center for Innovation and Inclusive Economics, November 2019. https://innovation.luskin.ucla.edu/california-building-decarbonization/.

132 Lehmann, Sarah, Nate Hunt, Cobi Frongillo, and Philip Jordan. “Diversity in the U.S. Energy Workforce: Data Findings to Inform State Energy, Climate, and Workforce Development Policies and Programs.” National Association of State Energy Officials (NASEO), BW Research Partnership, HBCU CDAC, April 25, 2021. https://www.naseo.org/data/sites/1/documents/publications/Workforce%20Diversity%20Data%20Findings%20MASTER%20Final42.pdf.

133 Los Angeles County Economic Development Program. “Local Worker Program,” May 30, 2017. https://economicdevelopment.lacounty.gov/local-worker-program/.

134 California, State of. “High Road Training Partnerships | CWDB.” Government. Accessed February 7, 2022. https://cwdb.ca.gov/initiatives/high-road-training-partnerships/.

135 Golden, Rachel. “Electrification for Climate Resiliency.” Sierra Club, October 9, 2019. https://www.sierraclub.org/articles/2019/10/electrification-for-climate-resiliency.

136 Mahone, Amber, Charles Li, Zack Subin, Michael Sontag, Gabe Mantegna, Alexis Karolides, Alea German, and Peter Morris. “Residential Building Electrification in CaliforniaConsumer Economics, Greenhouse Gases and Grid Impacts.” San Francisco, CA: Energy and Environmental Economics, Inc. (E3), April 2019. https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf.

137 Please note these incentive amounts are accurate as of February 2022, and are subject to change.

138 San José Clean Energy. “Time-of-Use Rate Transition”. Accessed February 17 2022.

139 “San José Customer Economics Analysis.”

140 Aas, Dan, Amber Mahone, Zack Subin, Michael Mac Kinnon, Blake Lane, and Snuller Price.2020. The Challenge of Retail Gas in California’s Low-Carbon Future: Technology Options, Customer Costs and Public Health Benefits of Reducing Natural Gas Use. California Energy Commission. Publication Number: CEC-500-2019-055-F.

Appendix A: Definitions

- **Air Source Heat Pump:** Air source heat pumps transfer heat from the outside air into a building to provide heating and also perform the reverse action to remove heat from inside a building to provide cooling. Compared to ground and water source heat pumps, air source heat pumps are a less expensive all-electric space heating and cooling option, and are often more appropriate in dense urban environments.
- **Building Decarbonization:** Building decarbonization refers to the effort to advance a variety of initiatives that reduce greenhouse gas emissions from buildings, including but not limited to building electrification. Other elements of building decarbonization include improving the energy efficiency of a building, utilizing 100 percent carbon-neutral power for buildings (such as installing on-site solar PV or choosing 100 percent renewable energy from SJCE) and installing battery storage, among other technologies.
- **Building Electrification:** The process of converting building systems that use fossil fuels (gas, oil or propane) to electric equipment that can ultimately be powered by emissions-free electricity. Building electrification can also include conversion of inefficient electric heating technologies to high-efficiency heating technologies.
- **Community Co-Creation:** A process of deep, iterative collaboration between government staff and leaders who are rooted in and accountable to historically marginalized communities. The purpose of community co-creation is to design City policies and programs that simultaneously achieve climate targets and advance equity.
- **Electric Grid:** The electric grid is the infrastructure system that delivers electricity from its generation source (such as gas-fired power plants or utility-scale solar energy developments) to the customers that use it for their daily needs. The grid's countless complex interconnections exist across three main sections: electricity generation, transmission over longer distances and distribution to customer homes and businesses.
- **Energy Efficiency:** Energy efficiency refers to the process of using less energy to perform an equivalent amount of work. Energy efficient technologies and strategies for buildings include weatherization/insulation, heating distribution improvements, LEDs and low-flow water fixtures.
- **Equity:** Fairness and justice in policy, practice and opportunity consciously designed to address the distinct challenges of non-dominant social groups, with an eye to equitable outcomes. There are three different forms of equity that can be advanced through design and decision-making:
    - **Procedural Equity:** Ensuring that processes are fair and inclusive in the development and implementation of any program or policy.
    - **Distributional Equity:** Ensuring that resources or benefits and burdens of a policy or program are distributed fairly, prioritizing those with highest need first.
    - **Structural (Intergenerational) Equity:** A commitment and action to correct past harms and prevent future negative consequences by institutionalizing accountability and decision-making structures that aim to sustain positive outcomes.

- **Greenhouse Gas (GHG) Emissions:** GHG emissions, which come primarily from the burning of fossil fuels, trap heat in the Earth's atmosphere, leading to a warming climate (climate change). These emissions include carbon dioxide, methane, nitrous oxide and fluorinated gasses such as chlorofluorocarbons and hydrochlorofluorocarbons.

- **Ground Source (Geothermal) Heat Pumps:** Ground source heat pumps transfer heat from the ground (as opposed to the air) to inside a building. They can provide whole-building heating, cooling and hot water at the highest efficiencies.

- **Heat Pump Water Heater (HPWH):** Heat pump water heaters (HPWHs) transfer heat from the indoor or outdoor air into a storage tank to heat water. HPWHs require significantly less energy to provide the same amount of hot water as a gas water heater. They can be more than 100 percent efficient because they transfer heat instead of generating it.

- **Historically Marginalized Communities:** Historically marginalized communities are those excluded from or underrepresented in mainstream social, economic, educational and/or cultural life. Examples of marginalized populations include, but are not limited to, groups excluded due to race, gender identity, sexual orientation, age, physical ability, language and/or immigration status. Marginalization occurs due to unequal power relationships between social groups., In the U.S., marginalization stems from years of state-sanctioned policies, practices, procedures and attitudes that are based on social identities and that advantage one social group over another. Historically, this has happened to many groups, especially on the basis of race and nation of origin.

- **Induction Stoves:** Induction stoves are stoves or stove tops that use electricity to directly heat pots and pans through a magnetic current, rather than a heat source. Benefits of induction stovetops include precise and rapid temperature control, elimination of indoor air pollutants by avoiding fossil fuel combustion, and reduction of fire and burn risk.

- **Minority- or Woman-Owned Business Enterprise (MWBE):** The acronym "MWBE" is commonly used in policy making as a combined reference to both minority-owned and/or woman-owned businesses.

- **Minority-Owned Business Enterprise (MBE):** The minimum requirements to qualify as a MBE are:

    * A business owned by a person of color by federal eligibility requirements, including people from Asian-Indian, Asian-Pacific, Black, Hispanic and Native American heritage.

    * The business is at least 51 percent owned by such individuals or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more such individuals (i.e. the management and daily operations are controlled by those minority group members).

    * Business owners are U.S. Citizens or legal residents.

- **On-site Solar Photovoltaics (PV):** On-site solar PV is an installation on or near a building that can provide solar energy to a building. On-site solar PV can help offset electricity costs for heat pumps, depending on local net energy metering rules.

- **Public Safety Power Shutoffs (PSPS):** A PSPS is a safety procedure utilized by electric utilities to proactively turn off power when and where conditions present an increased wildfire risk. The practice of de-energization as a last resort for public safety is regulated by the California Public Utilities Commission (CPUC).

- **Racial Equity:** Both a process and an outcome, racial equity is designed to center anti-racism, eliminate systemic racial inequities, and acknowledge the City of San José's historical and existing practices that have led to discrimination and injustices to Black, Indigenous, Latino/a/x, Asian and Pacific Islander communities. The racial equity process explicitly prioritizes communities that have been economically deprived and underserved, and establishes a practice for creating psychologically safe spaces for racial groups that have been most negatively impacted by policies and practices. It is action that prioritizes liberation and measurable change, and centers lived experiences of all impacted racial groups. It requires the setting of goals and measures to track progress, with the recognition that strategies must be targeted to close the gaps. As an outcome, racial equity is achieved when race can no longer be used to predict life outcomes, and everyone can prosper and thrive.,

- **Smart Controls:** Smart controls are devices that can be used to automate building operations to maximize energy use and cost savings (e.g. by programming energy usage when electricity rates are lower). Grid-enabled smart controls can also be integrated with the electric grid to allow for active grid management that can help prevent electricity shortages or blackouts.

- **Solar Power + Battery Storage:** Often referred to as "Solar + Storage," this term refers to packaging together the installation of on-site solar PV for a building while also installing on-site backup battery storage that can store extra solar power generated by the solar panels for use when needed.

- **Under-resourced Buildings:** Buildings that are under-resourced lack equitable access to financial resources and capital, as well as in many cases access to technical expertise, to maintain building health, safety and basic infrastructure, often resulting in neglected, unsafe or outdated building conditions.

- **Women-owned Business Enterprise (WBE):** The minimum requirements to qualify as a WBE with the Women's Business Enterprise National Council (WBENC) or a WBE program administered by a city, county or state are:

    * A for-profit business located in the United States;

    * 51 percent owned by a woman, or a group of women who, but for an inheritance, contributed a proportionate amount of capital to acquire ownership;

    * When applicable, the governing board is controlled by a woman or a group of women;

    * The top executive officer responsible for daily operations is a woman with technical expertise (experience) in the firm's primary business activity; and

    * Women business owners are U.S. citizens or legal residents.

Appendix B: Summary of Equitable Building Electrification Actions

Appendix B: Summary of Equitable Building Electrification Actions

Below is a summary of the actions in Chapter 5 of this Plan, including a preliminary analysis of the staffing and budget that may be required to achieve them. Please note the budget does not include direct incentives to building owners for retrofits. Staffing estimate may include existing staff time.

LEGEND

Staffing Estimate:		Non-Staffing Budget Estimate:	
O ○ ○	0.25 to 1 Staff Full-Time Equivalent	$ $ $ $	Under $100,000
O O ○	2 to 3 Staff FTE	$ $ $ $	$100,000 to $500,000
O O O	Over 4 Staff FTE	$ $ $ $	$500,000 to $1,000,000
		$ $ $ $	Over $1,000,000

Foundational Actions

Actions	Staffing Estimate	Non-Staffing Budget Estimate
Foundational Action #1: Engage the community in the evaluation of policy options supporting building electrification.	O O O	$ $ $ $
Foundational Action #2: Invest in supportive programs and resources to enable an equitable building electrification transition.	O O O	$ $ $ $
Foundational Action #3: Create more equitable and accessible engagement across the City.	O O ○	$ $ $ $
Foundational Action #4: Build a coalition for equitable building electrification, including launch of an Equitable Building Electrification Task Force.	O O O	$ $ $ $

Housing & Energy Costs

Actions	Staffing Estimate	Non-Staffing Budget Estimate
HEC-1.1 Provide more information on the costs of building electrification.	O ○ ○	$ $ $ $
Create an online Zero Carbon Hub that serves as the City's central information location for Climate Smart and building electrification resources.		
Share and interpret case studies and customer economic analyses.		
Assess and share existing cost planning tools to help guide economic decision-makers.		
Ensure all new programs or pilots track data on the cost impacts by types of tenants, owners, and decision-makers.		
HEC-1.2 Launch a "Retrofit Accelerator" program, designed to streamline building retrofits and ensure building owners can access existing incentives.	**See Foundational Action #2.**	**See Foundational Action #2.**
HEC-1.3 Expand awareness of and access to existing rebate programs.	O ○ ○	$ $ $ $
Conduct targeted outreach to low-income and fixed-income renters and homeowners about income-qualified programs.		
Work with local CBOs to promote BayREN, SJCE, and PG&E rebate programs.		
Streamline permits for electrification measures where possible.		
Provide assistance in applying to programs for historically marginalized communities.		
HEC-1.4 Identify sustainable funding sources and accessible financing options.	O ○ ○	$ $ $ $
Identify existing, sustainable funding sources for both low-income homeowners and renters.		
Identify new sources of funding that address critical gaps in existing funding sources.		
Promote existing financing options like REEL, and explore scalable offerings like Tariffed On-Bill Financing.		
Advocate for a state-level building decarbonization and managed gas transition plan to reduce public subsidies to fossil fuel infrastructure and ensure state and utility investments in electrification.		
HEC-2.1 Pair electrification and energy efficiency funding with affordable housing preservation programs.	O O O	$ $ $ $
HEC-2.2 Identify solutions to avoid pass-through costs of upgrades to low-income renters.	O ○ ○	$ $ $ $
HEC-2.3 Create affordability and tenant protections within a "Retrofit Accelerator" program.	**See Foundational Action #2.**	**See Foundational Action #2.**
Explore how to include tenant protections and affordability requirements tied to funding sources offered through a "Retrofit Accelerator" program.		
Coordinate potential opportunities for tenant outreach, such as hotlines for tenants to lodge complaints if building owners harass or raise costs for tenants.		
Identify solutions to avoid pass-through costs of upgrades to renters, with specific solutions for uncovenanted low-cost housing.		
HEC-3.1 Invest in existing training programs to provide comprehensive contractor training to ensure quality installations.	**See HQJ-2.3.**	**See HQJ-2.3.**
HEC-3.2 Identify and explore solutions to scale electrification that may reduce installation costs for electric technologies and upgrades.	O ○ ○	$ $ $ $
Partner with regional efforts to pilot bulk purchasing programs for electrification appliances to bring down appliance costs.		
Pilot a "targeted electrification" or "strategic decommissioning" project with PG&E to avoid planned gas infrastructure upgrades and unlock investments for electrification upgrades.		
HEC-3.3 Consider changes to electricity rate design that benefit residential and commercial customers who electrify.	O ○ ○	$ $ $ $
HEC 3.4 Evaluate the need to update San José's Building Performance Ordinance, which currently tracks energy and water usage in large buildings and requires energy efficiency actions, to understand the efficacy of requiring fuel switching or emission reductions that work towards carbon neutrality goal. Integrate building electrification as a key pathway.	**See Foundational Action #1.**	**See Foundational Action #1.**

Air Quality and Health

Actions	Staffing Estimate	Non-Staffing Budget Estimate
AQH-1.1 Invest in community-led outreach efforts to impacted communities and integrate information on electrification.	O ○ ○	$ $ $ $
Fund CBOs to design culturally appropriate outreach campaigns about building electrification in the historically marginalized communities they work closely with.		
AQH-1.2 Advocate for health messaging in outreach for existing building electrification programs, and ensure that information on health benefits and resources reach historically marginalized communities.	O ○ ○	$ $ $ $
Integrate health messaging, leading with community priorities and concerns and tailoring it for historically marginalized communities, into existing City-run or City-driven campaigns such as the City's Climate Smart Challenge.		
Improve the City's Induction Cooktop Checkout Program.		
AQH-1.3 Provide opportunities to better understand air quality in the home.	O ○ ○	$ $ $ $
Partner with research organizations and local CBOs to pilot a program that provides air quality monitoring devices to households.		
Include education about air quality in contractor training and information sharing by City departments (such as the Permit Center), including messaging contractors can share with their customers.		
AQH-2.1 Improve existing rebate programs to address air quality outcomes and incorporate health messaging.	O ○ ○	$ $ $ $
Coordinate with BayREN, SJCE, and PG&E program implementers to integrate air quality measures such as air quality testing,		
AQH-2.2 Design a "Retrofit Accelerator" program that can also support health and safety upgrades in buildings alongside electrification, prioritizing funding and assistance for middle- and lower-income households.	**See Foundational Action #2.**	**See Foundational Action #2.**
Develop a program model that will help building owners stack several funding sources so health and safety upgrades can be integrated into a building electrification retrofit, particularly for low-income homeowners and multifamily buildings with low-income tenants.		
Coordinate with existing rebate program implementers to ensure they dedicate resources to reaching low-income communities.		
Integrate air filtration and ventilation upgrades into the services offered by the Retrofit Accelerator program.		
Provide assistance to small- and medium-sized businesses to access existing rebate programs.		
Dedicate technical support for small- and medium-food service businesses to convert their commercial kitchens to all-electric technologies.		
AQH-2.3 Support regional and State policy efforts to enact appliance emissions standards that will eventually phase out gas appliances and to require a statewide all-electric new construction code.	O ○ ○	$ $ $ $
AQH-2.4 Research additional requirements and measures to mitigate industrial GHG emissions, particularly in historically marginalized communities.	O ○ ○	$ $ $ $

High Quality Job Opportunities

Actions	Staffing Estimate	Non-Staffing Budget Estimate
HQJ-1.1 Assist contractors from historically marginalized communities to become qualified contractors for existing electrification incentive programs.	O O O	$ $ $ $
Advocate for program implementers to conduct stakeholder research on barriers to entry (like language barriers to training, licensing, and exams), and work with implementers of existing programs to remove barriers.		
Ensure City-led, funded, or promoted trainings are accessible by ensuring that they are offered in a range of languages, times, and locations.		
Work with partners to integrate building electrification into curricula at local vocational schools or high school career technical education (CTE) courses.		
Work with work2future and other workforce groups to connect graduates of local workforce development programs that serve communities of color to existing employers in electrification.		
HQJ-2.1 Build relationships with labor unions and advocates, workers, and employers.	O O O	$ $ $ $
Establish a workforce development working group to support the growth of high road building electrification jobs in San José.		
HQJ-2.2 Participate in regional efforts to promote the creation of high-road jobs.	O O O	$ $ $ $
HQJ-2.3 Invest in existing training partners to provide comprehensive contractor training to ensure quality installations.	O O O	$ $ $ $
HQJ-2.4 Improve permit compliancee (i.e. obtaining the required permits for electrification upgrade work) so that all-electric technologies may be installed safely and efficiently.	O O O	$ $ $ $
HQJ-3.1 Advocate to the State and PG&E for thoughtful planning and engagement to ensure that pipefitters and workers in the gas industry are protected and can participate in the transition to all-electric buildings or other comparable workforce opportunities.	O O O	$ $ $ $
Advocate for funding and strategic planning to assist in retraining and protection efforts for pipefitters and workers in the gas industry.		
HQJ-3.2 Identify further policies and programs with labor and workforce stakeholders to mitigate negative impacts to pipefitters and workers in the gas industry.	**Included in HQJ-2.1.**	**Included in HQJ-2.1.**

Clean and Reliable Energy

Actions	Staffing Estimate	Non-Staffing Budget Estimate
CRE-1.1 Create Community Resilience Hubs to provide safe and comfortable spaces for residents to access during emergencies.	O O O	$ $ $ $
Conduct a study to assess backup power options at potential Community Resilience Hubs that could combine heat pump retrofits for heating and cooling.		
Conduct additional community engagement about the services that would be most needed by nearby communities during extreme events and integrate into programming offered at Resilience Hubs.		
Identify funding for needed electrification upgrades to Resilience Hubs, as well as funding to train and support community leaders and groups that help run the building as a critical facility during extreme events.		
CRE-1.2 Contribute to the creation of a resilient electric grid.	O O O	$ $ $ $
Identify programs and policies with utility partners that promote grid resilience--including demand response, high-efficiency appliances, energy efficiency, grid-interactive technology and battery storage--and integrate into offerings of existing or new programs.		
Incorporate resiliency and energy reliability opportunities in future policy requirements, to ensure backup power options are powered by clean energy.		
CRE-2.1 Improve and expand existing programs to help building owners install renewable energy, cooling, and clean energy storage options.	O O O	$ $ $ $
Coordinate with program implementers to expand awareness of existing resiliency and backup power programs and ensure dedicated resources for reaching historically marginalized communities.		

Appendix C: Co-Creation Process

Chapter 2 of this Framework describes many of the details about the co-creation process used to develop this Framework, as well as the partnerships with the co-creation consultants. This appendix section includes additional details on the City's research process to prepare for co-creation, as well as a variety of lessons learned from the process.

City Preparation Work

Prior to engaging community groups, the City conducted research on a variety of topics, both internally related to City process and policies, as well as externally to better understand who their community partners are and what their focus and priorities are. This preparation work was integral to the City critically analyzing the need for a new way of City-community engagement and building a vision for their role moving forward with a co-creation process. This research process ensured that the City would be better prepared to provide resources and build connections with their co-creation partners.

The City preparation work included:

- City Equity Commitments: Review of City equity goals and guidance to understand the perspective of various City departments to date.
- Maps of Historically Marginalized Communities: Perform preliminary GIS analysis of adverse environmental, affordability, and health impacts felt by historically marginalized communities in San José, particularly the impacts related to buildings.
- Community Groups: Develop a list of community groups in San José, both involved in sustainability and those more involved in direct service with certain historically marginalized communities. This helped inform conversations about selecting a co-creation consultant, as well as options for broader community engagement.
- Community Reports: Conduct a literature review of various reports published by local community groups. Topics included displacement, gentrification, and housing.
- Building and Housing Stock Analysis: Create a building stock dataset with several sources mapped together in order to understand the overlap across specific communities, building decision-makers, and building typologies.
- Existing Policies and Programs: Prepare a list of existing City policies and programs to map out the relevant actions the City had already taken.
- Compensated Collaboration: Identify funding to compensate both the co-creation partners for their collaboration work, as well as additional engagement opportunities with other CBOs.

Lessons Learned

- **Defining and Refining Purpose:** The City identified the intended purpose, outcomes, and process for the development of this Framework prior to reaching out to community groups. This was helpful to clearly identify what was being asked, however, the City remained adaptable and refined their purpose during the co-creation process to ensure they aligned with the CBOs' input. It was helpful to not come empty-handed to community groups, but rather begin with a suggested purpose, and then build on that with the co-creation team. This shared purpose was a touchstone at the beginning of every co-creation meeting, which the team said was helpful to ground each conversation.

- **Relationship Building:** It's critical to honor the importance of relationship building when working with community group partners, especially if it's for the first time. Local governments throughout the county and in San José have a history of deliberately excluding and discriminating against historically marginalized communities, and trust building is often required for productive work and partnership to occur today. For this co-creation process, both ICAN and Veggielution were more than gracious with their time, and they were willing to share their expertise and knowledge of the communities they represented. It was still vital to set aside time to ensure that trust was honored and built into the process. This showed up in several ways, such as dedicating staff capacity toward requests, questions, additional meetings, and adapting the meeting formats to meet the needs of each group as sufficiently as possible. Additional needs included:

    * Building Electrification 101 presentations with each organization's staff
    * Electrification Costs 101 presentations to discuss affordability concerns
    * Developing a flier on home electrification for Veggielution's farm share, translated into Vietnamese and Spanish
    * Presentation for ICAN's Air Quality Ambassadors to discuss the connection between building electrification and air quality

- **Planning Sufficient Time and Capacity:** Given the additional work that was required to ensure a truly collaborative co-creation process, another lesson learned is that this should be scoped into both the budget and the timeline from the beginning of the project. Too often, equitable processes are sacrificed for the sake of adhering to a timeline or due inadequate budget. During the co-creation process, cities must be responsive and adaptive to community organizations' capacities and needs.

- **Language Accessibility:** In many cities, historically marginalized communities include people who do not speak English as their first language. It is critical to the co-creation process that the partners work together to ensure needs are still met for non-English speakers. Strategies can include ample resources and budget for translation of both written materials and verbal events, incorporating more discussion time to talk through topics at a slower pace, incorporating descriptive imagery, and others. It is a key element of relationship-building to demonstrate this commitment to truly accessible collaboration. During the San José co-creation process, the team had not planned for significant translation, but in the end this was a major priority for the group and the City worked with partners to ensure the need was met.

- **Transforming Community Priorities to Policies:** One success coming out of this process was hearing from the co-creation partners that the City accurately incorporated community priorities in the policies of this Framework. In order to identify the priorities for each community group, the team began with a broad brainstorm of all needed services in the community, then connecting them to areas of building electrification, and ultimately potential solutions. It was an important finding that although there was a desire to remain an open and collaborative process, the onus of making these connections was on the technical staff. These co-creation conversations need to remain iterative--hearing community priorities, translating to policies and programs, then confirming what was heard and understood, and vetting and iterating on those options. This was also a much easier process for short-term solutions, where the community had critical input on how to implement programs or outreach. Longer-term or requirement-based solutions were more difficult to facilitate feedback on, as the parameters of how those strategies are implemented is what most impacts vulnerable or historically marginalized communities.

Appendix D: Summary of Community and Stakeholder Input

During the Framework development, the City and technical partners met with various stakeholders to ensure goals, priorities, and concerns heard during the co-creation process were vetted and validated by a larger audience (see Chapter 2 for more detail on this process). This targeted stakeholder outreach included workshops facilitated by Winter Consulting, individual conversations with community groups, as well as small focus groups.

List of Groups for Targeted Engagement

- Acterra
- Affordable Housing Network
- African American Community Service Agency
- Allied Housing/Abode Services
- Bloom Energy
- California Housing Partnership Coalition
- CarbonFreeSV
- Catalyze SV
- CHAM Deliverance Ministry
- Climate Reality Project, Santa Clara County chapter
- Eden Housing
- Grail Family Services
- Guadalupe River Park Conservancy
- International Children Assistance Network (ICAN)
- Latinos United for a New America (LUNA)
- Law Foundation of Silicon Valley
- Legal Aid At Work
- Local 332 International Brotherhood of Electrical Workers
- Local 393
- MenloSpark, Fossil Free Buildings Silicon Valley campaign
- MidPen Housing
- Mothers Out Front San José/Silicon Valley
- People Acting in the Community Together (PACT)
- Santa Clara and San Benito Counties Building and Construction Trades Council
- Santa Clara County Electrical Joint Apprenticeship Training Center
- School of Arts and Culture at Mexican Heritage Plaza
- Sierra Club (Loma Prieta Chapter)
- Silicon Valley Climate Reality
- Somos Mayfair
- South Bay Community Land Trust
- South Bay Labor Council
- South Bay Progressive Alliance
- Sustainable Silicon Valley
- SV@Home
- Veggielution
- Viet Voters
- Vietnamese American Cultural Center (VAC)
- Vietnamese American Roundtable (VAR)
- Vivo (Vietnamese Voluntary Foundation)
- work2future
- Working Partnerships USA

List of Groups that Provided Additional Feedback

- Individuals including:
  - Retired individuals
  - Residents
  - Homeowners
  - Property owners and housing providers
  - Teachers
  - HVAC contractors
  - Small business owners
- 350 Silicon Valley
- Acterra
- Avita Management Corporation
- Carbon Free Palo Alto
- Climate Reality: Silicon Valley chapter
- Families and Homes San Jose (FHSJ)
- Hensley Neighborhood Association
- Monterey County
- Natural Resources Defense Council
- OASI
- RMI
- San Jose State University
- SJCE Advocates
- South Bay Chapter of CA Interfaith Power & Light
- SPUR
- The Harker School
- Trinity Change
- University of California, Berkeley
- VietUnity
- Willow Glen Neighborhood Association
- Zero-Waste Chef

The following is a summary of feedback heard from these groups and how it was integrated into the Framework:

Housing Advocates: This group included housing and tenant advocacy groups, affordable housing providers and community-based organizations, which discussed opportunities and concerns about building electrification. Takeaways and recommendations included:

- New rules are needed to limit pass-through costs to tenants, as well as an expansion of the current protections for all tenants (noted that although ARO and TPO ordinances are helpful, they are not sufficient tenant protections). - *The City heard that this was an extremely important concern raised across many different stakeholders, and considerations were integrated into the Executive Summary, Chapter 3, as well as the Housing and Energy Costs section of Chapter 4, including HEC-2.2. Tenant protections is a difficult and complex challenge and needs to be holistically addressed alongside affordable housing production and preservation (both mentioned on page 59). The City will evaluate what it can feasibly accomplish through policy versus programmatic solutions.*
- Building electrification programs should be tailored to the individual needs and funding constraints of all housing stock types (i.e., deed-restricted and unregulated affordable housing, rent-stabilized properties). Understanding the limitations and risks of each sector is critical to designing successful strategies. - *Incorporated in action HEC-2.1 concerning combining affordable housing preservation programs and electrification programs.*
- For affordable housing properties, energy efficiency and building electrification are often a lower priority compared to other necessary building upgrades (such as a roof replacement or seismic retrofit). It will be important to incorporate these needs when discussing electrification upgrades. - *Potential solution offered in AQH-2.2,stacking health and safety funding in supportive programs.*

- Tenant relocation costs should be factored into major rehabilitation programs, which will increase the costs of the projects. - *Integrated in HEC-1.4, identifying holistic funding sources to cover various costs not directly related to electrification measures.*

- More cost data (i.e., cost/unit, impact to operational cost) is needed, as well as examples of other buildings that have undergone building electrification upgrades. - *Action HEC-1.1 was added, with specific sub-actions about sharing this information more broadly.*

- Affordable housing providers emphasized that a significant amount of funding and resources will be needed to make electrification feasible, as well as flexible timelines. They suggested that incentive programs can be too limiting or narrow in scope. - *This is emphasized in the introduction of Chapter 6 when discussing citywide costs, as well as in HEC-1.4, Outcome HEC-2, HEC-2.1, and CRE-2.4, advocating for additional public funding toward deed-restricted affordable housing.*

- Stakeholders noted that not all building owners have the same motives or needs. Small "mom and pop" owners have very different needs than bigger developers, and protections are needed to make sure that landlords do not take advantage of requirements as a way to forcibly usher out long-term and low-income tenants. Careful consideration is needed whether landlords of multifamily buildings should have access to public funding so that here is sufficient funding to cover all "under-resourced" buildings in the City, and so that intentional neglect is not rewarded. - *This point can be evaluated more during Retrofit Accelerator development to determine eligibility for public funding streams. It is addressed in HEC-2.3 in how tenant protections are critical, but the report does not focus on the different types of building owner needs. This is an important nuance to consider for implementation.*

Community-Based Organizations: This outreach centered around CBOs that provide direct services and work closely with or represent historically marginalized communities. A diverse set of organizations was engaged to ensure that many historically marginalized communities were reached. Takeaways included:

- Concerns and Barriers
    - It is important to note that community groups also echoed many of the concerns listed by housing advocates above, and emphasized the concern over families not being able to bear any additional costs.
    - CBOs gave substantial feedback on the actionability and feasibility of proposed building electrification solutions (for example, inaccessible rebates and incentives programs). Such feedback also came from the input of community members, demonstrating that outreach should not be top-down and that including community feedback can benefit projects. The City should continue working with CBOs to strategize how to address barriers to building electrification programs for historically marginalized communities. - *This was integrated into several actions concerning increasing access to existing rebate programs (AQH-2.1, HEC-1.3, CRE-2.1, HQJ-1.1), while designing new programs specifically tailored to historically marginalized communities' needs.*
- Ongoing Community Engagement
    - *CBO feedback directly informed the creation, emphasis, and foundational actions in Chapter 6, showing the need for more iterative, accessible and equitable engagement with communities to design and implement building electrification solutions.*

    - Communities need the City to be as transparent as possible when conducting outreach. It is important to be clear on the time frame and implementation of requirements, so there is sufficient time for tenant education, input and preparation. It is also important not to over-promise solutions; to be clear where the City is hitting barriers; and to show where community feedback has been integrated into the Framework and its implementation, so trust is built in how engagement efforts influence outcomes. - *Integrated into Chapter 6, in the considerations around the foundational action: Create more equitable and accessible engagement across the City.*

- Community Outreach and Messaging

    - Community groups gave substantial and detailed feedback on how outreach could be more accessible to historically marginalized communities, including but not limited to better translation; cultural competency tailored to specific audiences; retaining traditional communication methods such as phone and paper mail; and using platforms such as WhatsApp to share information with community members. In addition, community members suggested the City provide flexibility and accommodations (childcare, flexible times, multiple locations, a variety of participation methods, and stipends when funding is available) for in-person training or events to help historically marginalized communities participate. - *These nuanced and detailed recommendations were very helpful in moving forward with community-driven outreach. The suggestions were integrated at a high level into the report, particularly in sections relating to contractor training (under "High Quality Job Opportunities" and community outreach (under "Air Quality and Health" in both Chapters 3 and 4. They are also mentioned in several actions throughout Chapters 4 and 6, but should be revisited and expanded in the formation of any Task Force.*

    - Partnerships with grassroots organizations and other CBOs that work closely with historically marginalized communities may be the most effective way to share information with tenants about new protections related to building electrification. - *This is mentioned in community perspectives and equity considerations throughout the Framework, and also in actions AQH-1.1 and HEC-1.3 specifically around outreach efforts.*

    - It is important to highlight specific challenges these communities face, but also to highlight the innovative solutions already being implemented by CBOs and local communities. - *These were integrated into the "Community Perspectives" callout boxes through the report, including emphasis on successful outreach efforts CBOs have already completed related to climate.*

Labor and Workforce Advocates: The community engagement for this Framework brought together a subset of labor and workforce advocacy groups to begin discussions about workforce implications. Although this was high-level outreach that has been identified as needing a working group to solidify takeaways, many important concerns were raised, including:

- There is a need for more coordination to develop a suite of policies and programs for supporting a high-road workforce in buildings, defined as high-quality jobs with family-sustaining, living wages, comprehensive benefits and opportunity for career advancement. Without this we risk the creation of more low-wage, low-quality jobs which compete solely on lowest cost. More research is needed

to understand the impacts and mitigation strategies for workers in the gas industry. *- Integrated in HQJ-2.1, and the recommendation to have a working group tackling these issues.*

- More needs to be known about how to apply workforce standards to all projects across the City, not just to publicly-funded projects. - *Integrated in HQJ-2.2 and HQJ-2.3, referencing high-quality job requirements and participation in regional efforts around high-road jobs. This is a complex issue whose political and jurisdictional feasibility needs to be investigated further.*

- There need to be solutions that cater to supporting undocumented workers in these sectors, so they can access the economic benefits of building electrification job opportunities as well. In addition, dedicated support is needed for minority- and women-owned businesses to participate in building electrification opportunities. This support should be closely coordinated with union efforts to improve inclusion of these groups. *- Integrated in HQJ-2.3, although additional engagement with these groups will need to further define which solutions will be needed.*

Climate Advocates

Generally, feedback on the Framework from climate-focused organizations was positive. Many voiced agreement of the concerns and considerations outlined in the Framework to ensure an equitable transition, and that implementation of the Framework could result in accelerated action toward an all-electric, clean energy future.

Homeowners & Building Owners

A wide constituency of homeowners and building owners submitted feedback on the Framework, identifying key concerns:

- Landlords and homeowners felt they were excluded from engagement for this Framework and want to be further involved. - *In response, public comment was extended and additional public information sessions were held with additional outreach to these groups. These constituencies will be considered in the implementation of the Framework and in the development of any future electrification policies and programs to ensure all voices are heard. Clarifications around requirements were integrated into the Framework to ensure clarity on what is being proposed.*

- Homeowners were concerned the grid would not be able to handle the additional load, blackouts would become more common, backup gas would not be available, and fossil fuels will continue to be used at peak times for electricity. *- The City will be coordinating with PG&E on these efforts, and will consider these when designing an all-electric future that supports a resilient and reliable grid (see "Clean & Reliable Energy" section of Chapter 4 for more information).*

- Homeowners expressed continued preference for gas cooking, and concerns about induction and pacemakers and the fact induction stoves require replacement of cookware. *- This is an ongoing conversation many struggle with, and additional information on the benefits of induction stoves will be shared and promoted. Familiarity with the new technology may address some of these concerns, while others require additional research the City will need to monitor.*

- Homeowners expressed concerns that upcoming potential updates to Net Energy Metering regulations at the state level will impact the financial benefits of solar and ultimately make electrification more expensive. *- This is being monitored closely by City staff and will inform cost considerations in all future building programs and policies.*

- Feedback that rebates remain too low while cost of heat pump technology remains too high, as well as costs across all sectors. Additional considerations may add to the cost of full electrification, like infrastructure upgrades, panel upgrades, and solar/batteries. In particular, certain groups were highlighted as potentially needing technical and financial support, including: fixed-income senior homeowners; low- and moderate-income families; workers in the gas industry given fear of wage impacts; and neighborhoods with undergrounded utilities. *- These are valid concerns documented throughout the Plan (in particular the Housing & Energy Costs section of Chapters 3 and 4). Many flexible and innovative solutions will be needed to ensure the cost of electrification is feasible, and supports San Jose residents staying and thriving within the City. These will be issues that will continue to be discussed and addressed in future community engagement.*

- Concern around the 2030 carbon neutrality goal, suggesting that it may not be feasible to get necessary infrastructure upgrades completed, contractors trained, and high costs addressed. Concerns around the early retirement of newer gas equipment was a major concern. *- The City will consider these when addressing how this Framework may be implemented as part of acceleration toward the 2030 carbon neutrality goal. Any additional policies and programs will be co-developed with the community (see Chapter 6) to ensure negative consequences are avoided as much as possible.*

- Lack of EV infrastructure is still a barrier to transitioning to all-electric lifestyles. It was noted that EV counseling in multiple languages was a helpful City program, and could potentially be a model for electric homes as well. *- This approach can be considered in the improved community engagement and outreach around building electrification. EV infrastructure within buildings will also need to be addressed when considering whole-building upgrades.*

Mobile Home Park Owners

During the outreach process for the Framework, concerns over electrification of mobile home parks were highlighted by mobile home park owners and tenants. Major concerns included:

- There is a concern around potential tenant displacement and mobile home park closures due to increased costs from mandated electrification. Residents want to ensure costs are shared equitably, and do not fall on low-income tenants. Mobile home parks are often excluded from City programs and considerations, and would like to be included in future program and policy design. In addition, specific utility structures, jurisdiction, and technical considerations will need to be understood before mandating electrification for mobile home parks. Mobile homes are limited in what they are able to do, and often struggle with lack of air conditioning and frequent power outages. *- Mention of mobile home parks were integrated in HEC-1.2, CRE-2.2, and Chapter 4 as a potential target audience to address in program design providing technical and financial assistance. The City will also need to evaluate the City's oversight on mobile home properties and specific mobile home property attributes (e.g. electrical infrastructure) if further programs or policies are considered.*

For additional information, please see the City's Frequently Asked Questions document on the Framework for additional information.

Building Electrification Institute
CITIES DRIVING CHANGE

Steven Winter Associates, Inc.
Improving the Built Environment Since 1972

San José Customer Economics Analysis

Completed February 2022

Appendix E1 of the Electrify San José Framework

Prepared for City of San José

Contents

Purpose

City of San José staff worked with the Building Electrification Institute (BEI) to better understand the cost impacts of electrification in typical homes in San José. This analysis includes:

- A detailed cost analysis of single-family and low-rise multifamily homes (the most common building typologies in San José), including:
  - An estimate of total installation costs ("capital costs") of electrification compared to new gas alternatives*
  - An estimate of utility bill ("operating cost") impacts for electrified buildings, by building system, compared to new gas alternatives
- Additional measures to consider that can improve health, safety, and/or operating costs across all residential buildings
- An estimated total cost range of electrifying all residential buildings in San José by 2030

Building Electrification Institute

*Note that this analysis does not consider who pays for these costs, which could be the owner, tenant, or a combination. This analysis also does not evaluate the Incentives, rebates, and/or grants that could also be used to help pay for costs.

Methodology Overview

To complete this analysis, BEI used the following methodology:*

1. Segment San José's residential building stock into typologies based on number of units and age of buildings
2. Extract key assumptions from a study by E3, Residential Building Electrification in California, ("E3 Study") for available building typologies in California, including:
    - Installation cost estimates for replacing existing gas equipment with new electric equipment
    - Installation cost estimates for replacing existing gas equipment with new gas equipment
    - Energy use for typical homes by gas and electric systems in the San José climate
3. Apply residential energy rates from San José Clean Energy (SJCE) to the estimated energy use in each building type
4. Apply installation cost estimates from the E3 Study for each building system in each building type
5. Calculate installation and operating costs for the package of system replacements (or retrofits) for each building type and each system, covering:
    - Heating, Ventilation, Air Conditioning (HVAC)
    - Water heating
    - Laundry
    - Cooking (range/oven)
6. Sum the installation costs for each building type for the whole-city cost for retrofitting all residential buildings in San José.**

*For more details on methodology and assumptions refer to "Detailed Methodology Process & Assumptions."
**Note that this model extrapolated the most common building types to the remaining building types to cover all residential buildings in San José.

Residential Building Types Analyzed

The following four typologies represent nearly 95% of San José's building stock.*

Typology	Older Single-Family (Pre-1990)	Newer Single-Family (Post-1990)	Older Low-Rise Multifamily Building (Pre-1990)	Newer Low-Rise Multifamily Building (Post-1990)
Description	A home with one unit built before 1990.	A home with one unit built after 1990.	A building less than 4 stories tall with 3 or more units, built before 1990.	A building less than 4 stories tall with 3 or more units, built after 1990.
Example				
Total Number of Buildings in San José	313,700	33,770	39,890	6,900
% of Residential Buildings	75%	8%	10%	2%

*These four typologies were chosen for cost analysis based on their prevalence in San José and available cost data.

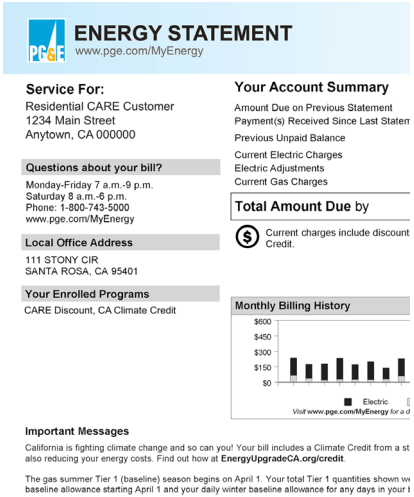
Costs of Building Electrification

There are two types of costs to consider:

Installation costs

- **Retail or "hard" costs of new equipment** (including electrification technologies and other related systems, such as solar PV)
- **Labor costs** for installation of this equipment
- **Other "soft" costs** associated with system installation (engineering design, permits, fees, etc.)

Operating costs



ENERGY STATEMENT
www.pge.com/MyEnergy

Service For:
Residential CARE Customer
1234 Main Street
Anytown, CA 000000

Questions about your bill?
Monday-Friday 7 a.m.-9 p.m.
Saturday 8 a.m.-6 p.m.
Phone: 1-800-743-5000
www.pge.com/MyEnergy

Local Office Address
111 STONY CIR
SANTA ROSA, CA 95401

Your Enrolled Programs
CARE Discount, CA Climate Credit

Your Account Summary
Amount Due on Previous Statement
Payment(s) Received Since Last Statem
Previous Unpaid Balance
Current Electric Charges
Electric Adjustments
Current Gas Charges
Total Amount Due by
Current charges include discount Credit.

Monthly Billing History
$600
$450
$300
$150
$0
Electric

Important Messages
California is fighting climate change and so can you! Your bill includes a Climate Credit from a st
also reducing your energy costs. Find out how at **EnergyUpgradeCA.org/credit**.

The gas summer Tier 1 (baseline) season begins on April 1. Your total Tier 1 quantities shown w
baseline allowance starting April 1 and your daily winter baseline allowance for any days in your

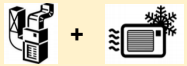
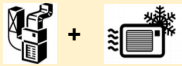
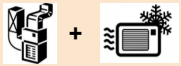
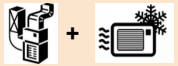
- **Utility bills** for electric and gas use in the home
- **Maintenance & repair** of existing equipment to ensure continued operation

Building Electrification Institute

Source: The Greenlining Institute, *Equitable Building Electrification Framework*
Image Source: PG&E

Equipment Replacement Scenarios

This analysis uses the following start and end points for HVAC systems:*

Building start and end points (for HVAC equipment)	**Older single-family (Pre-1990)**	**Newer single-family (Post-1990)**	**Older Low-Rise Multifamily Building (Pre-1990)**	**Newer Low-Rise Multifamily Building (Post-1990)**
Existing building with gas equipment in the starting point	**Gas Furnace** with **Window AC** (assumes the building does not have ducts) 	**Gas Furnace** with **Central AC** (assumes the building has ducts) 	**Gas Furnace** with **Window AC** per apartment (assumes the building does not have ducts) 	**Gas Furnace** with **Central AC** per apartment (assumes the building has ducts) 
Building that converts to new gas systems	**Gas Furnace** with **Window AC** 	**Gas Furnace** with **Central AC** 	**Gas Furnace** with **Window AC** 	**Gas Furnace** with **Central AC** 
Building that converts to all-electric systems	**Mini - split heat pump** 	**Ducted central heat pump** 	**Packaged terminal heat pumps (PTHP)** 	**Ducted heat pump per apartment** 

All end points assume that homes will retrofit or replace their homes to include sufficient cooling.

Types of Heat Pumps

Ductless Mini-split Heat Pump	Ducted Central Heat Pump	Packaged Terminal Heat Pump
		
Ductless mini-splits are decentralized heating and cooling systems that allow the user to control the temperatures in individual rooms or spaces. Mini-split systems have two main components -- an outdoor compressor/condenser and an indoor air-handling unit(s). The mini-split transfers heat between a house and the outside air via refrigerant lines, not requiring the use of ducts.	**Ducted heat pumps** are centralized heating and cooling systems that act much like traditional central heating and cooling systems. The heat pump unit sits outdoors, and the indoor fan coil works to move conditioned air into living spaces through vents via a duct system.	**Packaged Terminal Heat Pumps (PTHPs)** are decentralized heating and cooling systems that allow the user to control the temperatures in individual rooms or spaces. PTHPs transfer heat between a house and the outside all within the unit. PTHPs are typically found in openings under windows, not requiring the use of ducts.

Image Source (Mini Split Heat Pump): U.S. Department of Energy
Image Source (Ducted Central Heat Pump): EnergyStar.Gov
Image Source (Packaged Terminal Heat Pump): Lawrence Berkeley Lab

Equipment Replacement Scenarios

This analysis uses the following start and end points for other building systems:

Building start and end point (for all other systems)	Older Single-Family (Pre-1990)	Newer Single-Family (Post-1990)	Older Low-Rise Multifamily Building (Pre-1990)	Newer Low-Rise Multifamily Building (Post-1990)
Existing building with gas equipment in the starting point	Existing Gas Storage Water Heater 			
	Existing Gas Stove / Oven 			
	Existing Gas Dryer 			
Building that converts to new gas systems	*New* Gas Storage Water Heater 			
	New Gas Stove / Oven 			
	New Gas Dryer 			
Building that converts to all-electric systems	Heat Pump Water Heater 			
	Electric Resistance Stove / Oven 			
	Heat Pump Dryer 			

Installation Costs | Single-Family Homes

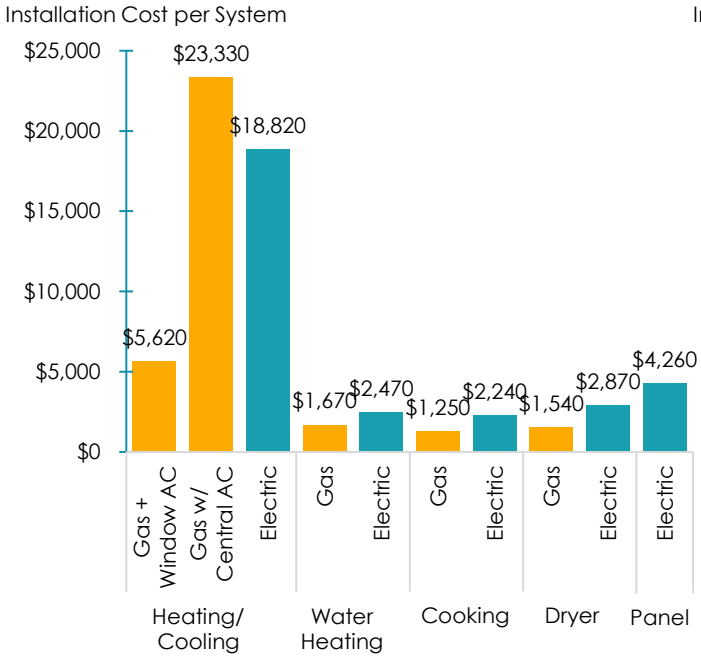
The graphs on the following two pages demonstrate the installation cost difference by system for retrofitting an existing single-family home to new gas systems versus new electric systems.

Key Findings:

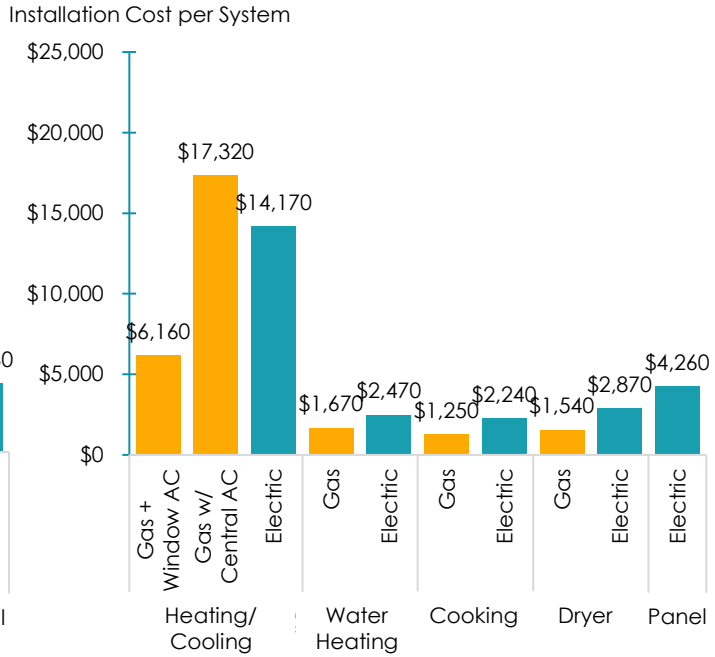
- Full home electrification installation costs are $3,000-$4,000 higher compared to a gas replacement scenario, assuming the home installs central cooling (as opposed to window air conditioners). However, when comparing the two priority systems (HVAC and water heating), the installation costs for electric equipment are comparable to their gas counterparts.
- Gas and electric equipment have different installation costs. Often, electric equipment is more expensive to install than gas equipment, but this is not always the case.
- When replacing HVAC systems in single-family homes, a gas furnace with window air conditioners (A/Cs) is the cheapest option. However, window A/C may not provide sufficient cooling for a home, especially as summers become increasingly hot in San José due to climate change.
- To provide central cooling for a single-family home, installing an all-electric HVAC system is less expensive than installing a new gas heating heating system with a central A/C system.
- The installation costs of electric water heating, cooking, and dryer equipment tend to be higher than their gas counterparts.
- For homes that currently use gas for heating and hot water, electrifying both systems likely requires upgrading the central electrical panel. This may not be necessary, however, if one of the two is already electric.

Installation Costs | Single-Family Homes by System

Older (Pre-1990) Single-Family Home



Newer (Post-1990) Single-Family Home



Notes and Assumptions:

1. *Costs assume a starting point of all gas equipment.*
2. *Installation costs include equipment costs and labor costs.*
3. *When a system breaks, it can be replaced with either gas or electric equipment. The difference in installation costs between new gas vs. new electric equipment is shown here, and is called the "incremental" cost.*
4. *Panel upgrades are needed in some cases, but this should be determined with a licensed contractor.*

<u>Total</u> Installation Cost Difference
(Incremental Cost)*:
$3,000-$4,000

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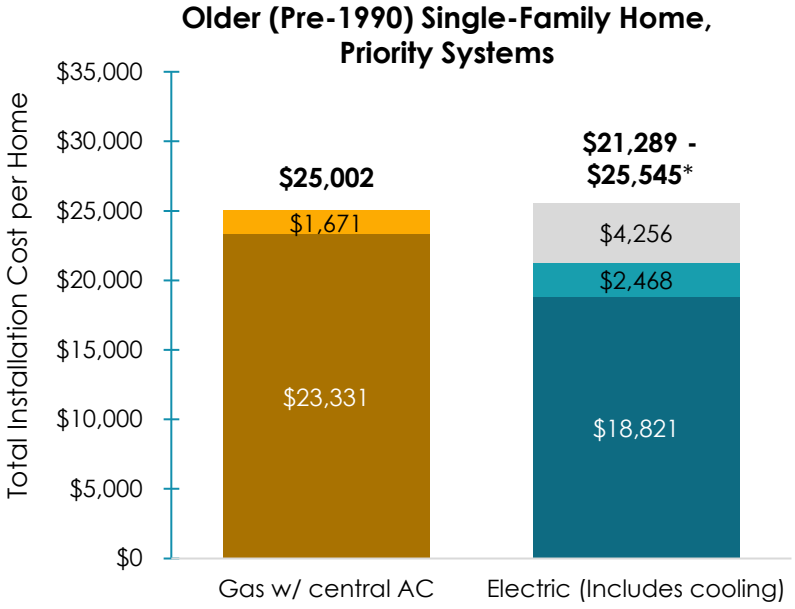
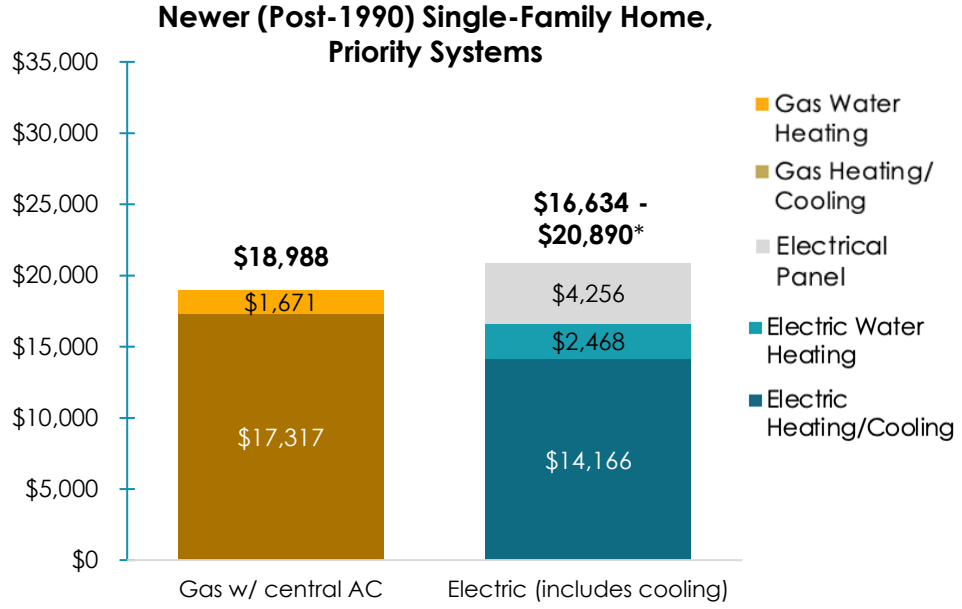
*Note: The total installation cost difference assumes homes must install central cooling to provide sufficient cooling as summers get hotter due to climate change. The "Gas + Window AC" scenario does not include the installation of central cooling and assumes existing window A/Cs are not upgraded.

Installation Costs | Single-Family Homes with Central A/C

Assuming a single-family home installs central cooling, the installation cost for priority systems (HVAC and hot water) are comparable to a retrofit to new gas equipment plus central cooling.*





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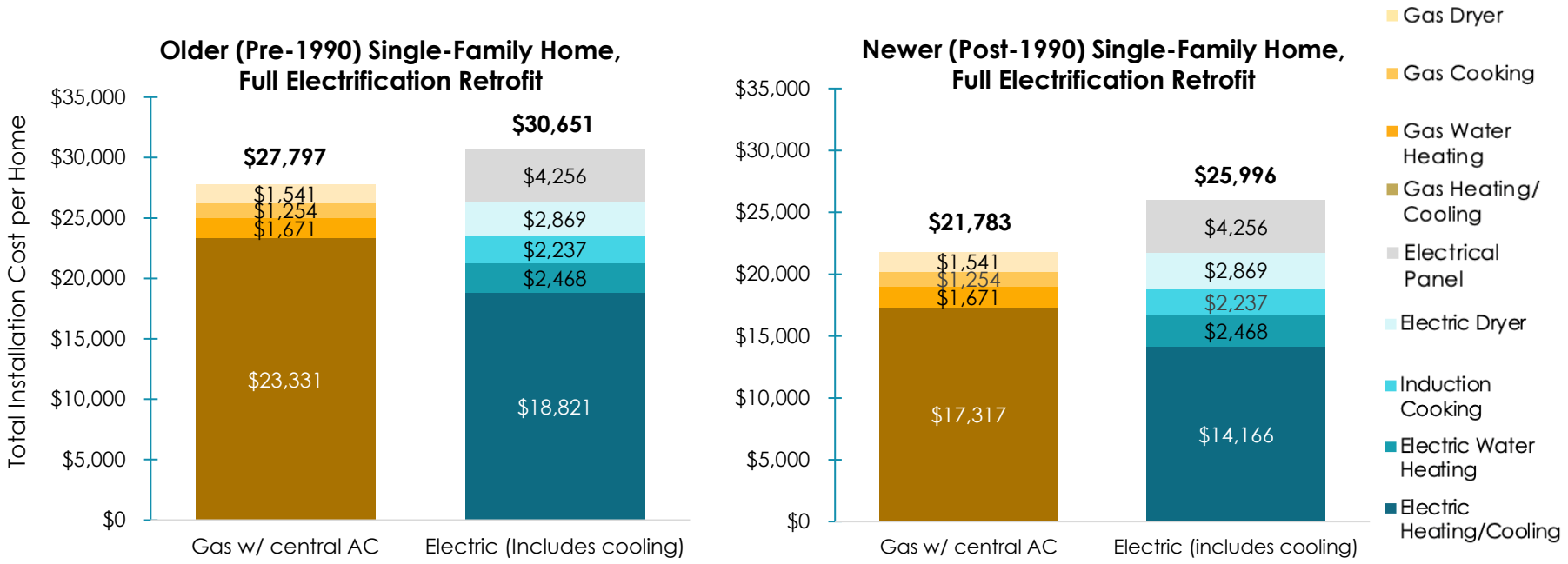
*Notes: HVAC and hot water systems make up the majority of both energy use and installation costs. The higher end of the range includes the cost of an electric panel upgrade, which is likely to be required in homes that currently use gas for both heating and hot water. However, this may not be necessary in all cases and should be determined with a licensed contractor.

Installation Costs | Single-Family Homes with Central A/C

The cost of a full electrification retrofit in a single-family home, however, is $3,000-$4,000 higher than a retrofit to new gas equipment plus central cooling.



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Installation Costs | Low-rise Multifamily

The following two pages demonstrate the installation cost difference by system for retrofitting an existing low-rise multifamily home to new gas systems versus new electric systems.

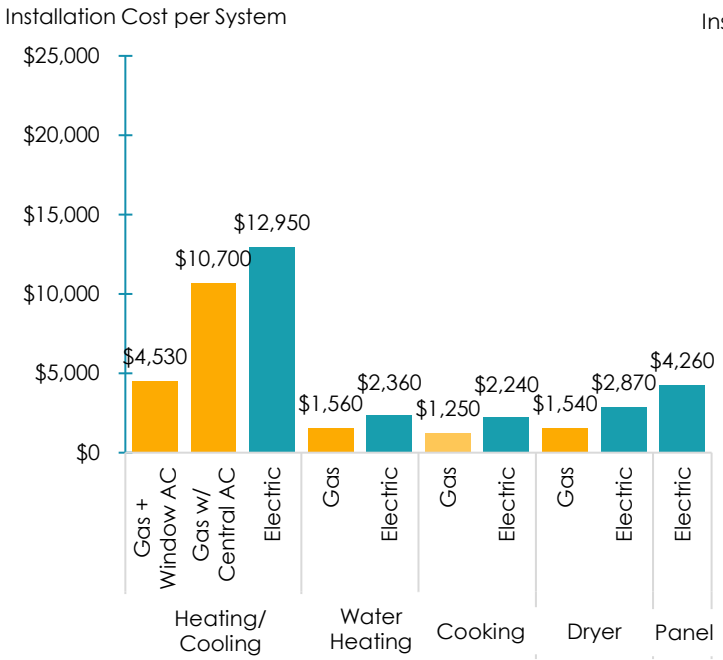
Key Findings:

- Full home electrification installation costs for low-rise multifamily buildings are $6,000-$10,000 higher compared to a gas replacement scenario.
- Similar to the findings for single-family homes, the installation costs for most electric equipment is more than the installation costs for gas equipment.
- When replacing HVAC systems, installing a gas furnace with window A/Cs is the cheapest option in multifamily buildings. However, window A/C may not provide sufficient cooling for a home, especially as summers become increasingly hot in San José due to climate change.
- In older multifamily buildings (built before 1990), installing a new gas furnace with a central A/C system is less expensive than installing a heat pump system to provide both heating and cooling for the whole building. In newer multifamily buildings however, the heat pump system is less expensive.*
- For many multifamily buildings, upgrading the central electrical panel will also be necessary in order to electrify both the heating and hot water systems.

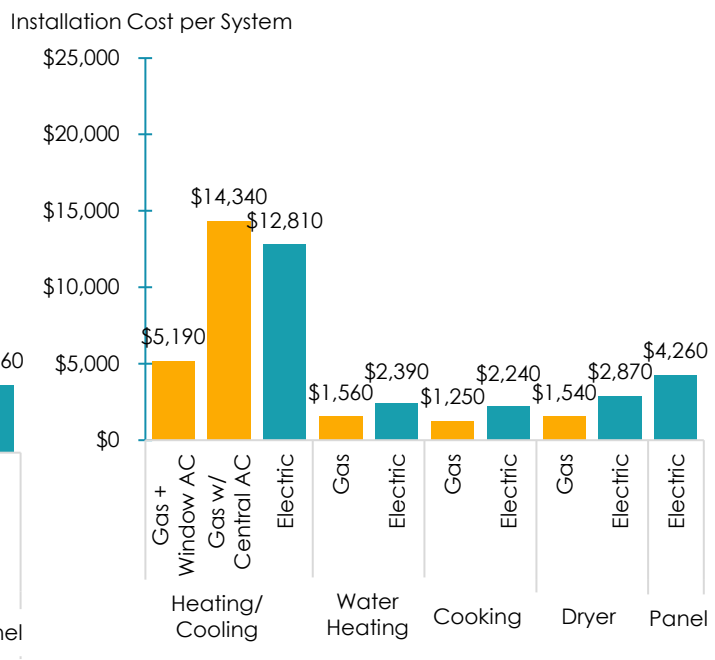
*Older homes were assumed to not have ductwork and would retrofit using a ductless HVAC system. This is a more expensive retrofit than the newer buildings, which were assumed to have existing ductwork that could be reused.

Installation Costs | Low-rise Multifamily Homes by System

Older (Pre-1990) Multi-Family Home



Newer (Post-1990) Multi-Family Home



Notes and Assumptions:

1. *Costs assume a starting point of all gas equipment and are displayed per dwelling unit.*
2. *Installation costs include equipment costs and labor costs.*
3. *When a system breaks, it can be replaced with either gas or electric equipment. The difference in installation costs between new gas vs. new electric equipment is shown here, and is called the "incremental" cost.*
4. *Panel upgrades are needed in some cases, but should be determined with a licensed contractor.*

<u>Total</u> Installation Cost Difference (Incremental Cost):*
$6,000-$10,000

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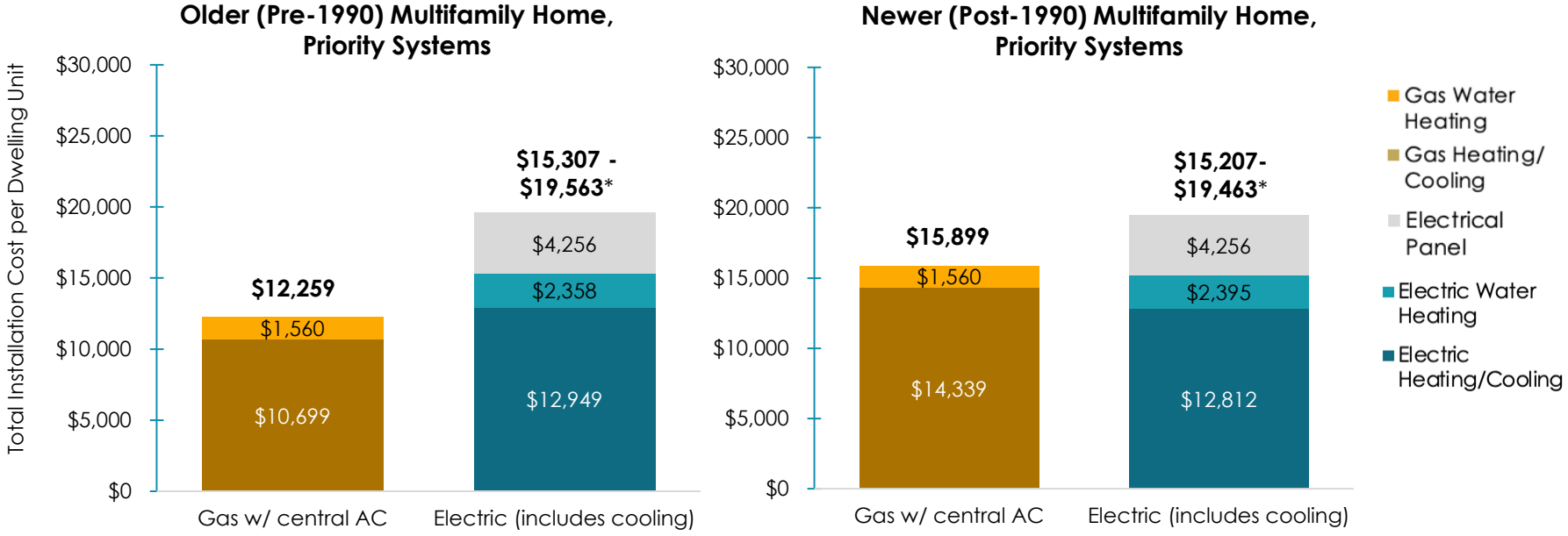
*Note: The total installation cost difference assumes homes must install central cooling to provide sufficient cooling as summers get hotter due to climate change. The "Gas + Window AC" scenario does not include the installation of central cooling and assumes existing window A/Cs are not upgraded.

Installation Costs | Low-rise Multifamily Homes with Central A/C

The installation cost for priority systems (HVAC and hot water) in a multifamily home could roughly breakeven, or up to $7,000 higher than a retrofit to new gas equipment plus central cooling.



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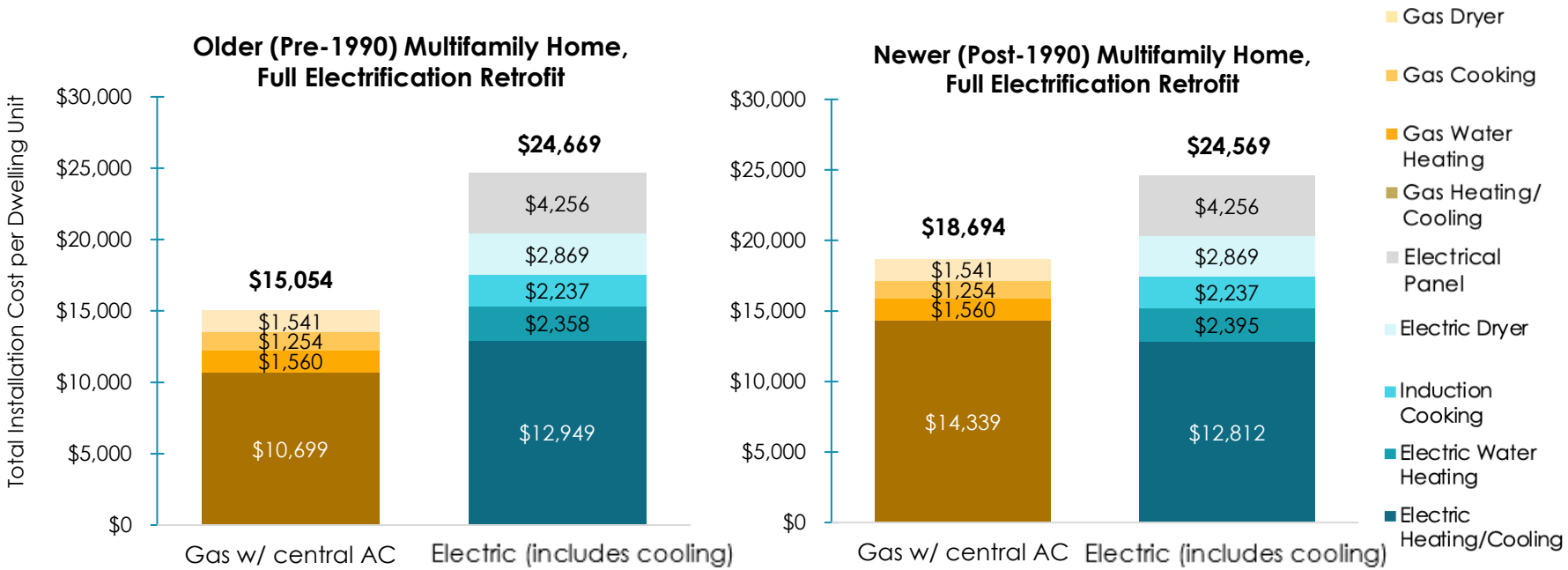
*Note: HVAC and hot water systems make up the majority of both energy use and installation costs. The higher end of the range includes the cost of an electric panel upgrade, which is likely to be required in homes that currently use gas for both heating and hot water. However, this may not be necessary in all cases and should be determined with a licensed contractor.

Installation Costs | Low-rise Multifamily Homes with Central A/C

The cost of a full electrification retrofit in a multifamily home is $6,000-$10,000 higher than a retrofit to new gas equipment plus central cooling.



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Measures to Consider | Health & Safety

Although not every home needs this work, additional upgrades may be required to address health, safety, or other needs in a building, which can add to installation costs:

Electrical Panel Upgrade

(this adds capacity for more electricity and may also be necessary for electric car charging stations)

Rewiring

(i.e. replacing knob-and-tube wiring)

Lead, Mold, Pest, or Asbestos Removal

Ductwork Update

(i.e. reconfiguring, sealing, insulating)

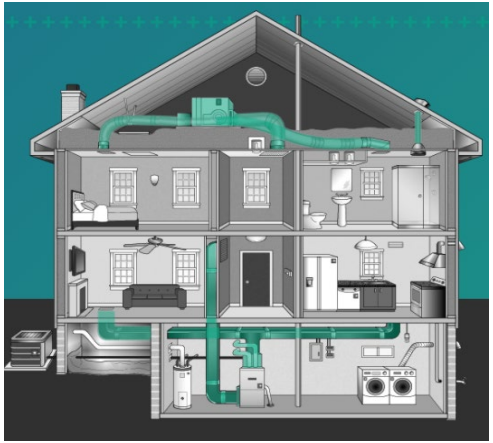

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Image Source (Electrical Panel): City of Portland
Image Source (Rewiring): International Association of Certified Home Inspectors
Image Source (Asbestos):San Diego County Air Pollution Control District
Image Source (Insulation): BayREN

Measures to Consider | Energy Efficiency & Resiliency

These are additional technologies to consider that may *add* to upfront costs, but help *reduce* operating costs. For example:

Energy Efficiency

Insulation and air sealing (a jacket for your home), smart controls and energy efficient appliances which can reduce energy load.

Rooftop Solar

Renewable energy can provide credit to your electricity bill and therefore reduce costs.

Battery Storage

Energy that you can use while electricity rates are lower or during emergencies, increasing your home's resiliency.

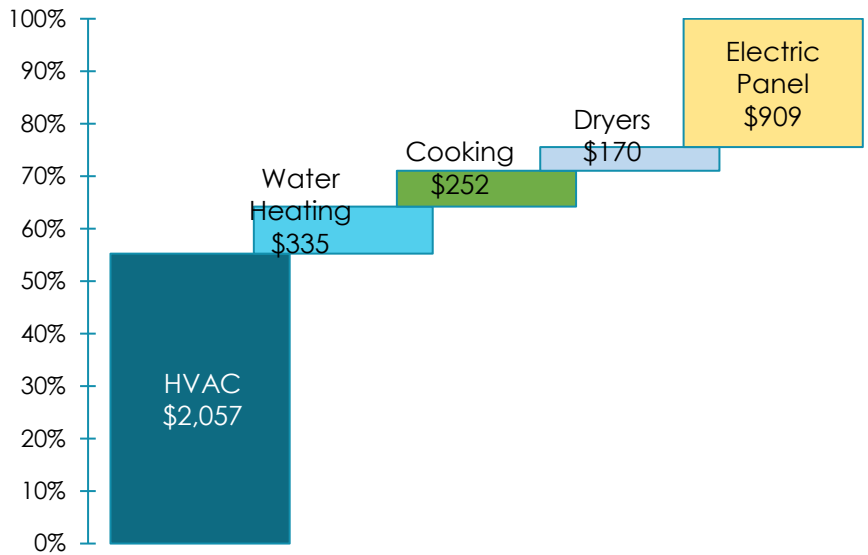
Building Electrification Institute

Image Source (Insulation): BayREN
Image Source (Solar): Grid Alternatives
Image Source (Battery): Energy.Gov

Citywide Residential Installation Costs

With a goal of electrifying all residential buildings by 2030, total installation costs for San José's residential buildings range from $2.7 to $4.7 billion.

Citywide Costs ($ Million)



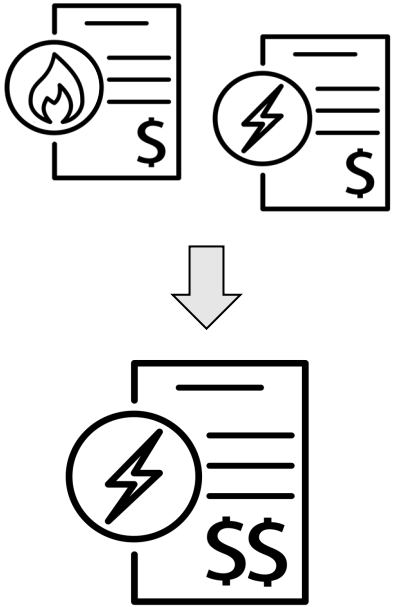
Notes on Approach:

- This analysis found a range for the city wide total costs which represents a combination of incremental and total cost:
  - This range includes the *incremental cost* of installing electric equipment for all equipment that will be replaced at the end of its useful life by 2030.
  - This range also includes the *total cost* of installing electric equipment for those pieces of equipment that *will* not reach the end of their useful life by 2030 (and therefore would need to be replaced early).
- These costs are scaled up based on the total number of residential buildings in San José.

Operating Costs

Operating costs in San José's residential buildings will depend on a range of factors:

- Cost of gas versus electricity (rates)
- Efficiency of the new system(s) compared to the old system(s)
- Heating and cooling loads, which can be reduced through energy efficiency of home (insulation & air sealing)
- On-site renewable energy (solar PV)
- Behavior of residents
- Increased need for heating and/or cooling, which could occur as a result of climate change



Opportunities which can help reduce operating costs:

- Ensure eligible customers are on discounted electricity rates (e.g. CARE & FERA)
- Scale up on-site solar PV and the use of smart controls, which can reduce usage or use it at the right time
- Lower SJCE's electricity rates

For more information, refer to the Housing & Energy Costs section within the Plan.

Operating Costs | Impacts by System*

	Gas Starting Point	Electrification End Point	Costs to consumer ↑	Savings to consumer ↓
HVAC	 **Gas Furnace + Central AC** **OR**  **Gas Furnace + Window AC**	 **PTHP** **OR**  **Mini-Split HP** **OR**  **Ducted Split HP**	***For those starting with a window AC:*** Single-family and Multifamily: $100-$200/year	***For those starting with central AC:*** • Single-family: $300-$400/year • Multifamily: $100-$150/year
Water Heating	 **Gas Storage Water Heater**	 **Heat Pump Water Heater**		Single-family and Multifamily: $50-$100 / year.
Cooking	 **Gas Stove**	 **Electric Resistance**		Single-family and Multifamily: Up to $20/year
Clothes Drying	 **Gas Dryer**	 **Heat Pump Dryer**	Single-family and Multifamily: $50-$100/year	
Addition of Solar		 **On-site Solar PV** 3kW per SF home or per MF apartment		Single-family and Multifamily: $700 / year

* Based on our analysis using San José Clean Energy rates, most system replacements see operating bill savings. However, these assumptions can change from house to house.

Operating Cost | Whole Home Impacts

Below is a summary of whole home operating costs impacts, based on the starting point and depending on the addition of solar.

Annual Operating Costs (positive(green)=savings)) All homes starting with all gas equipment and ending with all electric equipment.		**No Solar**	**With Solar**
Single-Family	Window AC in baseline	-$240 to $50	$500 to $710
	Central AC in Baseline	$240 to $410	$980 to $1070
Multifamily	Window AC in baseline	-$230 to -$210	$360 to $360
	Central AC in Baseline	$30 to $90	$620 to $650

*Changes to current NEM structure could alter the cost impacts, however this was not evaluated as part of this analysis.

Key Takeaways:

- **Most homes in San José will see energy bill savings** of up to $1,000 per year as a result of whole home electrification, although some homes may see bill increases of up to $240 per year.
- **The addition of on-site solar PV will guarantee annual energy bill savings** across all homes.*
- **Homes with central AC today will see greater bill savings** from electrification than those that currently have window A/Cs.

When to Consider Electrification for Your Home

Because electrification will eliminate GHG emissions and improve the health and safety of your home, electrification should always be considered if you are in the financial position to do so.

An electrification retrofit will most likely have positive economic benefits when:

- Undertaken as part of a major renovation where all or most systems will be replaced anyways.
- Specific equipment needs to be replaced because it is at the end of its useful life. In particular, when the furnace and the central cooling system needs replacement, a heat pump can replace both with just one, significantly more efficient system.
- Completed along with energy efficiency upgrades to reduce heating loads
- The home already as on-site solar PV, or there are plans to install it
- Rebates, incentives, or grants exist to help cover the costs
- The home uses an electric resistance, fuel oil, or propane heating system (instead of natural gas), which is less common in San José but is common in other regions.

*All upgrades should be discussed with a contractor who can understand the specific needs of your home. You can also receive advice and assistance for free with BayREN's Home Energy Advisor Program.**

*BayREN provides a free Home Energy Advisor service. For homeowners, please call 1-866-878-6008.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Appendix E2: Detailed Methodology Process and Assumptions

The findings included in this customer economics analysis are based on a study done by E3, "Residential Building Electrification in California" ("E3 Study").*

Process and Assumptions:

1. Use the ("E3 Study") for an estimate of capital costs for electrification retrofits. For building typologies, the E3 Study looked at residential buildings including single family homes, duplexes, low rise residential, high-rise multifamily buildings.
2. Extract key assumptions of fossil-fuel based systems for validation in San José's building stock:
    - Heating, Ventilation and Air Conditioning (HVAC)
    - Water heating (WH)
    - Laundry
    - Cooking
    - Average building size
3. Assign residential energy cost rates to each segment
    - Start with the E3 Study assumptions, and confirm with the City if these appear valid for the local utility.
    - If the annual blended rate for electricity and gas seems inappropriate, use an updated annual blended rate, and make any adjustments to the E3 Study results
4. Expand the estimates from the building types examined in the E3 Study to the wider residential building types in San José's residential building stock by mapping baseline energy use and systems from the building types explicitly modeled in the E3 Study to the remaining building types in San José.
5. For each residential building type, assign baseline systems and electrification retrofits, and assign retrofit capital and operating cost changes by system
6. Sum up system-specific costs to whole building capital and operating cost changes. These are representative of whole building costs per building type.
    - For the representative building in each type, this gives approximate simple payback and changes to operating costs

* Mahone, Amber, Charles Li, Zack Subin, Michael Sontag, Gabe Mantegna, Alexis Karolides, Alea German, and Peter Morris. "Residential Building Electrification in California|Consumer Economics, Greenhouse Gases and Grid Impacts." San Francisco, CA: Energy and Environmental Economics, Inc. (E3), April 2019. https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf.

7. Map costs using a $/SF or $ / dwelling unit approximation
    - For space and water heating, $/SF is appropriate.
    - For cooking and laundry, $ / dwelling unit may be more appropriate
8. Sum costs for each building type to get a whole-city cost, separable by building segment.
9. Develop estimate of what proportion of dwelling units use gas today for each equipment type.[†]
10. Make an estimate of average remaining useful life for each piece of equipment given useful life[‡] and the time scale to reach full electrification, per the following formula:

$$Capital\ Cost_{i,j} = Equip.Cost_i * Portion.using.gas_i * Dwelling.Units_j$$
$$Residential\ Total\ Electrification\ Cost = \sum_{j=1}^{19} \sum_{i=1}^{5} Capital\ Cost_{i,j}$$

Key Assumptions used:

- Percentage of buildings with gas equipment by vintage, based on the following:

		RASS (CA CZ04)	Portion of Buildings with Gas Equipment				
Housing Type	Vintage	Heating	WH	Cooktop	Dryer	Portion that don't have central A/C	Portion that need electrical upgrade (gas HVAC+WH)
SF	pre-1978	83%	93%	76%	52%	22%	83%
	1978 - 1989	83%	93%	76%	52%	22%	83%
	1990 - 1999	83%	93%	76%	52%	22%	83%
	2000 - 2014	76%	90%	90%	54%	22%	83%
	unknown	83%	93%	76%	52%	22%	83%
Dup	pre-1978	72%	64%	67%	41%	17%	64%
	1978 - 1989	72%	64%	67%	41%	17%	64%
	1990 - 1999	72%	64%	67%	41%	17%	64%
	2000 - 2014	66%	62%	79%	43%	17%	64%
	unknown	72%	64%	67%	41%	17%	64%
LRMF	pre-1978	54%	50%	66%	16%	40%	50%
	1978 - 1989	54%	50%	66%	16%	40%	50%
	1990 - 1999	54%	50%	66%	16%	40%	50%
	2000 - 2014	50%	48%	78%	17%	40%	50%
HRMF	pre-1978	54%	50%	66%	16%	40%	50%
	1978 - 1989	54%	50%	66%	16%	40%	50%
	1990 - 1999	54%	50%	66%	16%	40%	50%
	2000 - 2014	50%	48%	78%	17%	40%	50%
	unknown	54%	50%	66%	16%	40%	50%

Figure 27: Appliance Saturation Rates. Using California Residential Appliance Saturation Study (RASS) by DNV GL, 2019, filtered for Climate Zone 04. The darker shading represents a higher percentage of gas equipment for each housing type: Single Family (SF), Duplex (Dup), Low Rise Multifamily (LRMF), High Rise Multifamily (HRMF).

[†] DNV GL Energy Insights USA, Inc. 2020. 2019 California Residential Appliance Saturation Study. California Energy Commission. Publication Number: CEC-200-2021-005-ES.

[‡] Useful life is based on the estimated number of years a piece of equipment will remain in operation before needing to be replaced.

Building Electrification Institute

CITIES DRIVING CHANGE

San José Building & Housing Stock Analysis

Completed August 2020

Appendix F of the Electrify San José Framework

Prepared for City of San José

Building and Housing Stock Analysis | Approach

San José partnered with the Building Electrification Institute (BEI) to conduct a building and housing stock analysis to understand its local building stock and how building type relates to electrification and efficiency opportunities, as well as improving the health, resiliency, and affordability for San José community members.

The goals of the analysis are to:

- **Understand broad opportunities for electrification** across San José's building stock
- **Identify key considerations** for different building types, decision-makers, and communities
- **Begin to inform future policy and program design** options to encourage electrification

To achieve these goals, the team analyzed **three types of indicators**:

1. **Technical Indicators** to help identify which types of buildings may be easier or harder to electrify based on building type or construction.
2. **Ownership and Decision-making Indicators** to help identify buildings with owners or decision-makers who are more or less likely to decide to pursue building electrification and to understand potential barriers and solutions.
3. **Social Vulnerability and Environmental Risk Indicators** to help identify buildings that may need greater assistance and public investments to help the City design appropriate programs or strategies. Impacted communities, which often include low-income communities and communities of color, will require the City and others to design specific strategies tailored to their needs in order to ensure an equitable transition to building electrification.

Note for Users: *This analysis is based on publicly available data from the City of San José. All analysis, charts, and maps presented in this report are based on datasets that were pulled in 2019 and represent the best publicly available data at the time, however these datasets are without warranty or any representation of accuracy, timeliness, or completeness.*

Building and Housing Stock Analysis | Approach

The approach for the analysis included the following steps:

1) Collect Data

The BEI team collected publicly available building data on technical, market, and socio-demographic factors.

2) Develop Building Inventory

Using this data, the team developed a parcel-level inventory of all building sin San José.

3) Create building typologies

Using technical building factors, the team then created common building typologies, based on potential electrification and energy efficiency interventions.

4) Segment the building stock

The team then segmented the building stock based on technical, ownership/ decision-making, social vulnerability, and environmental risk indicators.

5) Identify considerations by typology

Together with Climate Smart San José and San José Clean Energy staff, the team discussed indicators and considerations for each building typology.

***In addition to this analysis**, San José can engage with key community stakeholders to ground truth the data provided and further analyze the opportunities and barriers identified to develop new programs, policies, and strategies that can scale up electrification in different building segments.*

Contents

Technical Indicators

List of Technical Indicators

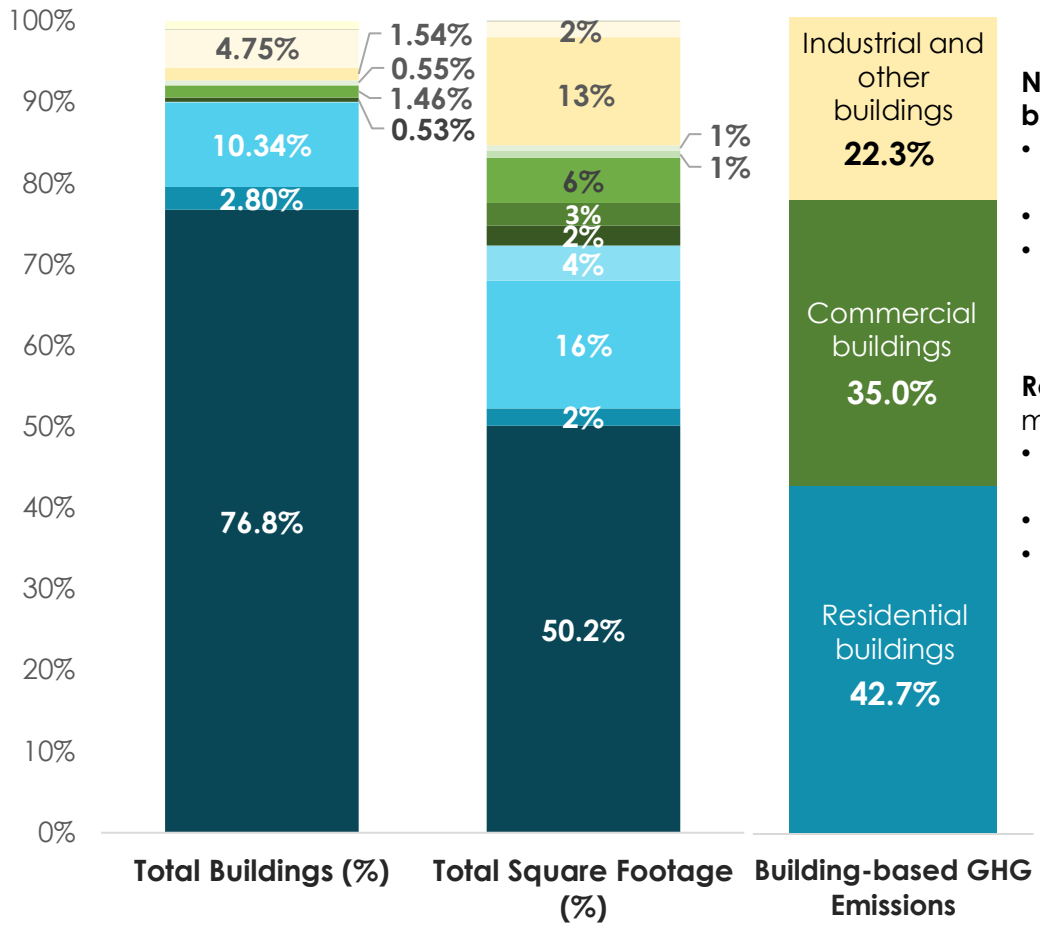
- Building typologies
- Building vintage
- Recent major renovations
- Building size
- Building height (number of floors)
- Residential Units

Technical Indicators | Building Typologies

Summary of Building Typologies

	Typologies	Number of Units	Number of Stories	Total Buildings	Total Square Footage
1	**Single-Family Homes**	1	Up to 3	178,530	305,662,521
2	**Duplex**	2	Any	6,519	12,835,152
3	**Low-Rise Multifamily Complex**	3+	Up to 3	24,055	95,908,849
4	**High-Rise Multifamily Complex**	3+	4+	279	26,484,498
5	**Low-Rise Commercial Office**	Any	Up to 3	1,236	14,935,596
6	**High-Rise Commercial Office**	Any	4+	118	16,934,490
7	**Commercial Retail**	Any	Any	3,394	33,891,713
8	**Hotels and Motels**	Any	Any	162	5,310,957
9	**Institutional & Public**	Any	Any	1,280	4,126,334
10	**Industrial/Manufacturing**	Any	Any	3,582	81,330,799
11	**Other**	Any	Any	11,047	11,972,196
12	**Outdoor Spaces**	Any	Any	17	13,236
	Missing Data	NA	NA	2,322	-
	TOTAL			**232,541**	**609,406,341**

Buildings by Count and Area



Non-residential buildings make up:
- 10% of total buildings
- 28% of built area
- 57.3% of GHG emissions

Residential buildings make up:
- 90% of total buildings
- 72% of built area
- 42.7% of GHG emissions

Building Electrification Institute

GHG Emissions Source: Climate Smart San José https://data.prospectsv.org/ghg-emissions/
Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Typologies

Summary of Building Typologies

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12	**Outdoor Spaces**	Any	Any	17	13,236
	Missing Data	NA	NA	2,322	-
	TOTAL			**232,541**	**609,406,341**

Use Class	Number of Units	Number of Stories	Total Number of Buildings	Total Square Footage
Residential (Mixed Use)	1	Up to 3	81	4,104,147

Mixed-Use Buildings, classified in tax assessor data as "Residential (Mixed Use)", were included in the residential building typologies. They make up <1% of total residential square footage. Please note some mixed-use buildings may exist in commercial typologies as well, although not identified clearly enough in base datasets to create a separate category.

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Typologies

Median Buildings by Typology

#	Typologies	Median Area (sq. ft.)	Median Height (Stories)	Median # of Residential Units	Median Year Built
1	**Single-Family**	1,617	1	1	1968
2	**Duplex**	1,904	1	2	1960
3	**Low-Rise Multifamily Complex**	4,504	2	4	1967
4	**High-Rise Multifamily Complex**	131,060	4	153	2011
5	**Low-Rise Commercial Office**	6,086	1	NA	1971
6	**High-Rise Commercial Office**	157,537	6	NA	1986
7	**Commercial Retail**	4,827	1	NA	1966
8	**Hotels and Motels**	29,886	2	NA	1986
9	**Institutional & Public Buildings**	11,104	1	NA	1966
10	**Industrial/Manufacturing**	18,365	1	NA	1978
11	**Other**	1,813	3	NA	2014
12	**Outdoor Spaces**	1,004	1	NA	1963
	City-wide Median	**1,678**	**1**	**1**	**1968**

Single-Family Homes

Low-Rise Multifamily Complex

Low-Rise Commercial Office

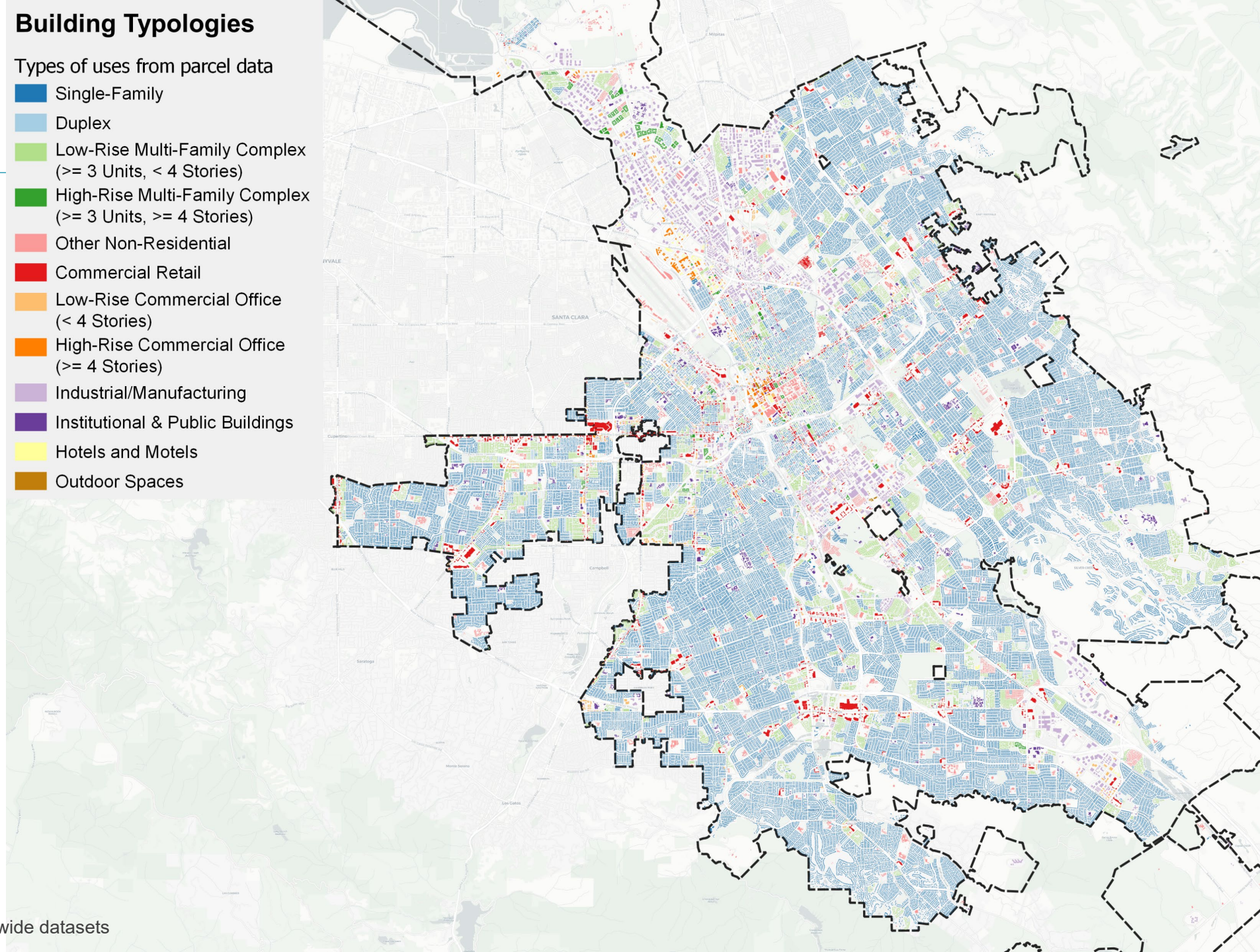
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Building Typologies

Number of Buildings by Typology

Typology	# of Buildings (% total)
Single-Family	178,530 (77%)
Duplex	6,519 (3%)
Low-Rise Multifamily Complex	24,055 (10%)
High-Rise Multifamily Complex	279 (0.1%)
Low-Rise Commercial Office	1,236 (1%)
High-Rise Commercial Office	118 (0.05%)
Commercial Retail	3,394 (1.46%)
Hotels and Motels	162 (0.07%)
Institutional & Public Buildings	1,280 (0.55%)
Industrial/ Manufacturing	3,582 (1.54%)
Other	11,047 (5%)
Outdoor Spaces	17 (0.01%)



Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Typologies

Summary Table

#	Typologies	Number of Units	Number of Stories	Number of Parcels	Number of Buildings	Percentage of Buildings	Total Square Footage	Percentage of Total Square Footage	Total Residential Units	Percentage of Residential Units
1	**Single-Family Homes**	1	Up to 3	171,405	178,530	77%	305,662,521	50%	171,405	55%
2	**Duplex**	2	Any	5,690	6,519	3%	12,835,152	2%	11,380	4%
3	**Low-Rise Multifamily Complex**	3 or More	Up to 3	6,666	24,055	10%	95,908,849	16%	101,723	33%
4	**High-Rise Multifamily Complex**	3 or More	4 or More	128	279	0%	26,484,498	4%	26,300	9%
5	**Low-Rise Commercial Office**	Any	Up to 3	1,069	1,236	1%	14,935,596	3%	-	-
6	**High-Rise Commercial Office**	Any	4 or More	92	118	0%	16,934,490	3%	-	-
7	**Commercial Retail**	Any	Any	2,840	3,394	2%	33,891,713	6%	-	-
8	**Hotels and Motels**	Any	Any	120	162	0%	5,310,957	1%	-	-
9	**Institutional & Public Buildings**	Any	Any	530	1,280	1%	4,126,334	1%	-	-
10	**Industrial/Manufacturing**	Any	Any	2,602	3,582	2%	81,330,799	13%	-	-
11	**Other**	Any	Any	7,404	11,047	5%	11,972,196	2%	-	-
12	**Outdoor Spaces**	Any	Any	12	17	0%	13,236	0%	-	-
	Missing Data	NA	NA	3,165	2,322	1%	-	-	-	-
			TOTAL	201,723	232,541	100%	609,406,341	100%	310,808	100%

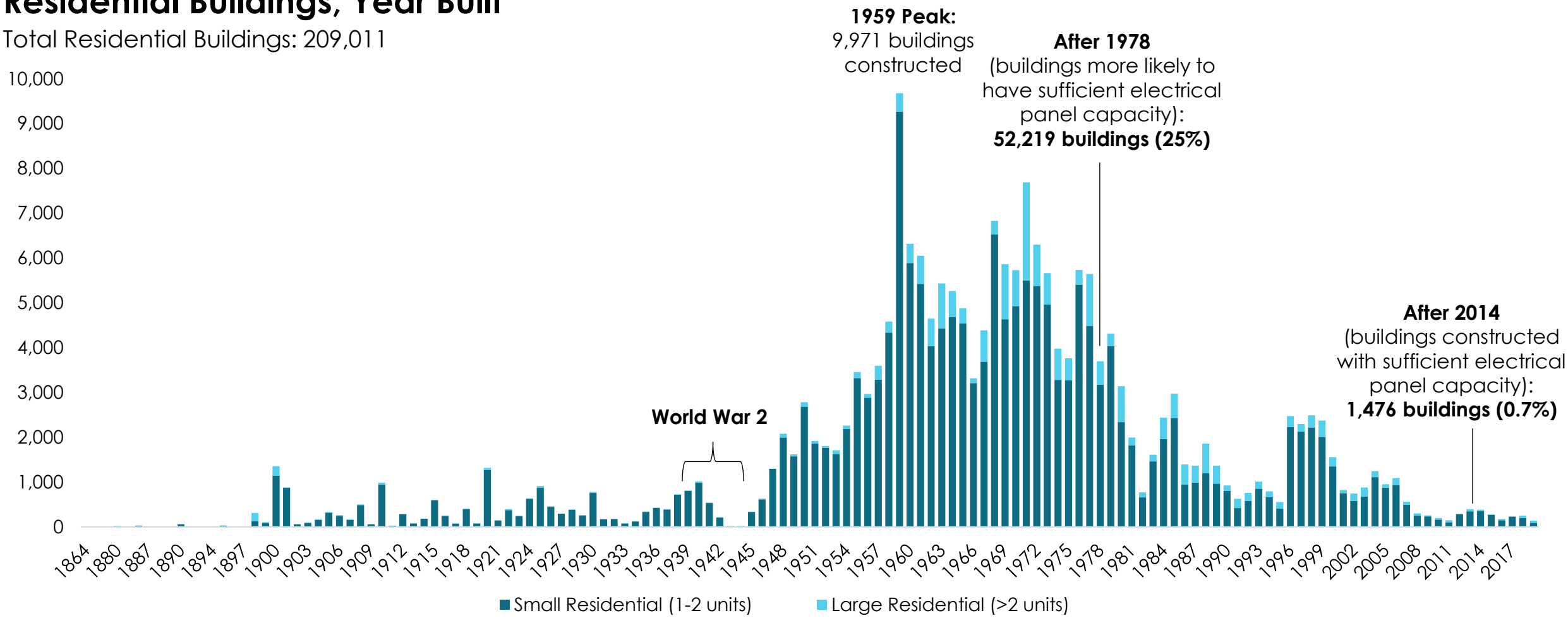
Note: There are fewer single family units than buildings because the number of buildings counts multiple buildings on a parcel. Some of these structures may be ADUs, but others may be large detached garages, sheds, or other structures.

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Vintage

Residential Buildings, Year Built

Total Residential Buildings: 209,011



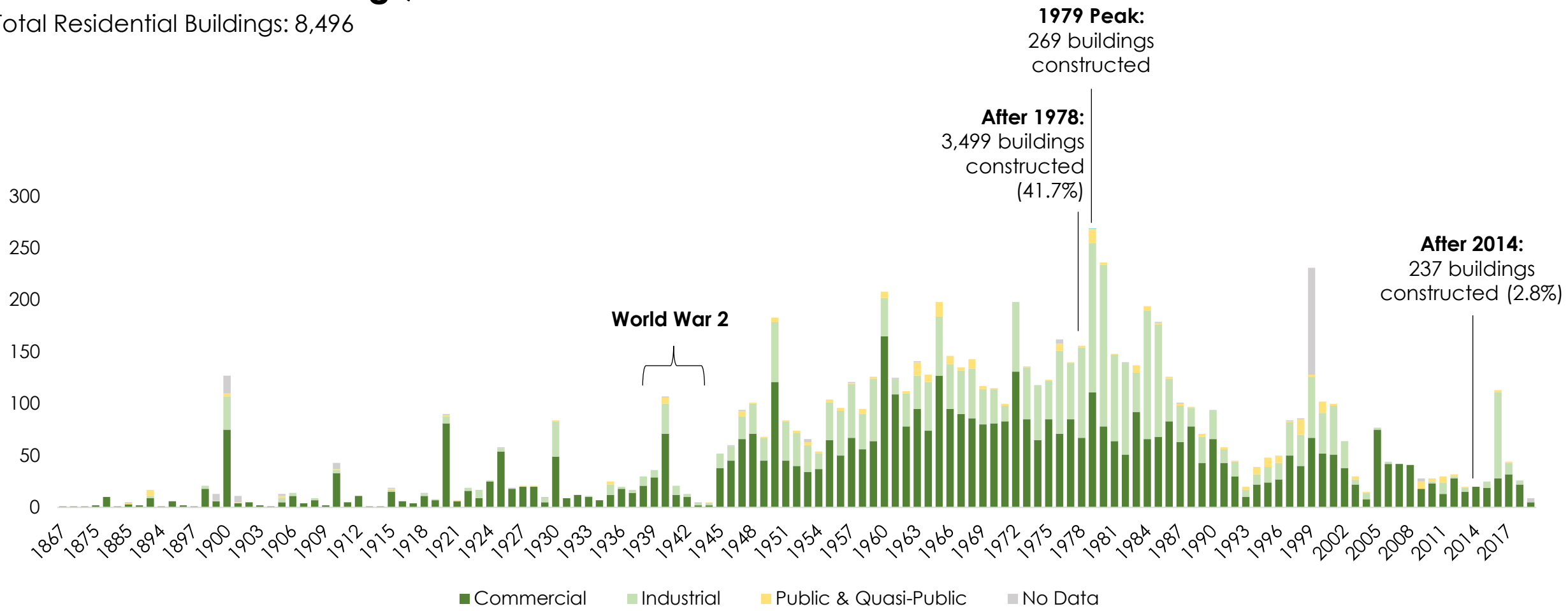
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Vintage

Non-Residential Buildings, Year Built

Total Residential Buildings: 8,496



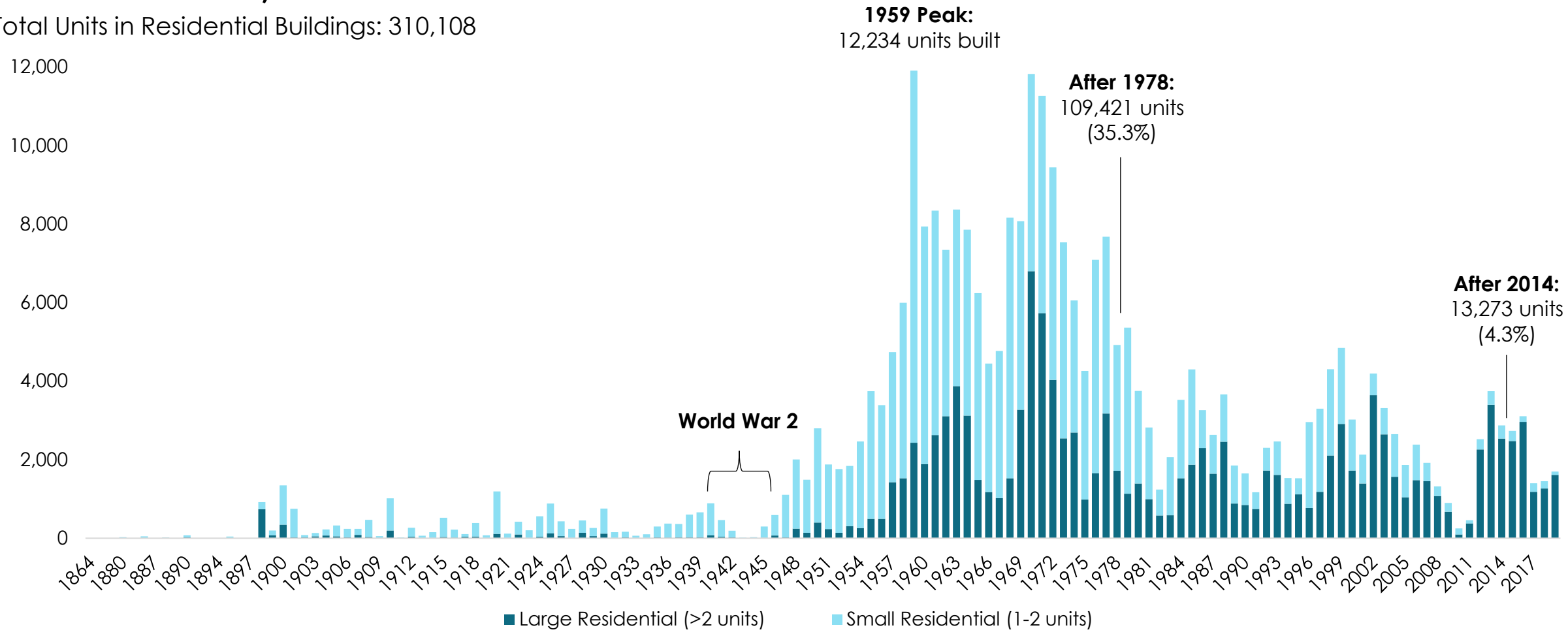
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Vintage

Residential Units, Year Built

Total Units in Residential Buildings: 310,108



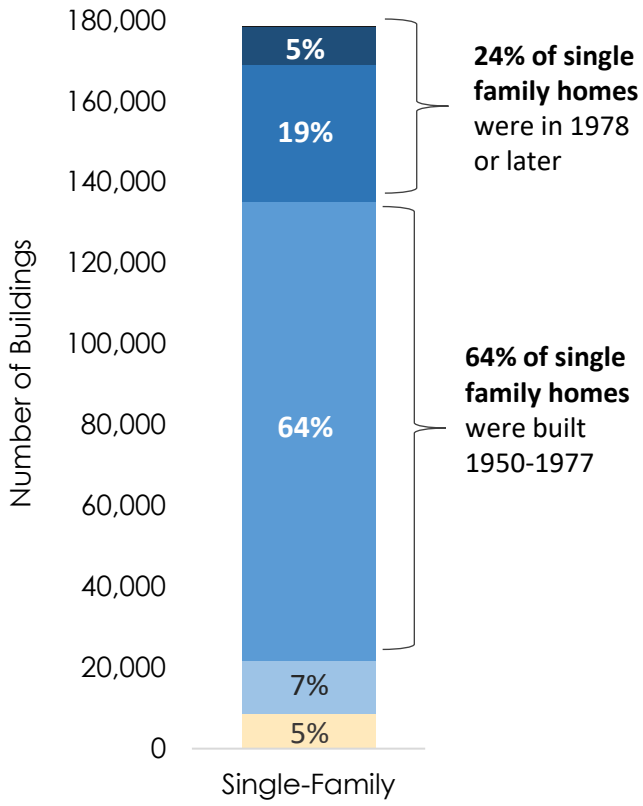
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

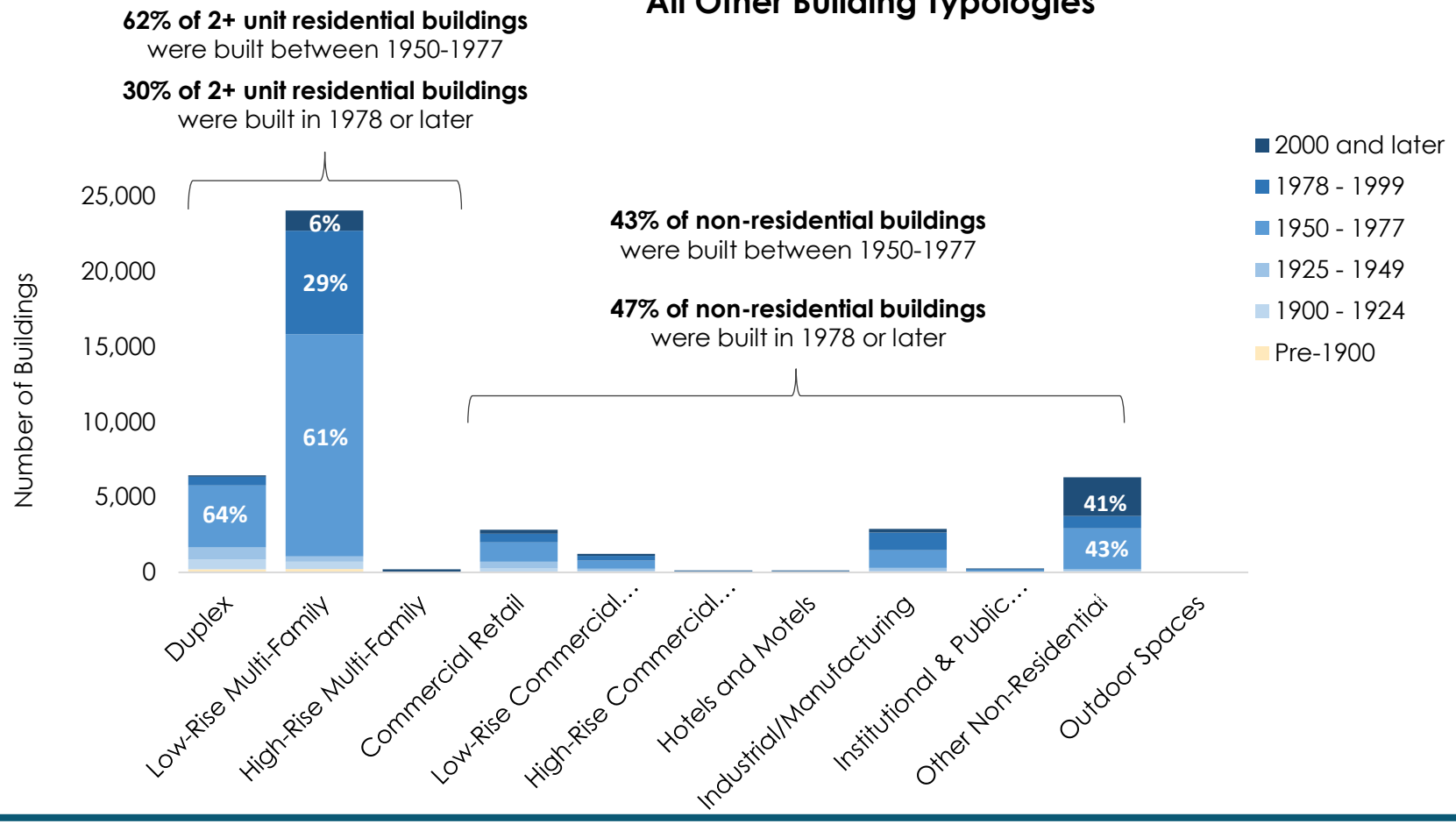
Technical Indicators | Building Vintage

Number of Buildings by Typology and Vintage

Single Family Homes



All Other Building Typologies



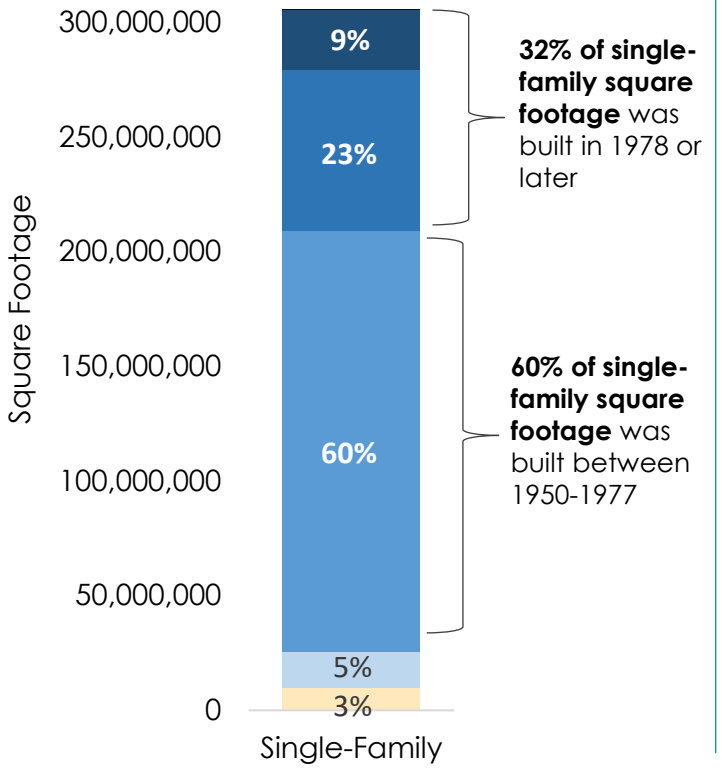
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

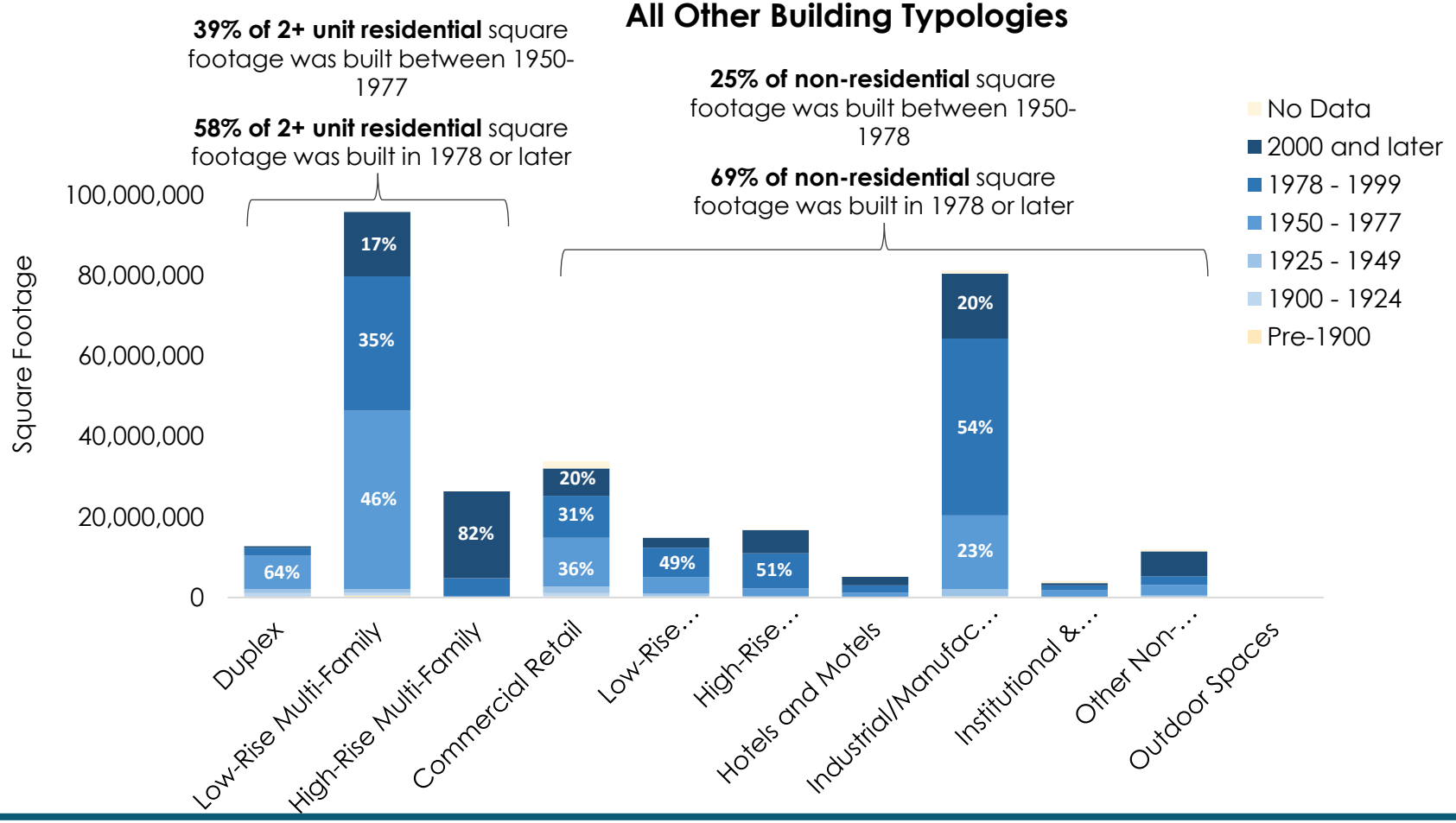
Technical Indicators | Building Vintage

Square Footage by Typology and Vintage

Single Family Homes



All Other Building Typologies



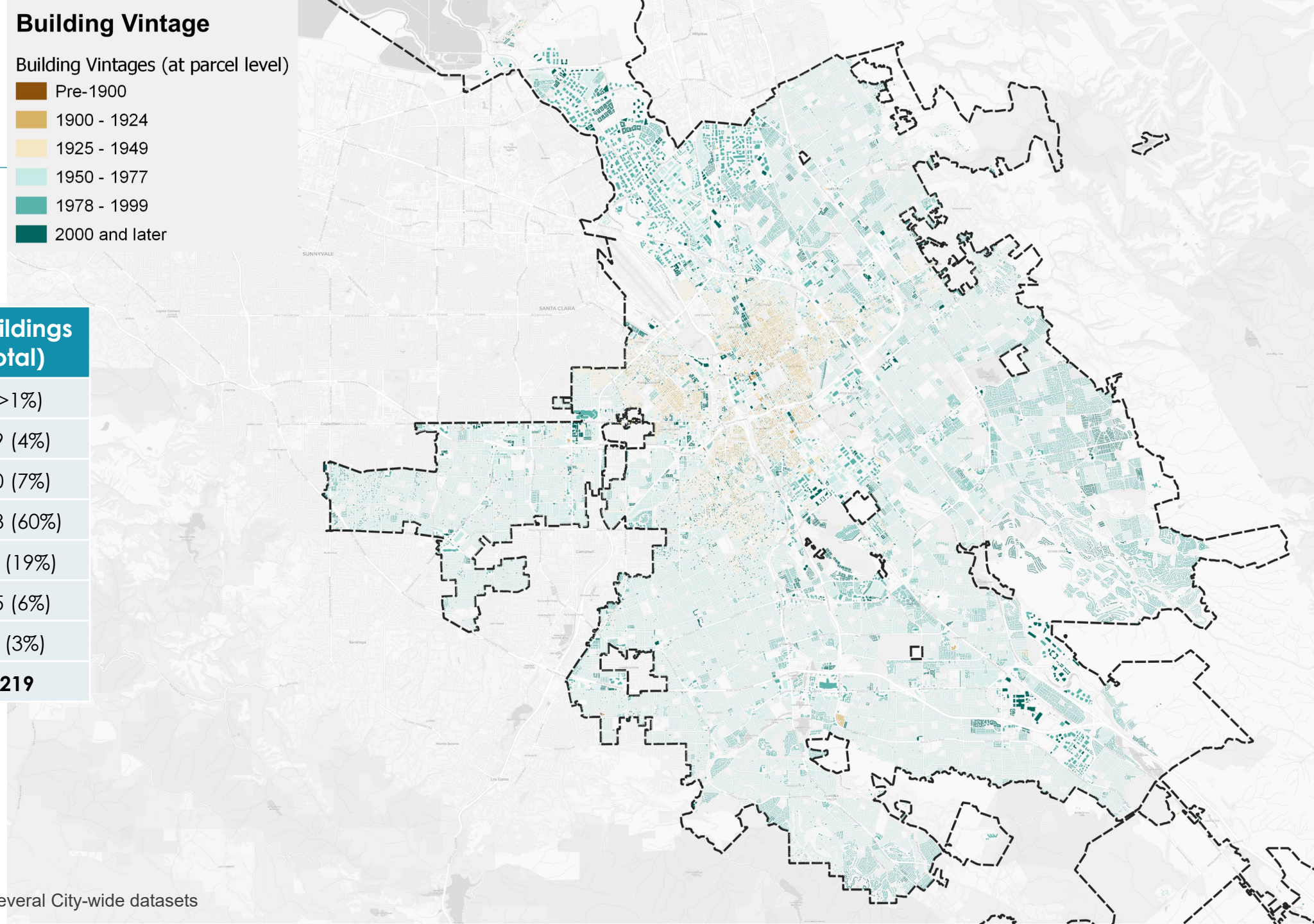
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Building Vintage

Number of Buildings by Year Built

Year	# of Buildings (% total)
Pre-1900	699 (>1%)
1900-1924	10,139 (4%)
1925-1949	15,100 (7%)
1950-1977	138,208 (60%)
1978-1999	44,363 (19%)
2000-Present	14,265 (6%)
No Data	7,212 (3%)
TOTAL	**230,219**



Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Vintage

Summary Tables

Number of Buildings

#	Typology	Pre-1900	1900 - 1924	1925 - 1949	1950 - 1977	1978 - 1999	2000 and later	No Data	Total Bldgs
1	Single-Family	0.1%	5%	7%	64%	19%	5%	0.1%	178,530
2	Duplex	3%	10%	12%	63%	9%	1%	1%	6,519
3	Low-Rise Multifamily	0.9%	2%	1%	61%	29%	6%	0%	24,055
4	High-Rise Multifamily	0%	0.4%	0.7%	3%	13%	56%	27%	279
5	Low-Rise Commercial Office	2%	6%	11%	43%	27%	10%	1%	1,236
6	High-Rise Commercial Office	0%	0.8%	4%	17%	52%	25%	2%	118
7	Commercial Retail	1%	7%	13%	38%	17%	8%	17%	3,394
8	Hotels and Motels	0%	0.6%	5%	23%	30%	17%	25%	162
9	Industrial/Manufacturing	0.2%	2%	6%	33%	33%	7%	19%	3,582
10	Institutional & Public Buildings	0.5%	0.8%	2%	7%	7%	3%	80%	1,280
11	Other	0.1%	0.9%	0.8%	25%	7%	23%	43%	11,047
12	Outdoor Spaces	0%	0%	0%	65%	12%	0%	24%	17

Square Footage

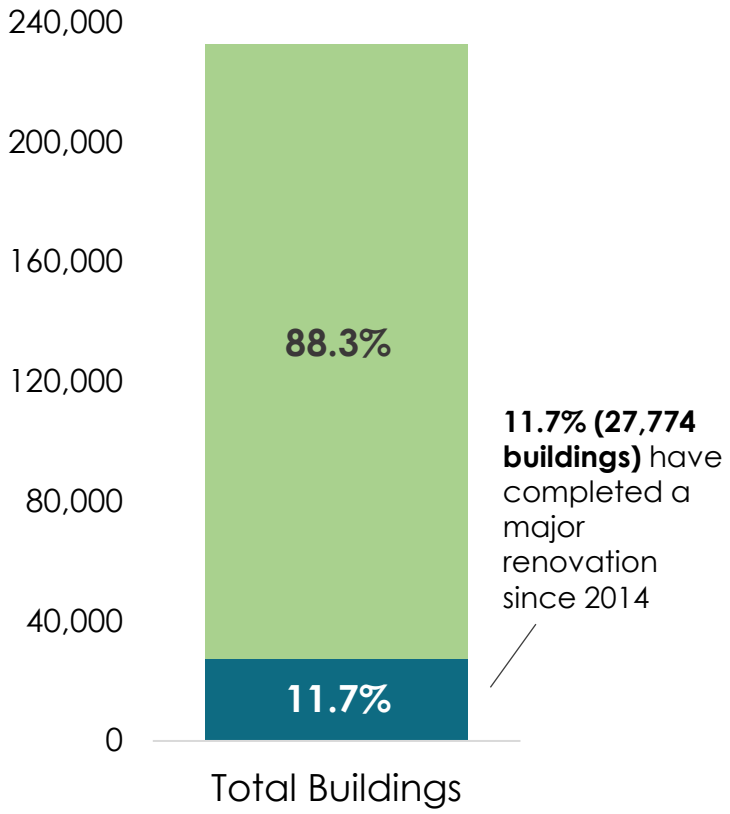
#	Typology	Pre-1900	1900 - 1924	1925 - 1949	1950 – 1977	1978 - 1999	2000 and later	No Data	Total Sq Ft
1	Single-Family	0%	3%	5%	60%	23%	9%	0%	305,662,521
2	Duplex	2%	7%	8%	64%	15%	4%	0%	12,835,152
3	Low-Rise Multifamily	1%	1%	1%	46%	35%	17%	0%	95,908,849
4	High-Rise Multifamily Complex	0%	0%	0%	1%	17%	82%	0%	26,484,498
5	Low-Rise Commercial Office	1%	2%	5%	36%	31%	20%	5%	33,891,713
6	High-Rise Commercial Office	1%	2%	4%	27%	49%	17%	0%	14,935,596
7	Commercial Retail	0%	0%	1%	12%	51%	34%	1%	16,934,490
8	Hotels and Motels	0%	0%	3%	19%	34%	41%	2%	5,310,957
9	Industrial/Manufacturing	0%	0%	2%	23%	54%	20%	1%	81,330,799
10	Institutional & Public Buildings	0%	1%	0%	42%	30%	13%	13%	4,126,334
11	Other	1%	1%	2%	22%	18%	51%	4%	11,972,196
12	Outdoor Spaces	0%	0%	0%	95%	5%	0%	0%	13,236

Building stock source: BEI analysis of several City-wide datasets

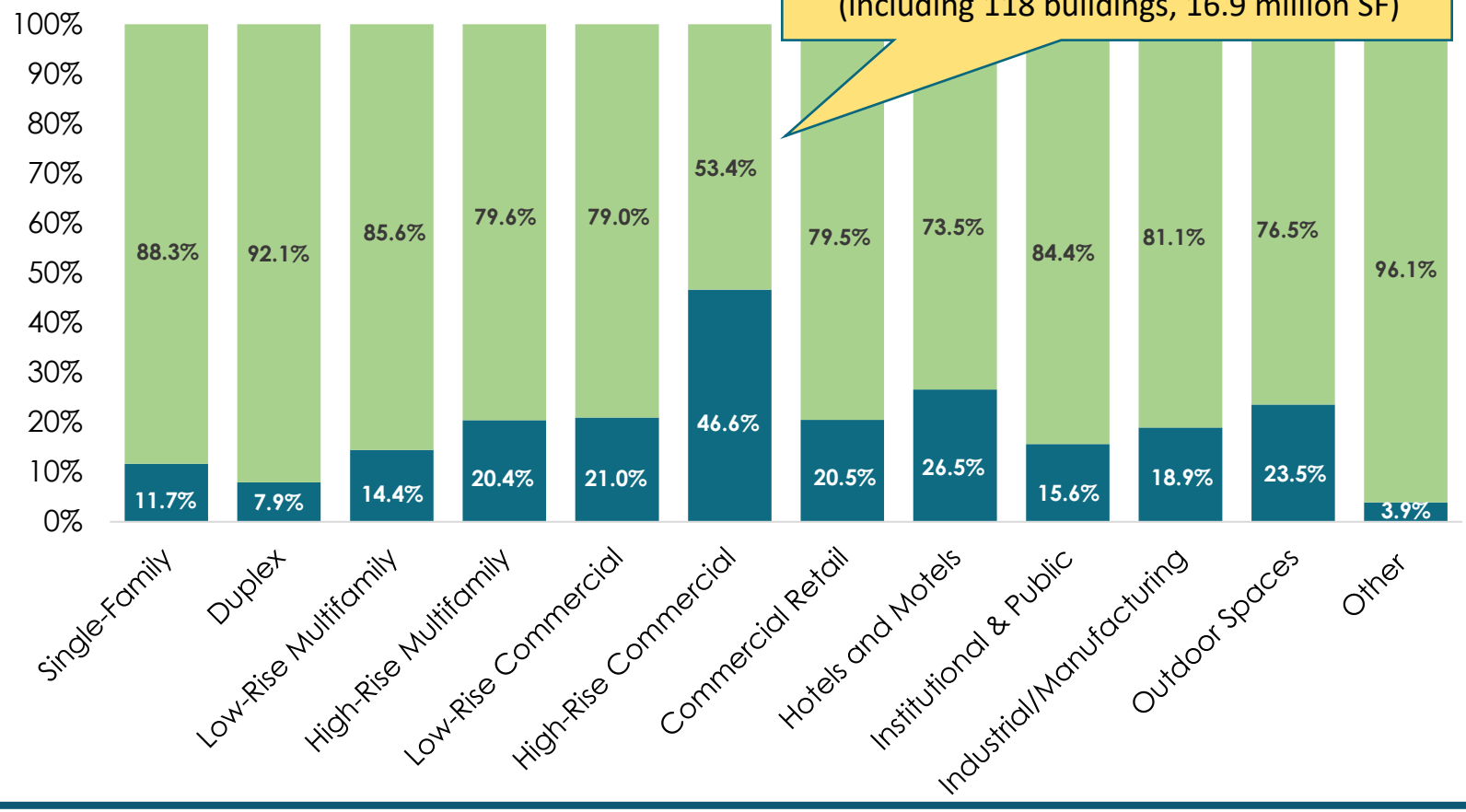
Technical Indicators | Major Renovations

Buildings with a Recent Major Renovation (after 2014)

All Buildings (Total Renovations)



Major Renovations by Typology (Percentages)



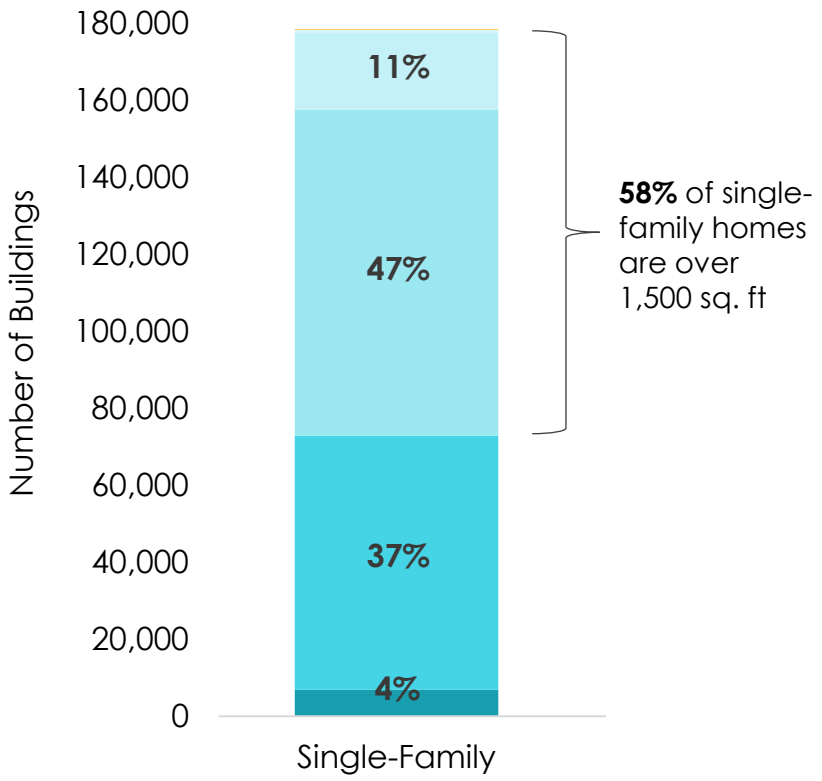
Building Electrification Institute

Source: City of San José Permit Center

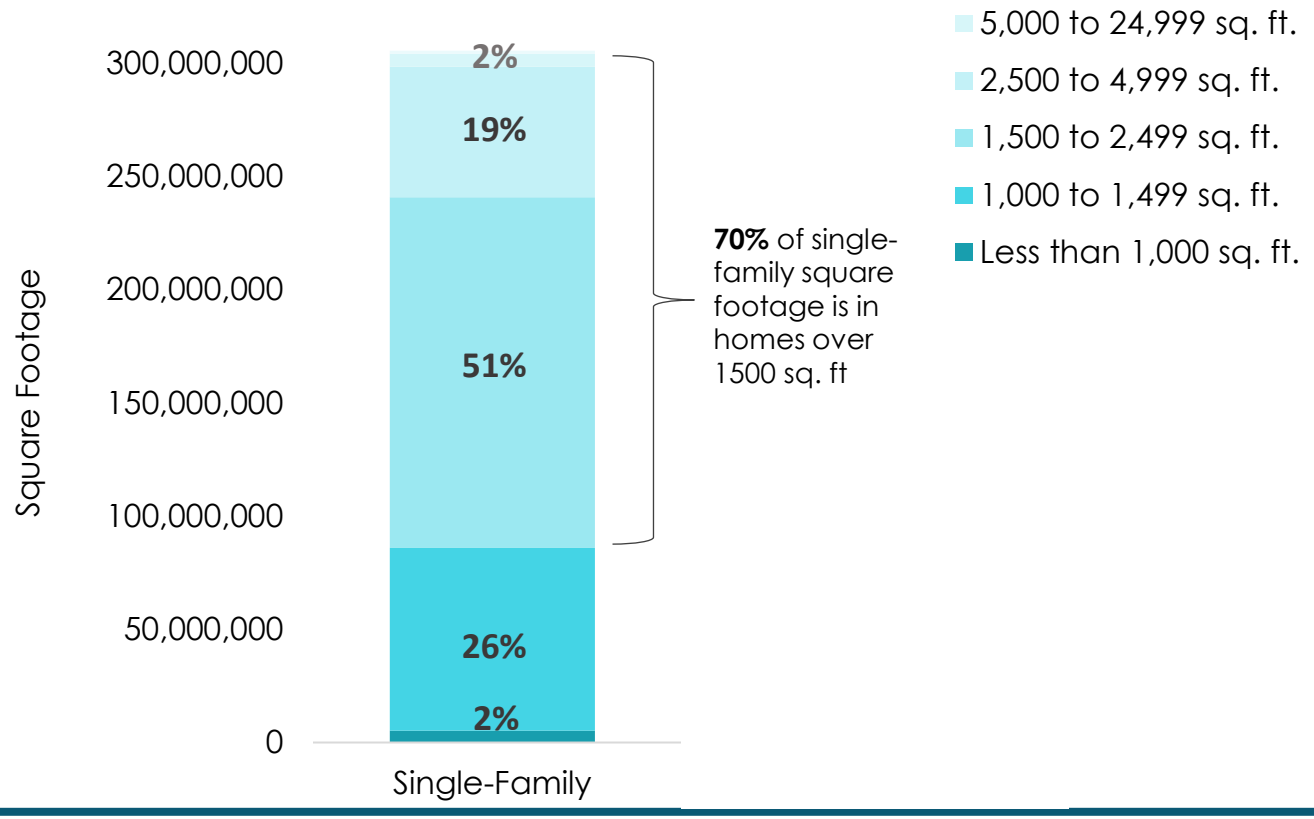
Technical Indicators | Building Size

Small Residential Buildings by Building Size

Number of Buildings by Building Size



Square Footage by Building Size

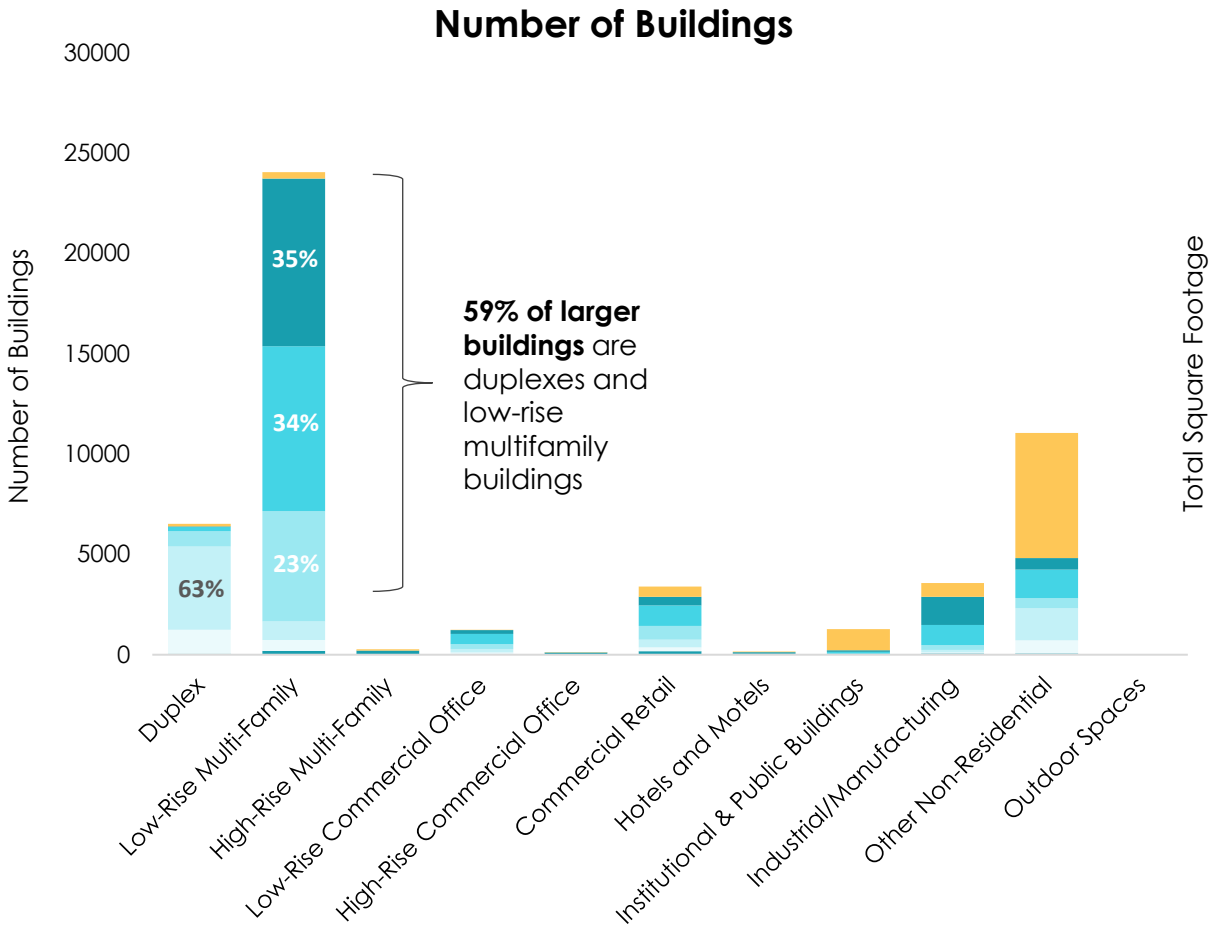


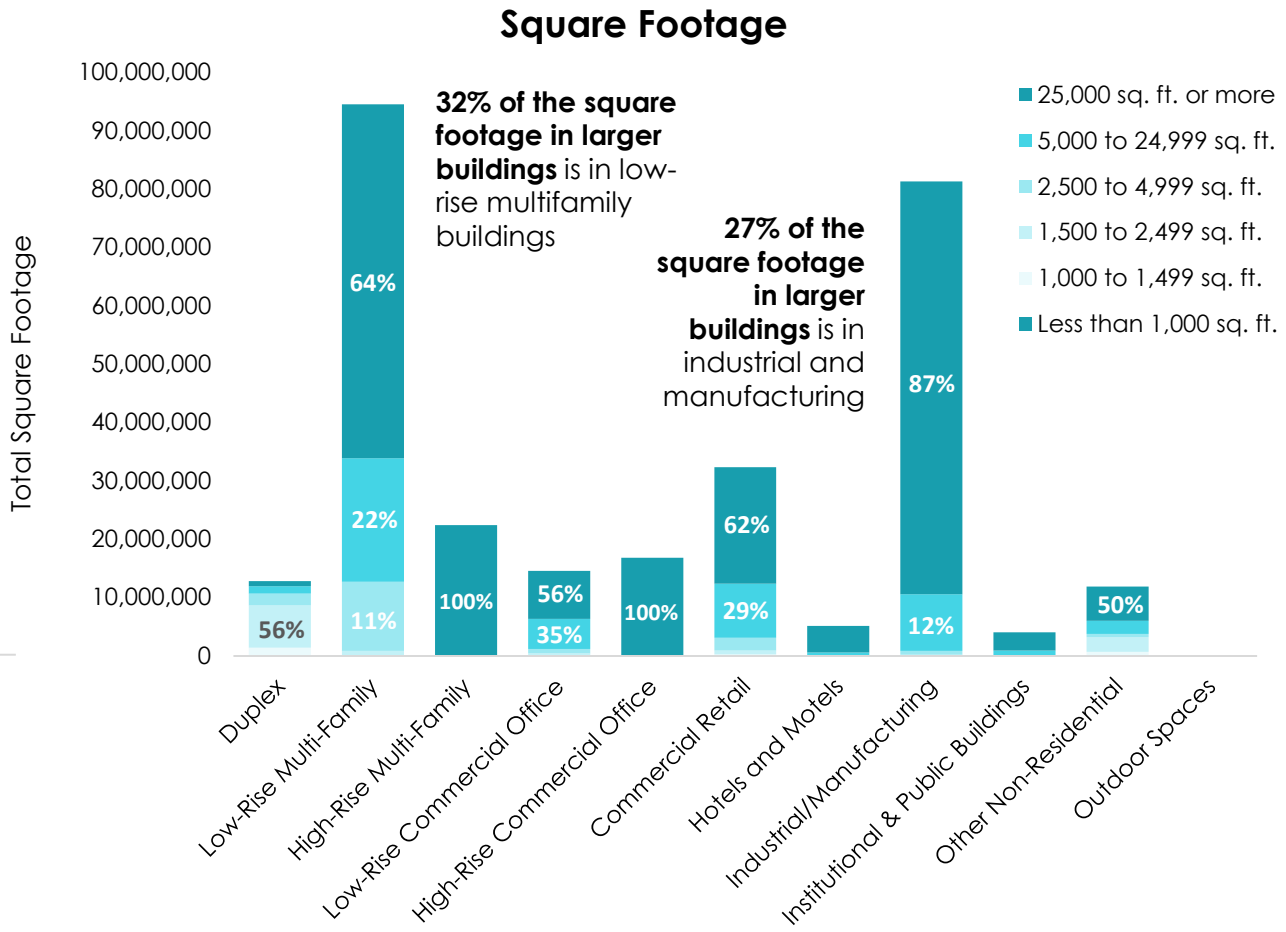
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Size

Larger Buildings





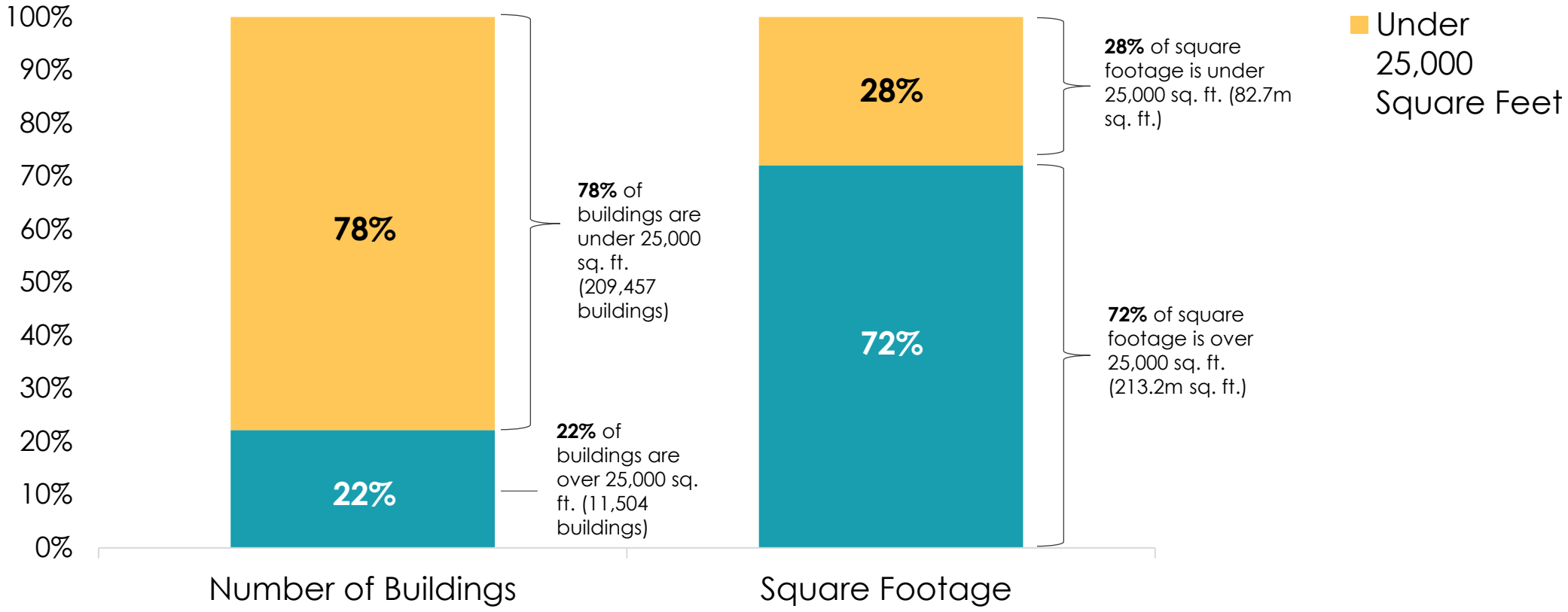
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Size

Buildings and Square Footage over 25,000 Square Feet

Not including Single Family Homes



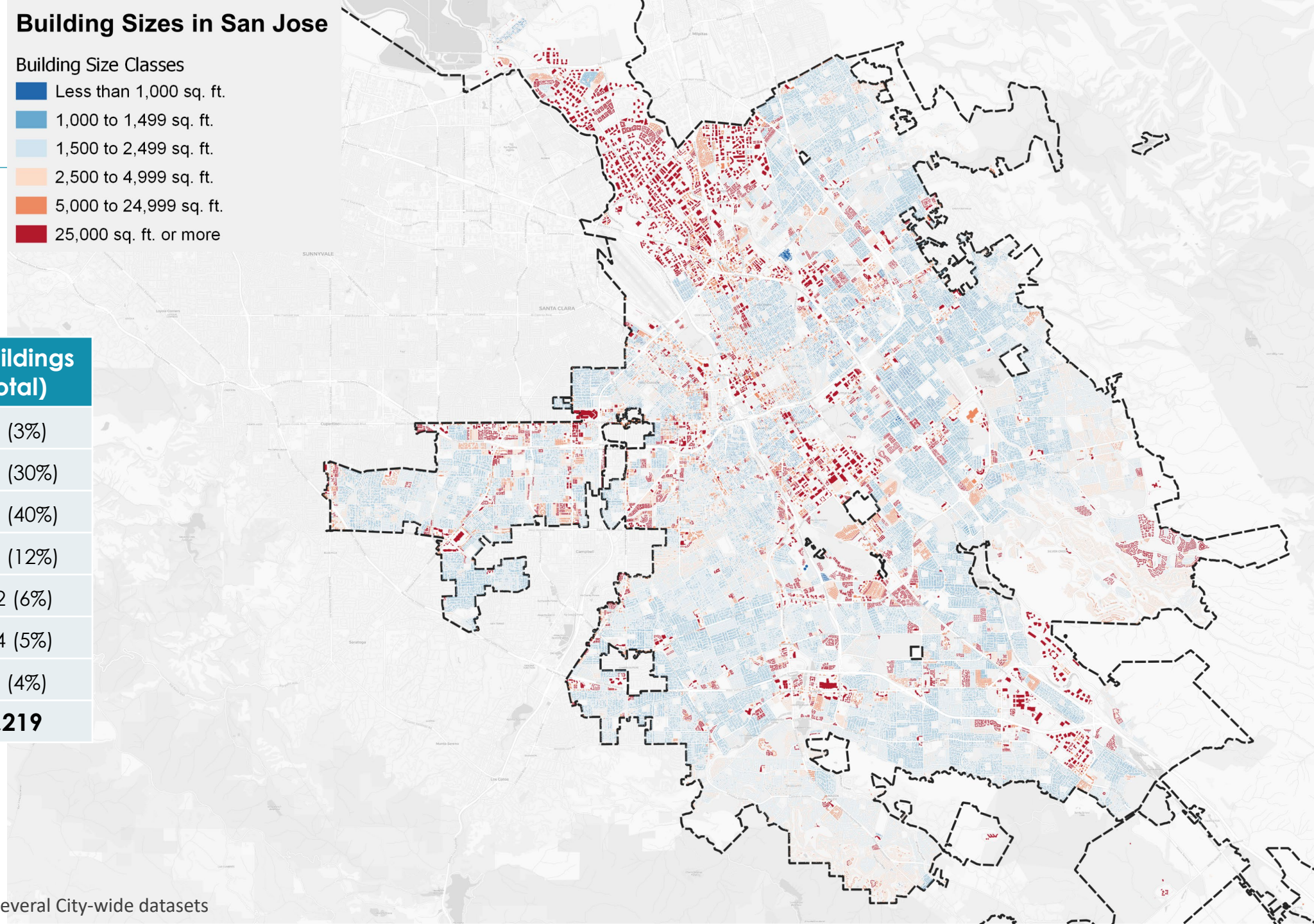
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Building Size

Number of Buildings by Size (Sq. Ft.)

Building Size (sq. ft)	# of Buildings (% total)
Less than 1,000	7,442 (3%)
1,000-1,499	68,809 (30%)
1,500-2,499	91,969 (40%)
2,500-4,999	27,855 (12%)
5,000-24,999	13,382 (6%)
25,000 or more	11,504 (5%)
No Data	9,258 (4%)
TOTAL	**230,219**



Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Size

Summary Tables

Number of Buildings

#	Typology	Less than 1,000 sq. ft.	1,000 to 1,499 sq. ft.	1,500 to 2,499 sq. ft.	2,500 to 4,999 sq. ft.	5,000 to 24,999 sq. ft.	25,000 sq. ft. or more	No Data	Total Bldgs
1	Single-Family	3.8%	37%	47%	11%	0%	0%	0.1%	178,530
2	Duplex	1%	18%	63%	12%	3%	0%	2%	6,519
3	Low-Rise Multifamily	0.8%	2%	4%	23%	34%	35%	1%	24,055
4	High-Rise Multifamily	0%	0.0%	0.0%	1%	2%	70%	27%	279
5	Low-Rise Commercial Office	5%	6%	11%	20%	30%	13%	15%	3,394
6	High-Rise Commercial Office	2%	8.2%	13%	19%	42%	16%	0%	1236
7	Commercial Retail	0%	0%	0%	0%	2%	97%	1%	118
8	Hotels and Motels	0%	0.6%	1%	1%	34%	41%	23%	162
9	Industrial/ Manufacturing	1.9%	1%	4%	7%	28%	39%	19%	3,582
10	Institutional & Public Buildings	0.4%	1.3%	1%	1%	8%	6%	82%	1,280
11	Other	0.7%	5.8%	14.4%	5%	13%	5%	56%	11,047
12	Outdoor Spaces	29%	12%	6%	18%	0%	0%	35%	17

Square Footage

#	Typology	Less than 1,000 sq. ft.	1,000 to 1,499 sq. ft.	1,500 to 2,499 sq. ft.	2,500 to 4,999 sq. ft.	5,000 to 24,999 sq. ft.	25,000 sq. ft. or more	Total Sq. Ft.
1	Single-Family	2%	26%	51%	19%	2%	0%	305,662,521
2	Duplex	0%	11%	56%	16%	10%	7%	12,835,152
3	Low-Rise Multifamily	0%	0%	1%	12%	22%	65%	95,908,849
4	High-Rise Multifamily	0%	0%	0%	0%	0%	100%	26,484,498
5	Low-Rise Commercial Office	0%	1%	2%	7%	27%	63%	33,891,713
6	High-Rise Commercial Office	0%	1%	2%	5%	34%	58%	14,935,596
7	Commercial Retail	0%	0%	0%	0%	0%	100%	16,934,490
8	Hotels and Motels	0%	0%	0%	0%	11%	89%	5,310,957
9	Industrial/ Manufacturing	0%	0%	0%	1%	12%	87%	81,330,799
10	Institutional & Public Buildings	0%	0%	1%	1%	21%	77%	4,126,334
11	Other	0%	6%	21%	5%	19%	50%	11,972,196
12	Outdoor Spaces	16%	15%	16%	53%	0%	0%	13,236

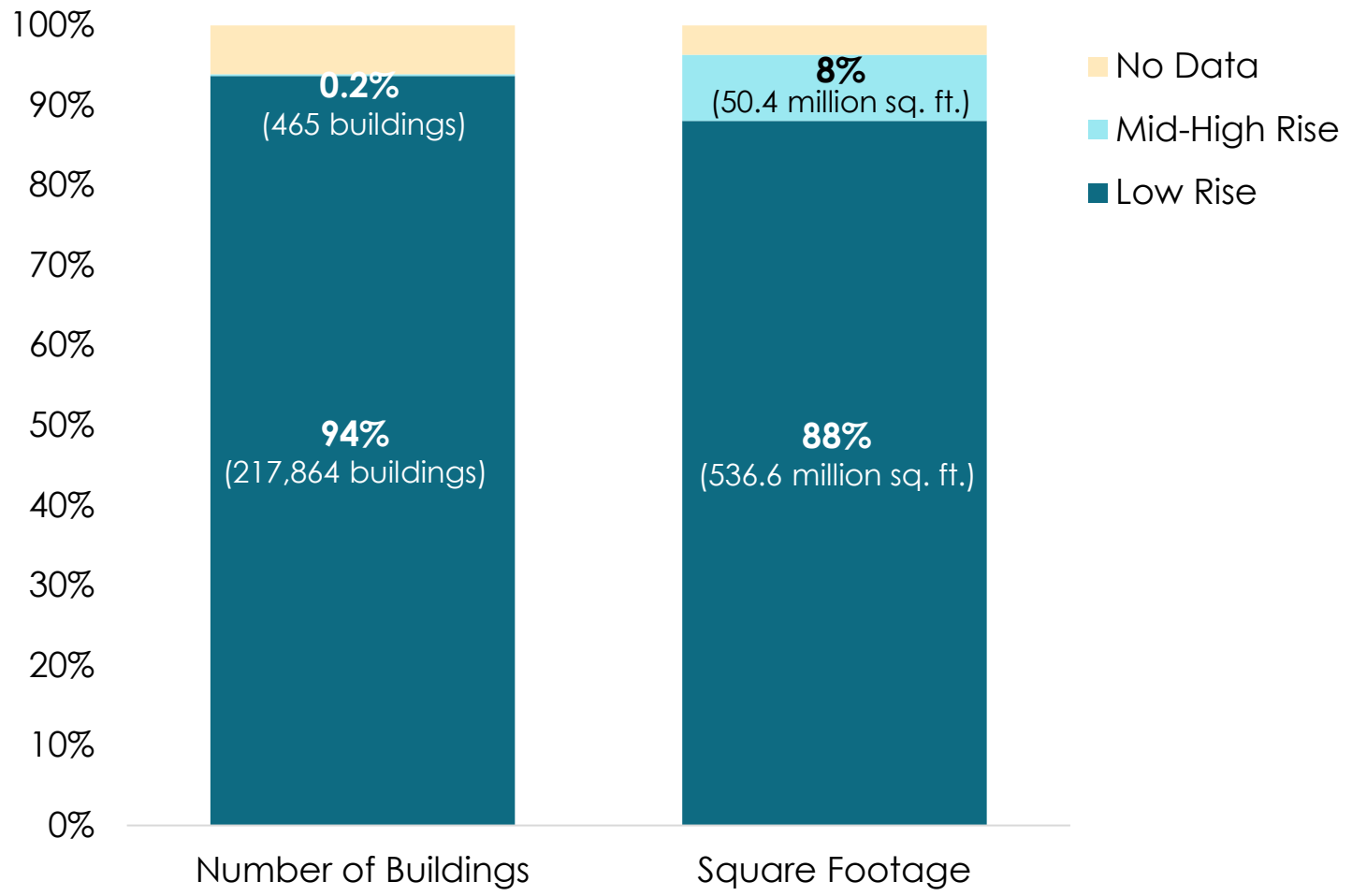
Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Height

Breakdown of Buildings by Height

Low-Rise Buildings: Up to 3 Stories
- 94% of buildings
- 88% of square footage

Mid- to High-Rise Buildings: 4+Stories
- 0.2% of buildings
- 8% of square footage

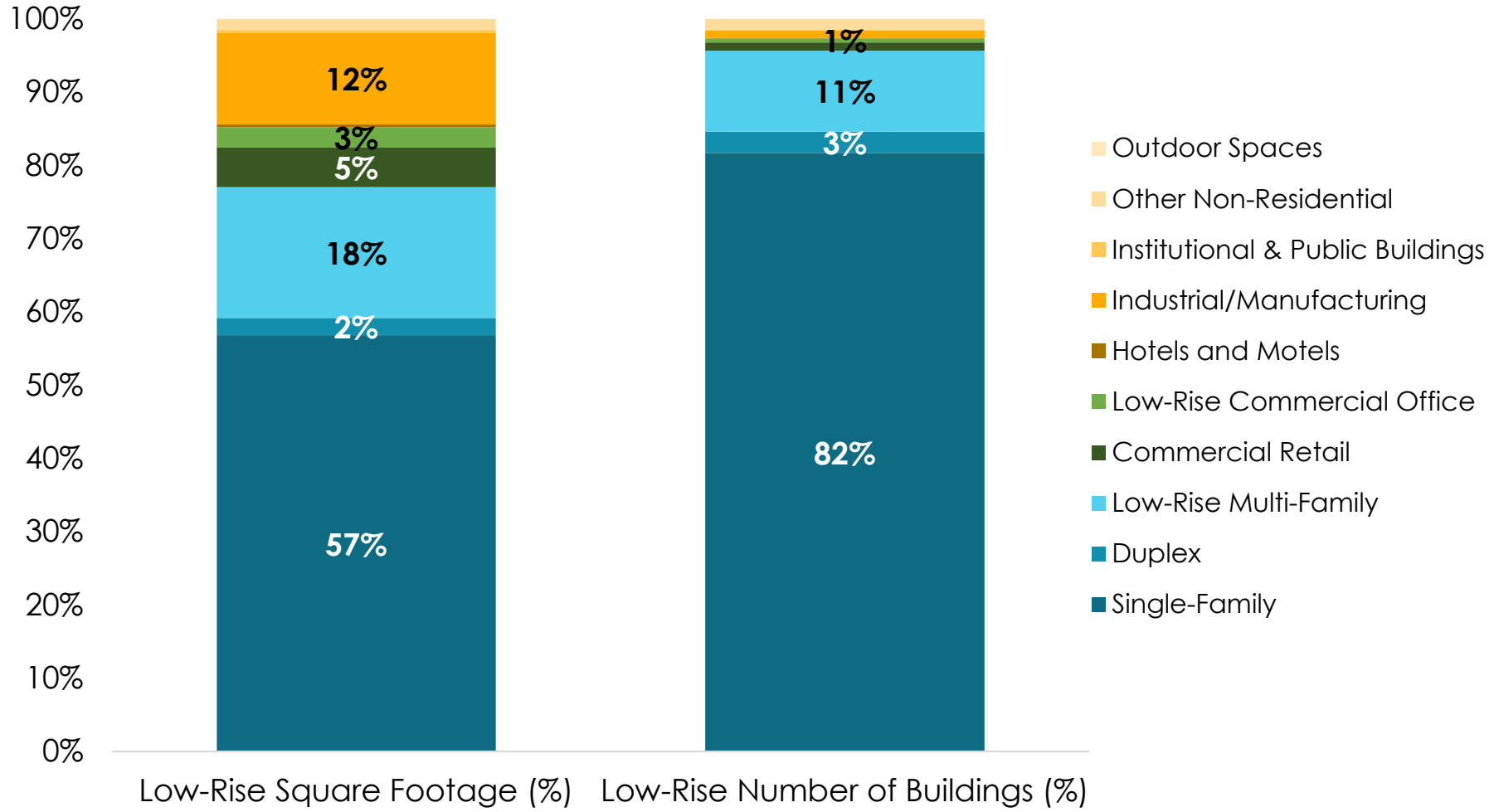


Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Height

Low-Rise Buildings (Up to 3 Stories)

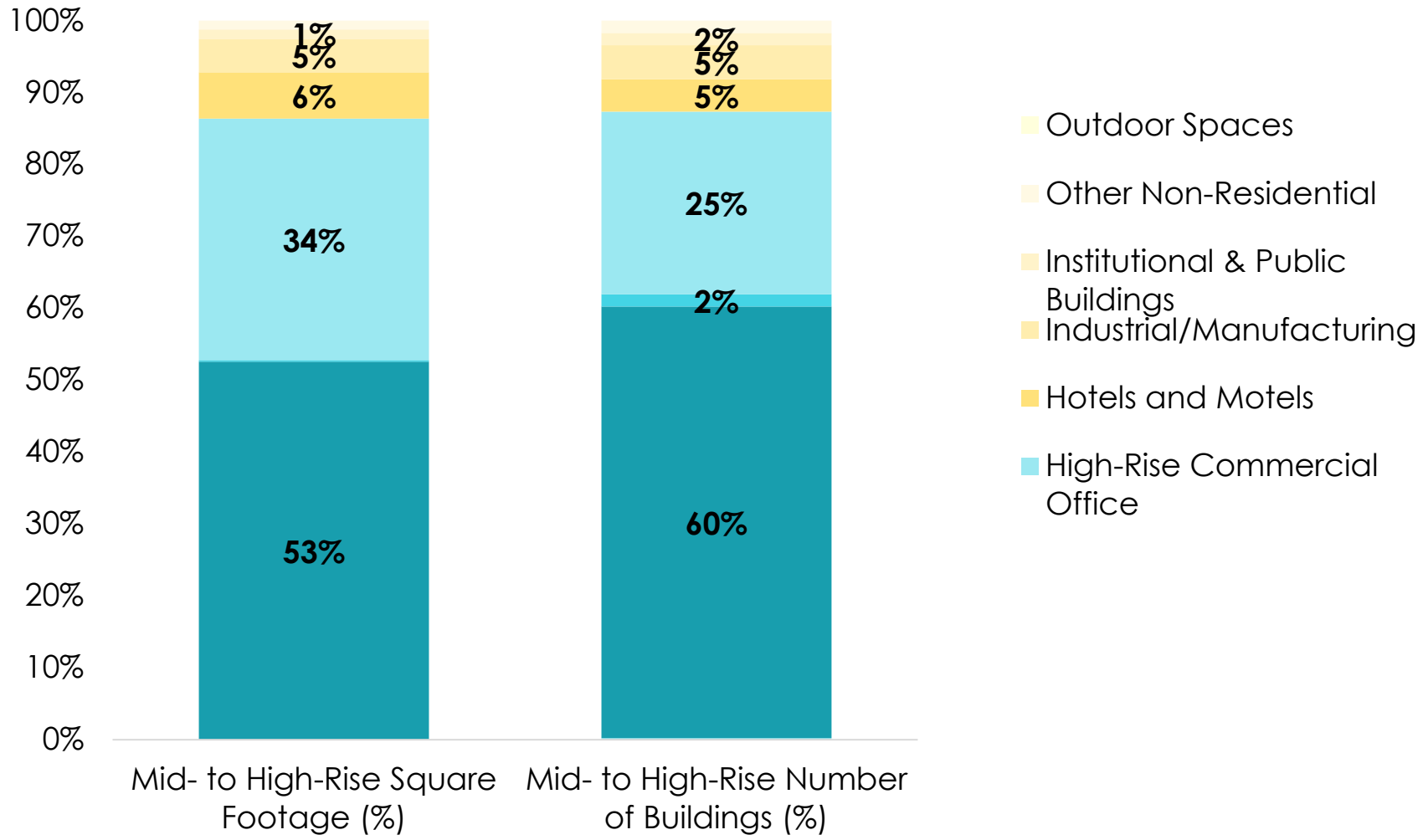


Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Height

Mid- to High-Rise Buildings (4+Stories)

Only 465 buildings were categorized as mid- to high-rise buildings in the available data. However, these alone make up nearly 10% of San José's built square footage.



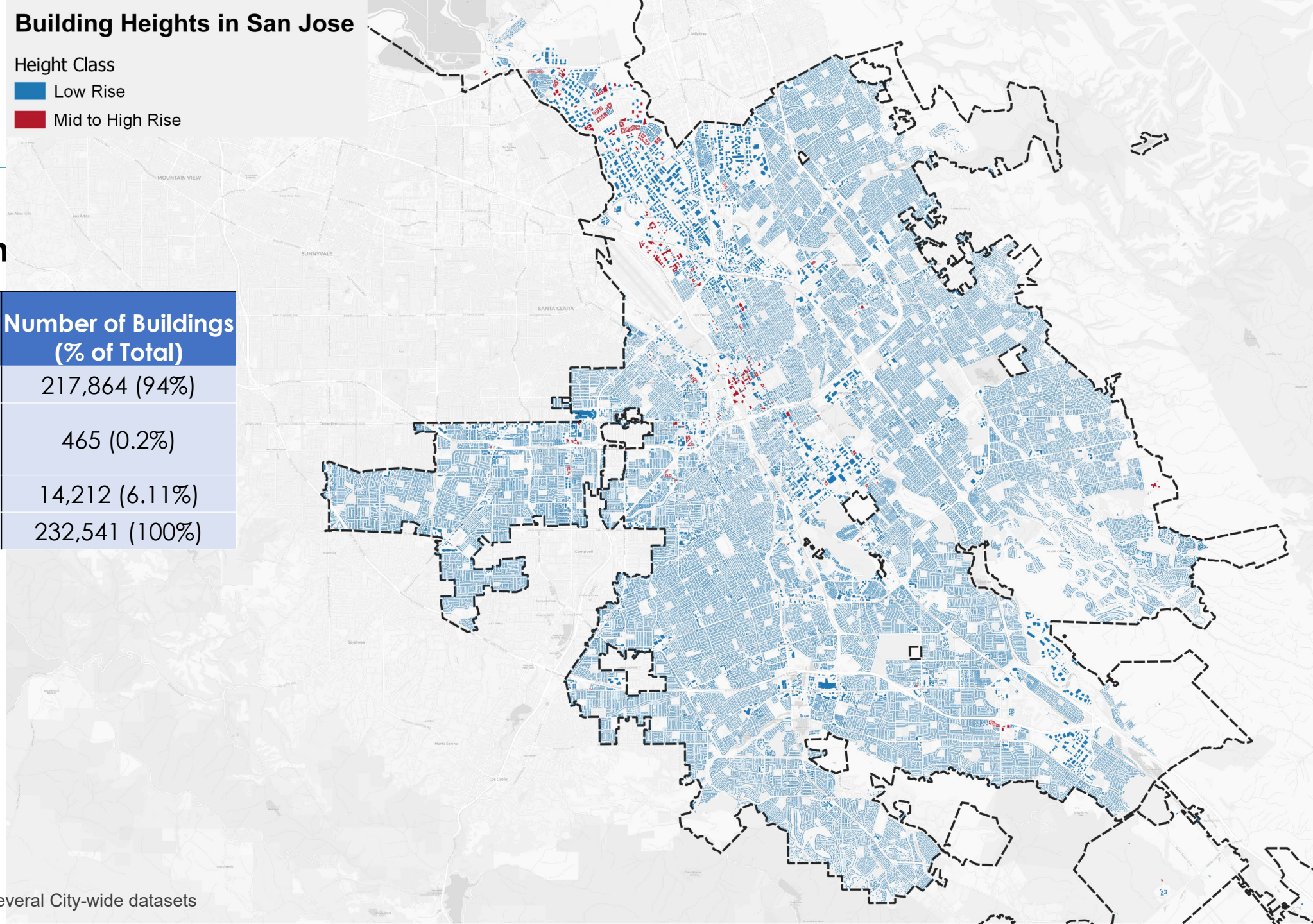
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Building Height

Number of Buildings by Heigh

Height Classification	Number of Buildings (% of Total)
Low-Rise (<4 Floors)	217,864 (94%)
Mid-to-High Rise (4+ Floors)	465 (0.2%)
No Data	14,212 (6.11%)
Total Buildings	232,541 (100%)



Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Building Height

Summary Tables

Number of Buildings

#	Typology	Low Rise (Total)	Low Rise (%)	Mid to High Rise (Total)	Mid to High Rise (%)	No Data (Total)	No Data (%)	Grand Total
1	Single-Family	178,098	100%	N/A	0%	432	0%	178,530
2	Duplex	6,298	97%	1	0%	220	3%	6,519
3	Low-Rise Multifamily	24,055	100%	N/A	0%		0%	24,055
4	High-Rise Multifamily	N/A	0%	279	100%		0%	279
5	Commercial Retail	2,441	72%	8	0%	945	28%	3,394
6	Low-Rise Commercial Office	1,236	100%	N/A	0%		0%	1,236
7	High-Rise Commercial Office	N/A	0%	118	100%		0%	118
8	Hotels and Motels	103	64%	21	13%	38	23%	162
9	Industrial/ Manufacturing	2,318	65%	22	1%	1,242	35%	3,582
10	Institutional & Public Buildings	182	14%	8	1%	1,090	85%	1,280
11	Other	3,122	28%	8	0%	7,917	72%	11,047
12	Outdoor Spaces	11	65%	N/A	0%	6	35%	17

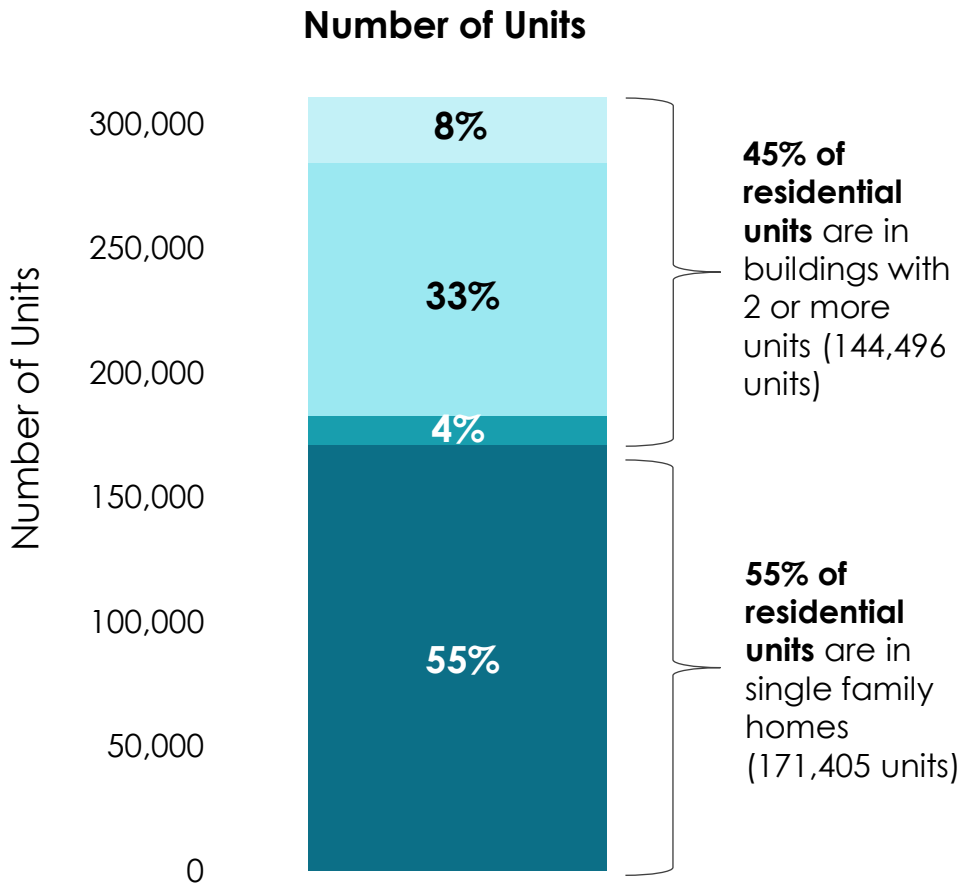
Square Footage

#	Typology	Low Rise (Total Sq Ft)	Low Rise (%)	Mid to High Rise (Total Sq Ft)	Mid to High Rise (%)	No Data (Total Sq Ft)	No Data (%)	Grand Total
1	Single-Family	305,064,011	100%	N/A	0%	598,510	0%	305,662,521
2	Duplex	12,651,745	99%	2,191	0%	181,216	1%	12,835,152
3	Low-Rise Multifamily	95,908,849	100%	N/A	0%		0%	95,908,849
4	High-Rise Multifamily	N/A	0%	26,484,498	100%		0%	26,484,498
5	Commercial Retail	28,873,203	85%	122,980	0%	4,895,530	14%	33,891,713
6	Low-Rise Commercial Office	14,935,596	100%	N/A	0%		0%	14,935,596
7	High-Rise Commercial Office	N/A	0%	16,934,490	100%		0%	16,934,490
8	Hotels and Motels	2,055,843	39%	3,234,114	61%	21,000	0%	5,310,957
9	Industrial/ Manufacturing	66,878,308	82%	2,355,268	3%	12,097,223	15%	81,330,799
10	Institutional & Public Buildings	2,311,943	56%	661,413	16%	1,152,978	28%	4,126,334
11	Other	7,953,544	66%	618,673	5%	3,399,979	28%	11,972,196
12	Outdoor Spaces	13,236	100%	N/A	0%		0%	13,236

Building stock source: BEI analysis of several City-wide datasets

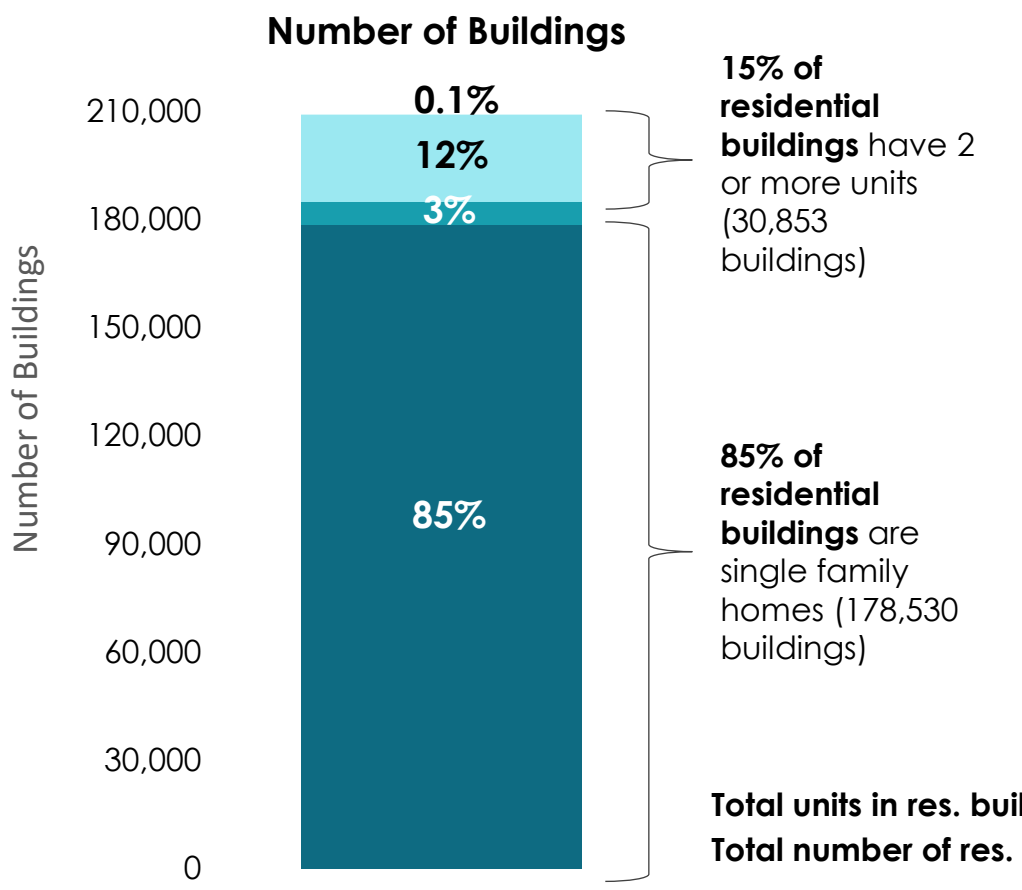
Technical Indicators | Residential Units

Housing Units in Residential Buildings



45% of residential units are in buildings with 2 or more units (144,496 units)

55% of residential units are in single family homes (171,405 units)



15% of residential buildings have 2 or more units (30,853 buildings)

85% of residential buildings are single family homes (178,530 buildings)

High-Rise Multifamily
Low-Rise Multifamily
Duplex
Single Family

Total units in res. buildings = 315,901
Total number of res. buildings = 209,383

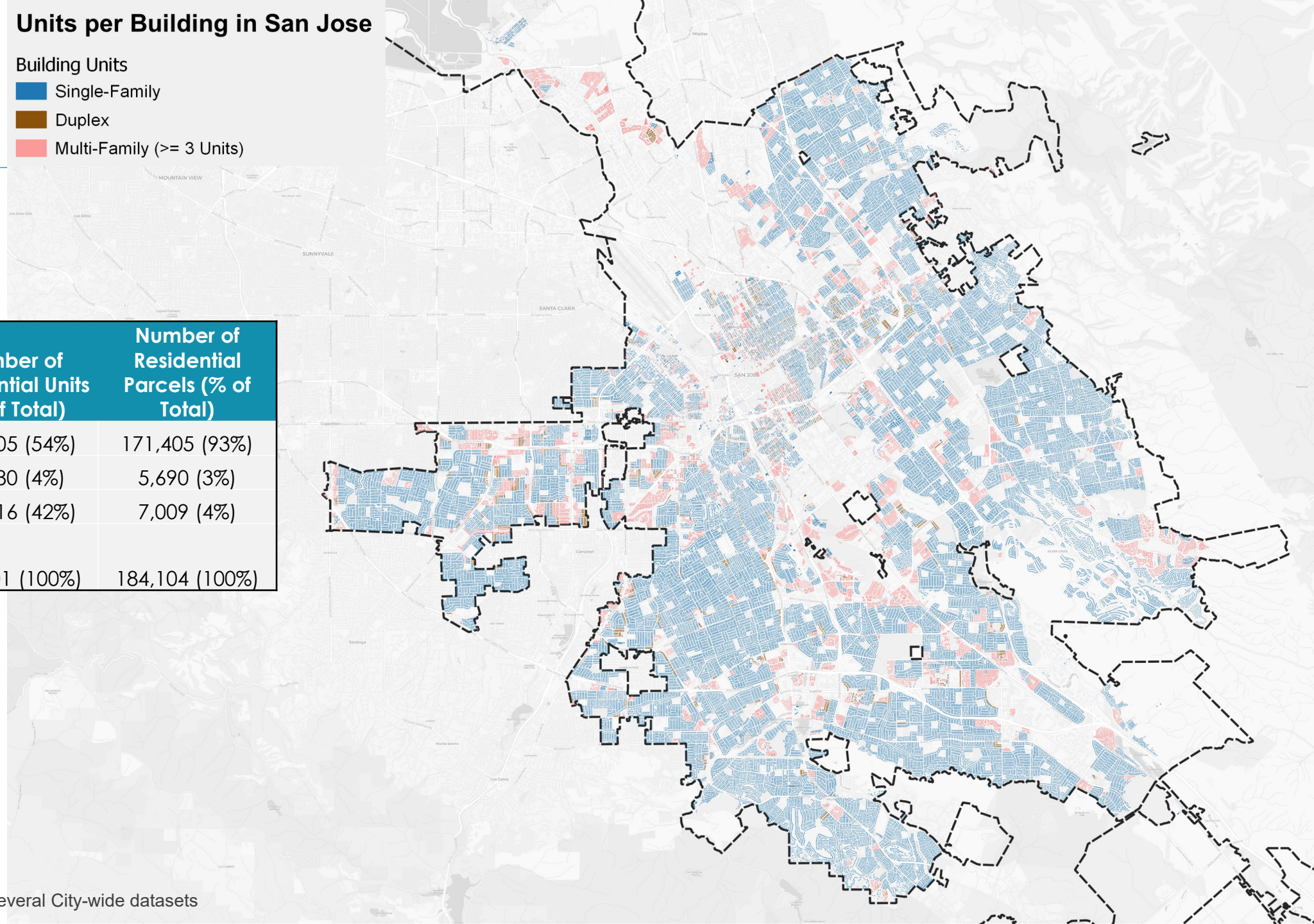
Building Electrification Institute

Building stock source: BEI analysis of several City-wide datasets

Residential Units

Number of Residential Units by Parcel

Unit Classification	Number of Residential Units (% of Total)	Number of Residential Parcels (% of Total)
Single-Family (1 unit)	171,405 (54%)	171,405 (93%)
Duplex (2 units)	11,380 (4%)	5,690 (3%)
Multifamily (3+ units)	133,116 (42%)	7,009 (4%)
Total Residential Units and Parcels	315,901 (100%)	184,104 (100%)



Building stock source: BEI analysis of several City-wide datasets

Technical Indicators | Residential Units

Residential Units – Summary Tables

Number of Buildings

#	Typology	1 unit (%)	2 units (%)	3+ units (%)	No Data (%)	Grand Total
1	Single-Family	100%	---	---	---	178,530
2	Duplex	---	100%	---	---	6,519
3	Low-Rise Multifamily	---	---	99.96%	0.04%	24,055
4	High-Rise Multifamily	---	---	100%		279
5	Commercial Retail	47%	13%	29%	12%	3,394
6	Low-Rise Commercial Office	57%	12%	28%	3%	1,236
7	High-Rise Commercial Office	42%	10%	37%	10%	118
8	Hotels and Motels	6%	3%	85%	6%	162
9	Industrial/Manufacturing	41%	15%	38%	7%	3,582
10	Institutional & Public Buildings	21%	11%	65%	3%	1,280
11	Other	8%	3%	54%	34%	11,047
12	Outdoor Spaces	23%	12%	31%	33%	105
#	No data	25%	8%	67%	---	2,322

Square Footage

#	Typology	1 unit (%)	2 units (%)	3+ units (%)	No Data (%)	Grand Total
1	Single-Family	100%	---	---	---	305,662,521
2	Duplex	---	100%	---	---	12,835,152
3	Low-Rise Multifamily	---	---	99.98%	0.02%	95,908,849
4	High-Rise Multifamily	---	---	100%		26,484,498
5	Commercial Retail	47%	13%	32%	8%	33,891,713
6	Low-Rise Commercial Office	53%	11%	32%	4%	14,935,596
7	High-Rise Commercial Office	50%	8%	28%	13%	16,934,490
8	Hotels and Motels	3%		96%	0.5%	5,310,957
9	Industrial/Manufacturing	53%	14%	32%	1%	81,330,799
10	Institutional & Public Buildings	38%	13%	41%	7%	4,126,334
11	Other	29%	3%	27%	41%	11,972,196
12	Outdoor Spaces	92%	2%	2%	4%	160,418

Note: These tables include units listed in the data under non-residential building typologies. This may be due to mixed use parcels, or an error or misclassification in base datasets.

Ownership & Decision-Making | Affordable Housing

List of Ownership and Decision-Making Indicators

- Affordable housing
- Rent stabilization
- Potential ADUs
- Early Adopters
- New homeowners
- Baby boomers
- Millennials
- Families with children
- School service areas

Ownership & Decision-Making | Affordable Housing

Affordable housing requires additional considerations for future policies and programs, given unique needs, constraints, funding structures and timelines. While evaluating assistance opportunities for affordable housing, it is important to consider the following principles:

- **PROTECT tenants:** Ensure renters are not unnecessarily forced out of their homes
- **PRESERVE housing and stabilize communities:** Ensure housing that is currently affordable remains affordable to those who live there
- **PRODUCE more affordable housing:** Build new housing that serves all income levels to accommodate new residents

All three of these approaches should be considered when developing electrification programs and policies to avoid negative consequences for vulnerable communities, including accelerated displacement or gentrification. Partnering closely with the City of San José Housing Department is critical to developing equitable approaches to affordable housing.

Sources: Right to the City Alliance, AHF, CASA, Urban Habitat

Ownership & Decision-Making | Affordable Housing

Regulated Affordable Housing (or "deed-restricted" affordable housing) is housing that is rent-restricted or receives state, federal, and/or local subsidies to offer housing for income-qualified individuals. Multifamily buildings can contain a range of units subject to different rent restrictions and subsidy stipulations, providing housing to families at multiple income levels. In San José, this includes housing built under the **Inclusionary Housing Ordinance (IHO)**, which:

- Requires all new residential developments (>20 units) to ensure 15% of units in new projects are affordable (can negotiate income-level breakdown & on-site vs. off-site)
- Allows for alternative compliance pathways include paying an in-lieu fee or providing 20% HUD Restricted Units (Section 8) project-based vouchers
- Affordability restrictions remain in place often for 55 years

Source: City of San José Housing Department discussions

Ownership & Decision-Making | Affordable Housing

Unregulated Affordable Housing (also known as "Naturally-Occurring Affordable Housing) is housing that is currently priced below local average market rate and/or is affordable to existing residents, but is not subject to regulations restricting rents or incomes. This type of housing:

- May be located in lower-income areas with fewer services, which can create and exacerbate existing inequities for residents.
- May also be located in higher-income or gentrifying areas and be undervalued, posing a threat to continued affordability.
- Generally makes up a substantial portion of any city's housing stock, although there is a lack of quality data to identify these buildings.

Ownership & Decision-Making | Rent Stabilization

Apartment Rent Ordinance (ARO), also known as "Rent Control" or "Rent Stabilization" is another important housing sector to consider in potential policies and programs.

- ARO applies to **buildings with 3 or more units and built prior to 1979**. **Rent is limited to a 5% annual increase**, but the landlord can raise the rent to market rate if the tenant vacates voluntarily or is evicted.
- The City does not consider ARO units 'affordable housing' since they do not serve specific communities, however, they do tend to fall 20-40% below market rates overall.

San José also has a **Tenant Protection Ordinance (TPO)**, which only allows landlords to evict tenants only based on 13 "just causes", with a goal to promote stability. ARO units are subject to TPO, however TPO includes several other unit types.

Although these policies provide needed protections and affordability for tenants, additional solutions are needed to ensure affordability for all in San José.

2019 Rent Control Registry*

Unit Type	# of RC units	RC Average Rent	Market-Rate Average Rent
Studio	2,608	$1,434	$1,958
1 bedroom	15,082	$1,630	$2,236
2 bedroom	14,046	$1,967	$2,738
3 bedroom	1,688	$2,346	$3,384
4 bedroom	38	$2,898	Unavailable
Pending	43	--	

**88% of rent controlled units have reported*

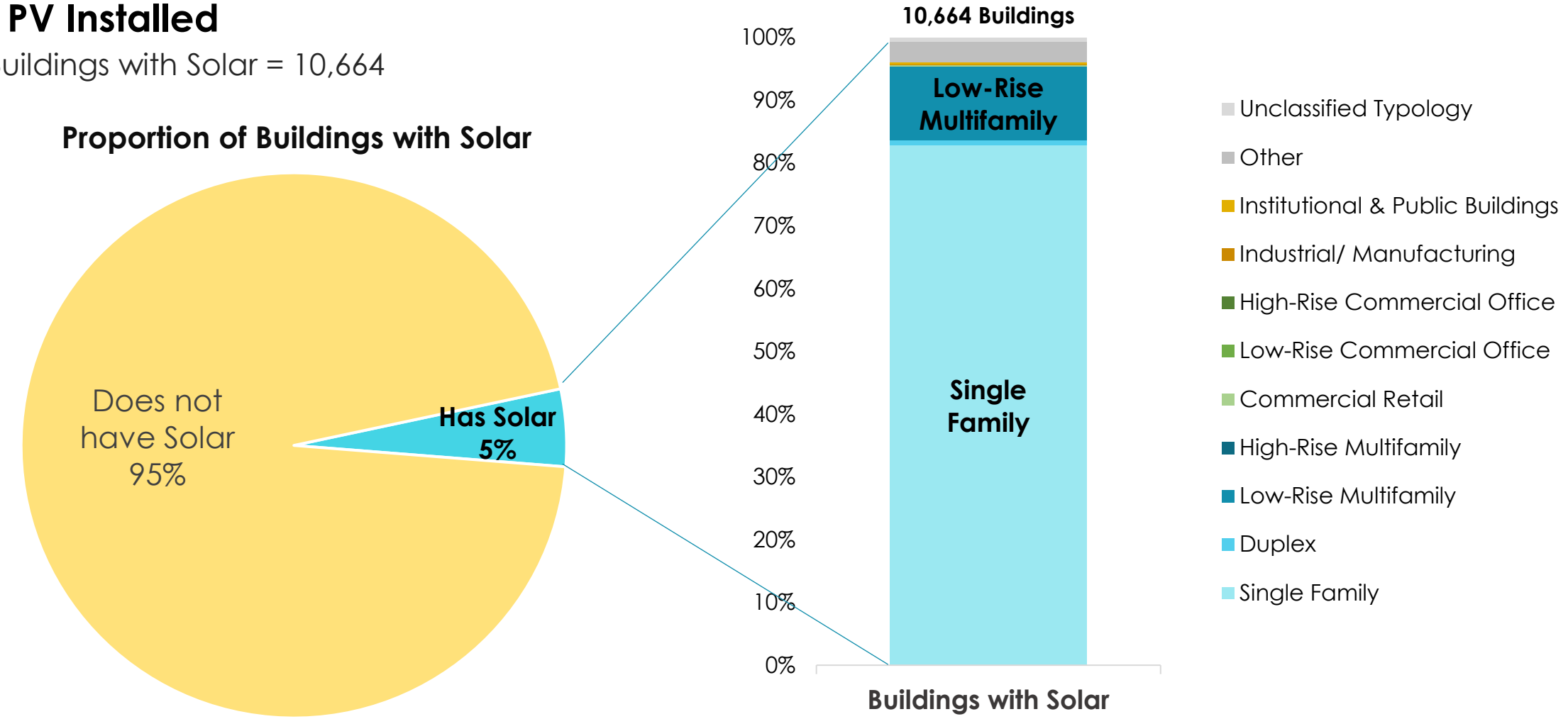
Note: Since subsidized affordable housing restrictions are stricter, those buildings are exempt from rent control regulations. However, it is possible in rare cases a building may contain both types of units. It is more likely that subsidized affordability requirements have expired and one or both datasets have not been fully updated.

ARO also includes a requirement to re-control a portion of demolished / removed apartments that are subject to ARO (under the Ellis Act), and requires building owners to report rent amount and tenant stay length annually (see Rent Control Registry).
Source: City of San José Housing Department; Market-Rate Rents from City of San José Housing Market Update, Q4 2019

Ownership & Decision-Making | Solar PV

Solar PV Installed

Total Buildings with Solar = 10,664

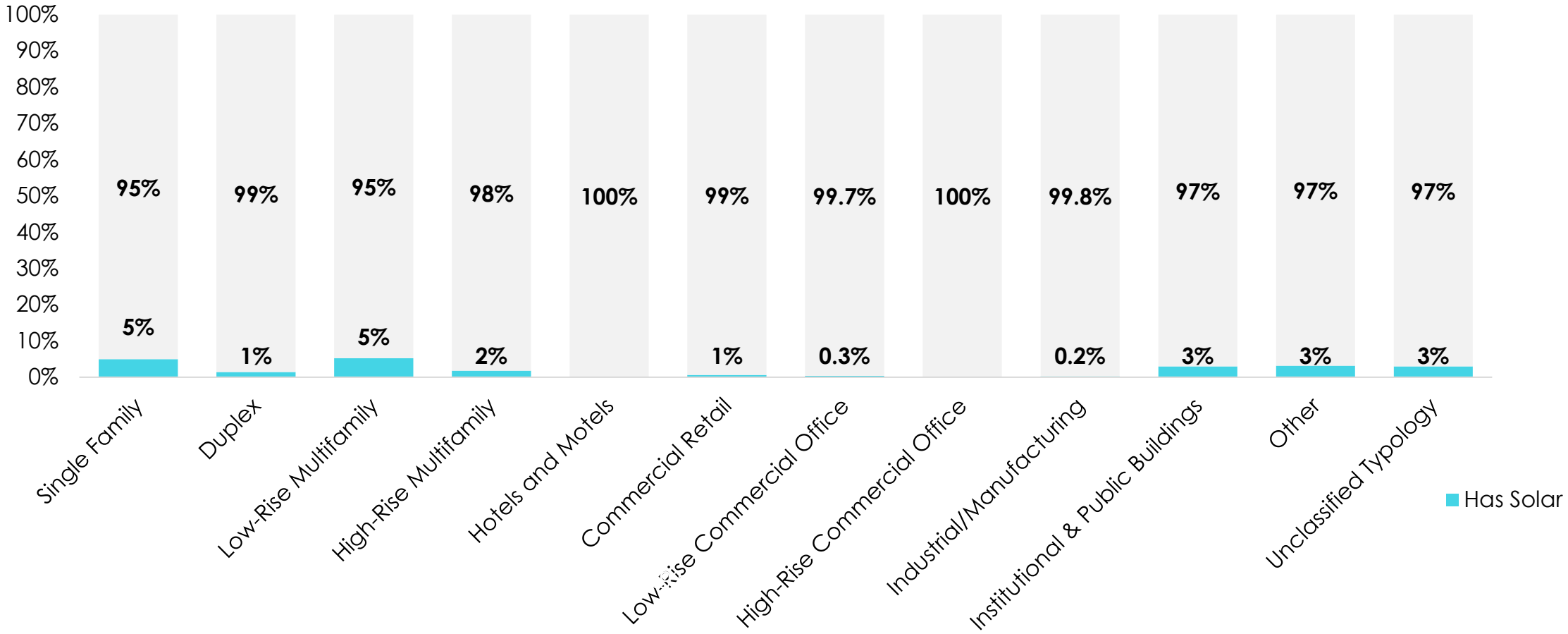


Building Electrification Institute

Source: City of San José Permit Data

Ownership & Decision-Making | Solar PV

Solar PV Installed by Typology



Building Electrification Institute

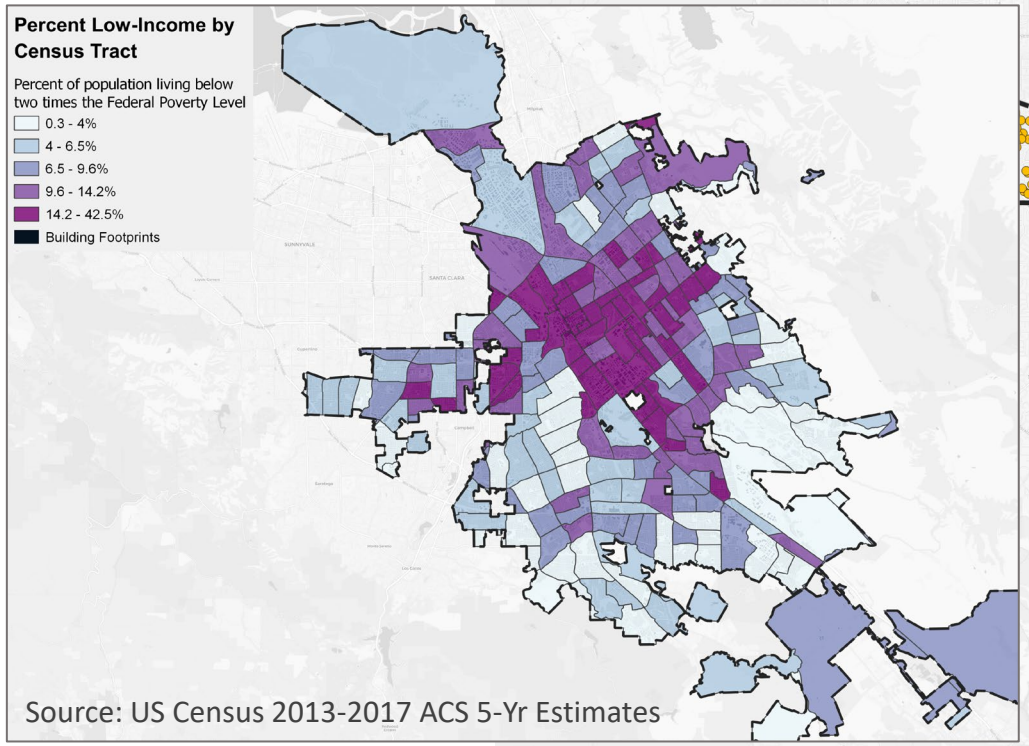
Source: City of San José Permit Data

Solar PV

Location of Properties with Solar PV Installed

Total Parcels with Solar = 9,342
Total Buildings with Solar = 10,664

For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

Source: City of San José Permit Data

Early Adopters

Building Occupant Characteristics

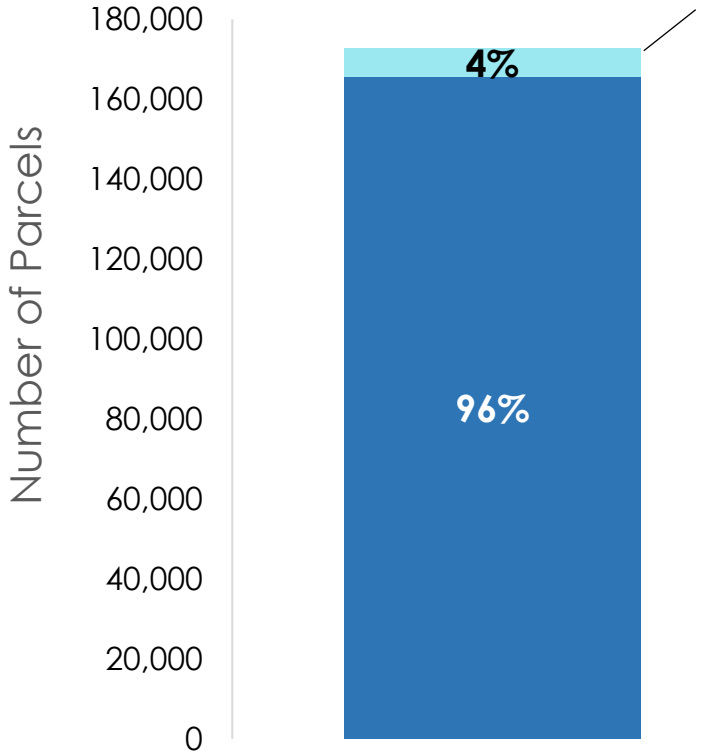
- Has PV

Ownership & Decision-Making | Potential ADUs

Potential ADUs in Single Family Homes

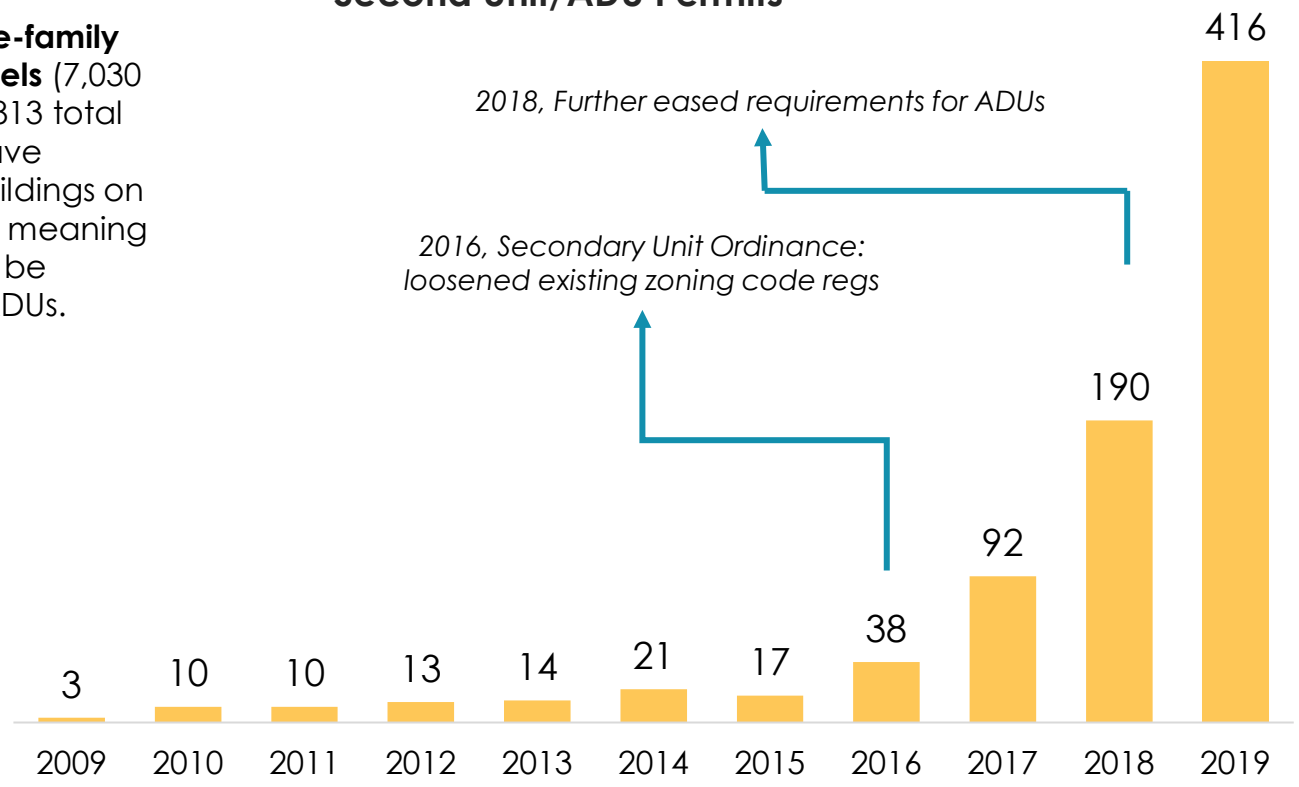
Assuming single-family home parcels with multiple buildings on a lot have detached garages or already have an ADU.

Parcels with Potential ADUs



4% of single-family home parcels (7,030 out of 172,813 total parcels) have multiple buildings on the parcel, meaning they could be potential ADUs.

Second Unit/ADU Permits



Building Electrification Institute

Parcels with ADUs Source: BEI mapping analysis via Microsoft Building Footprint layer
ADU Permit Source: San José Housing Market Report (2020)

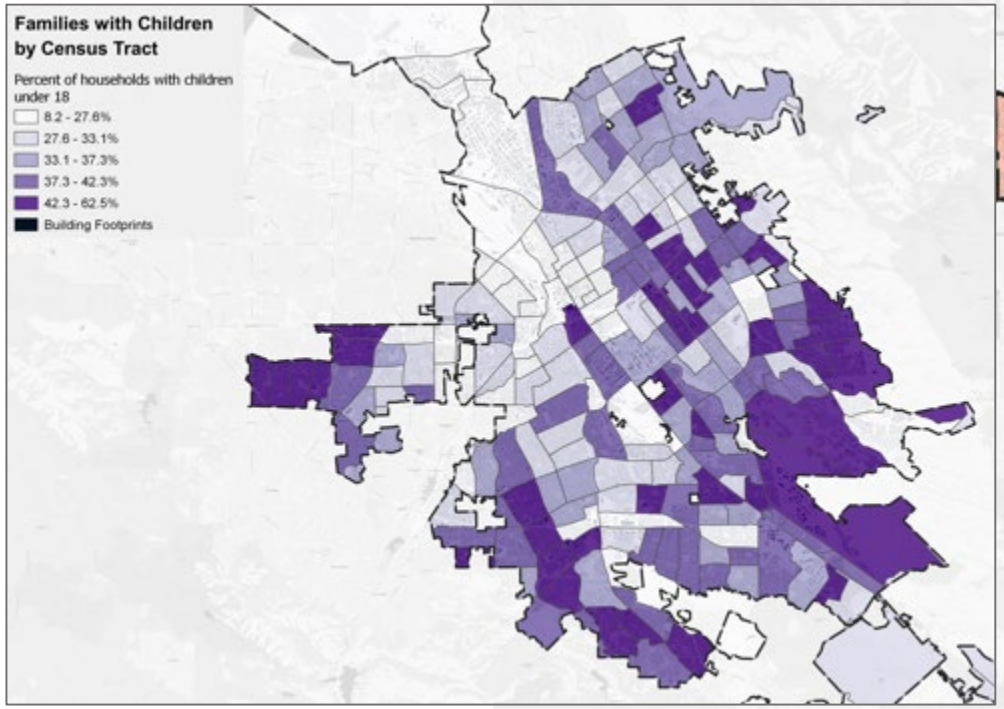
New Homeowners

New Homeowners by Census Tract

Percent of Households that Moved into Current Home in 2015 or Later

- 0 - 1.05%
- 1.05 - 1.86%
- 1.86 - 2.7%
- 2.7 - 3.77%
- 3.77 - 9.54%
- Building Footprints

For Comparison: Families with Children



8.8%

8%

Source: US Census 2013-2017 ACS 5-Yr Estimates

Baby Boomers

Ages 65-79

Baby Boomers by Census Tract

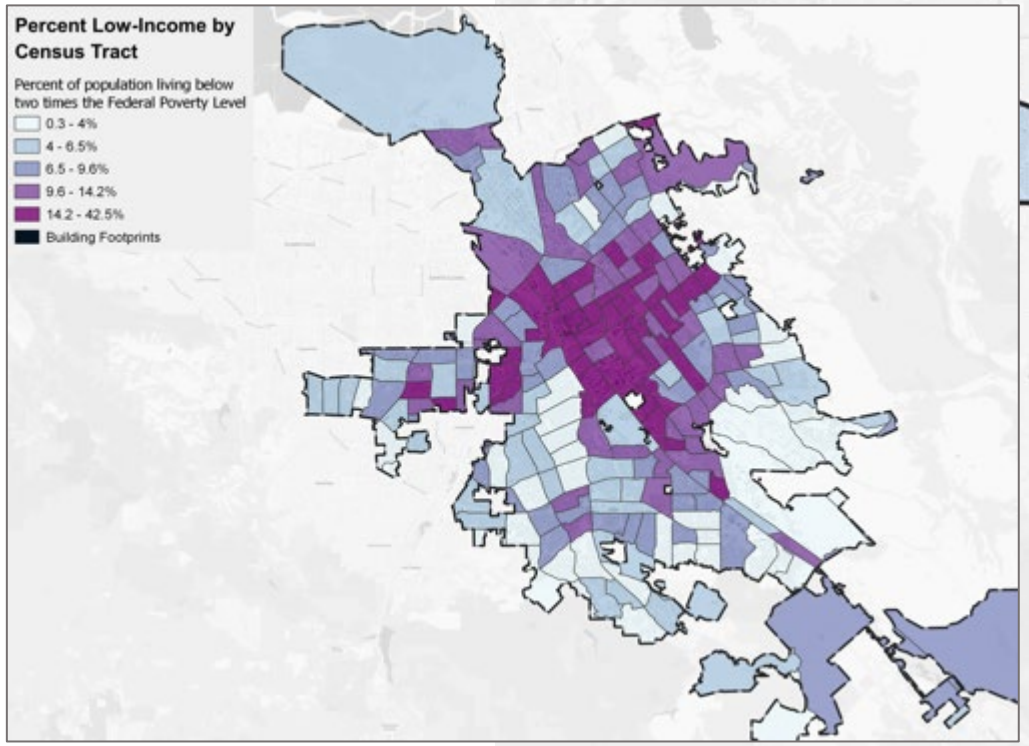
Percent Aged 65 to 79

- 1.1 - 6.5%
- 6.5 - 8.1%
- 8.1 - 9.9%
- 9.9 - 11.9%
- 11.9 - 32.3%
- Building Footprints

24%

32%

For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

Millennials

Ages 20-39

Millennials by Census Tract

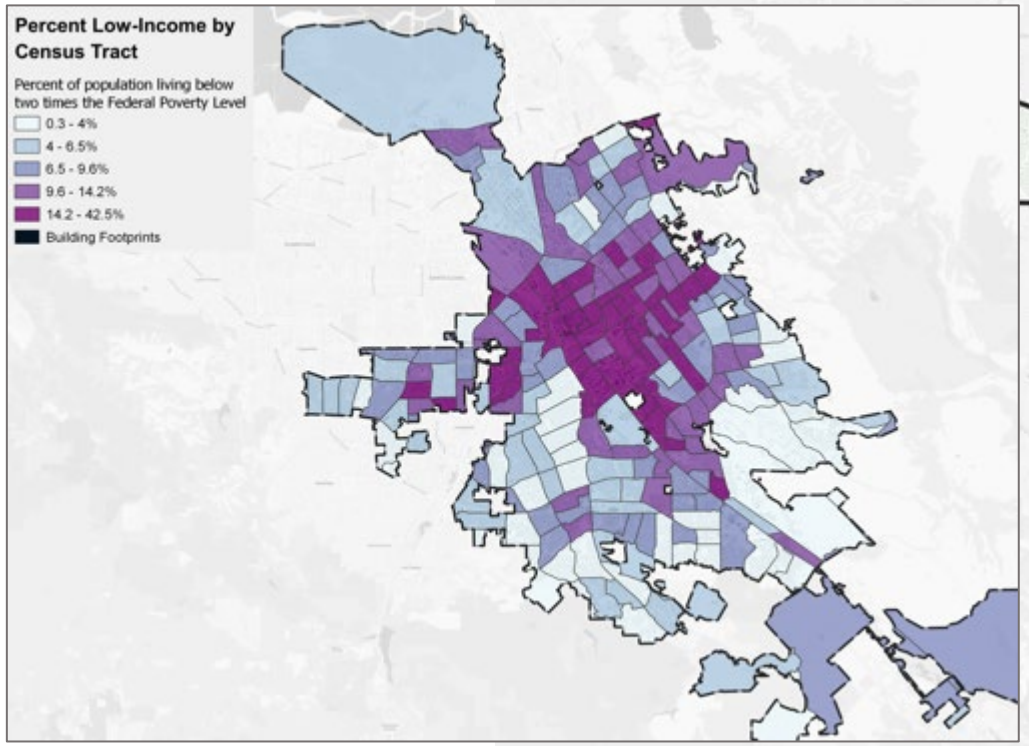
Percent Aged 20 to 39

- 7.5 - 20.5%
- 20.5 - 26.3%
- 26.3 - 30.2%
- 30.2 - 35.1%
- 35.1 - 72.1%
- Building Footprints

72%

54%

For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

Families with Children

Households with Children under 18

Families with Children by Census Tract

Percent of households with children under 18

- 8.2 - 27.6%
- 27.6 - 33.1%
- 33.1 - 37.3%
- 37.3 - 42.3%
- 42.3 - 62.5%
- Building Footprints

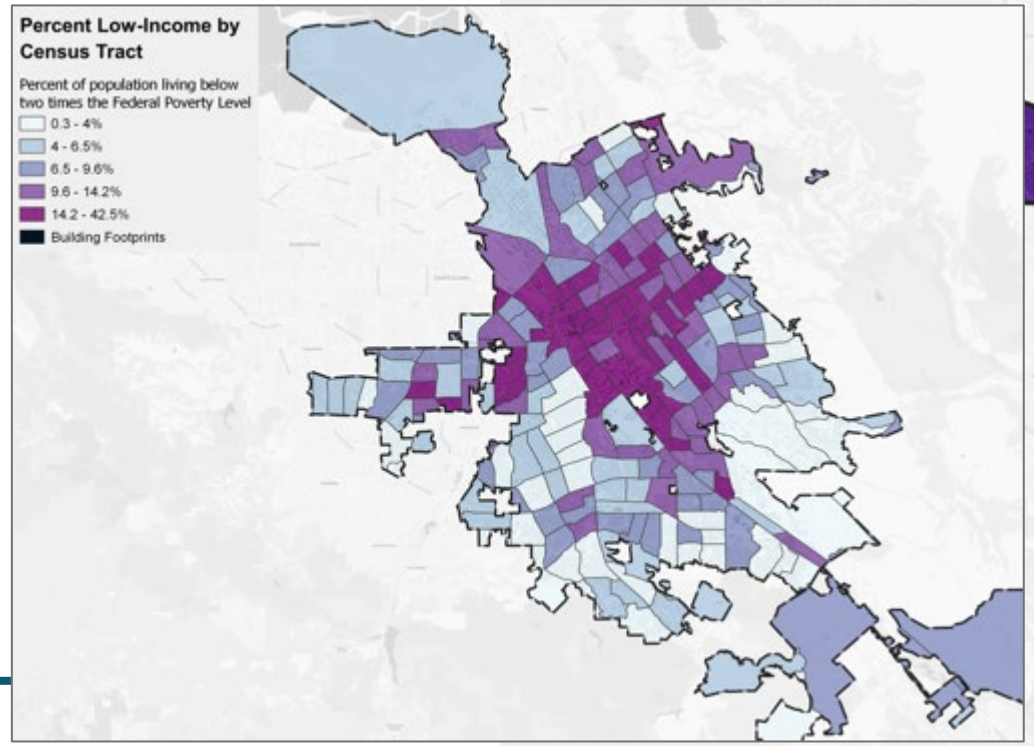
61%

57%

62%

56%

For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

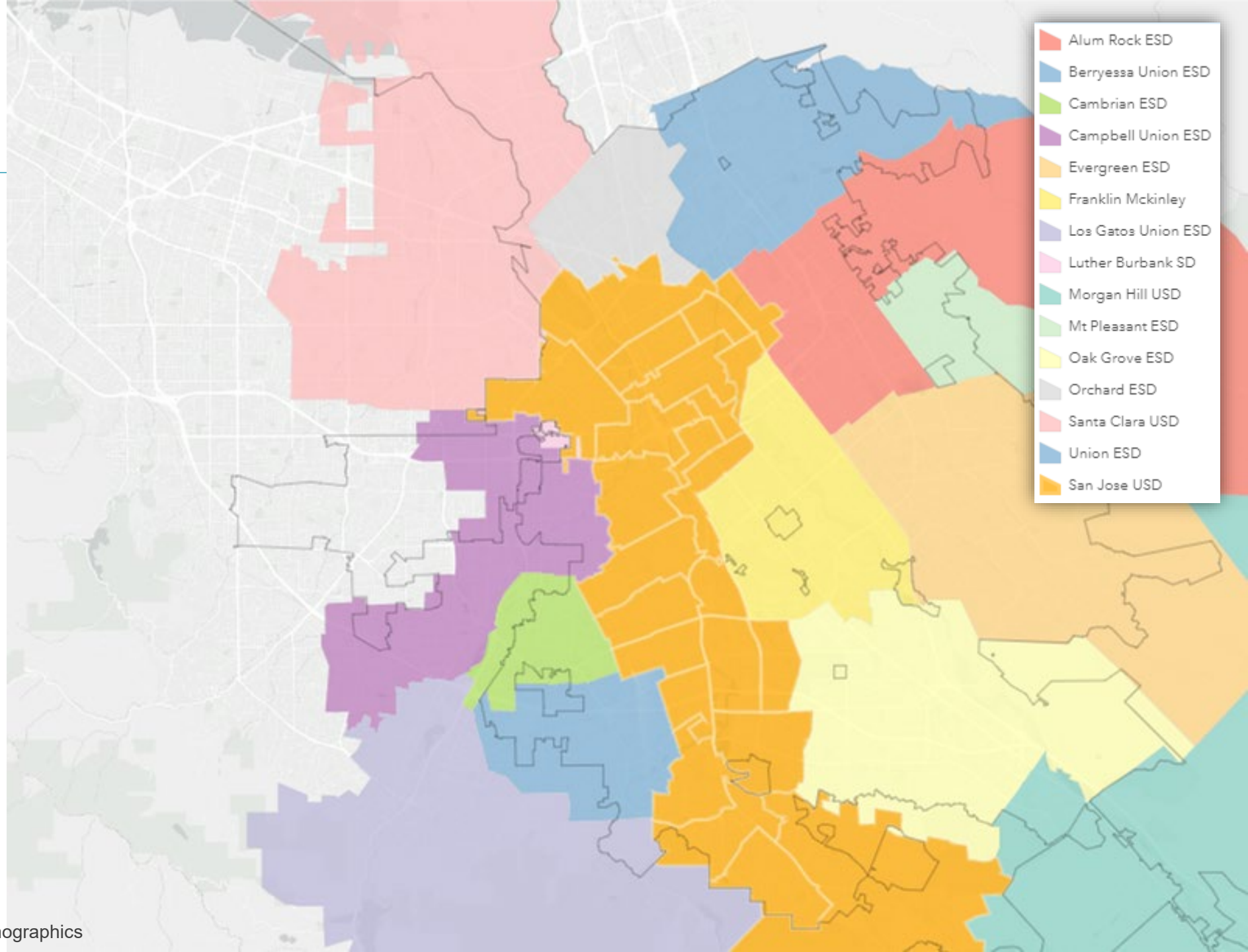
School Service Areas

Elementary School Districts

15 Elementary School Districts in San José Unified School District

Includes 24 Elementary Schools:

- Lowell
- Horace Mann
- Washington
- Gardner
- Galarza
- Grant
- Willow Glen
- Trace
- Anne Darling
- Bachrodt
- Booksin
- Schallenberger
- Empire Gardens
- Allen at Steinbeck
- Reed
- Canoas
- Simonds
- Los Alamitos
- Terrell
- Williams
- Carson
- Almaden
- Olinder



Source: San José Unified School District, Davis Demographics

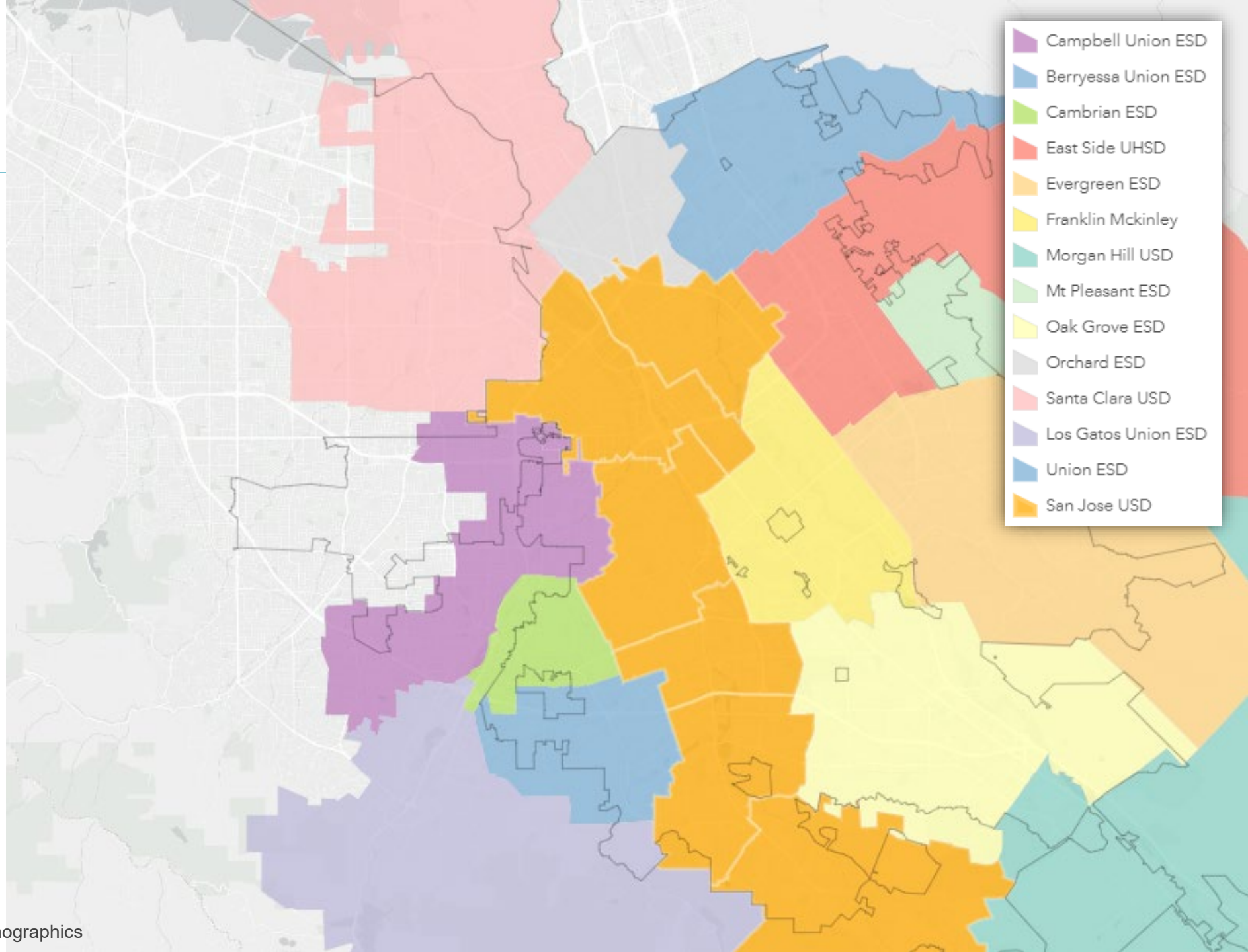
School Service Areas

Middle School Districts

14 Middle School Districts in San José Unified School District

Includes 6 Middle Schools:

- Muwekma Ohlone
- Hoover Middle
- Willow Glen Middle
- John Muir Middle
- Bret Harte Middle
- Castillero Middle



Source: San José Unified School District, Davis Demographics

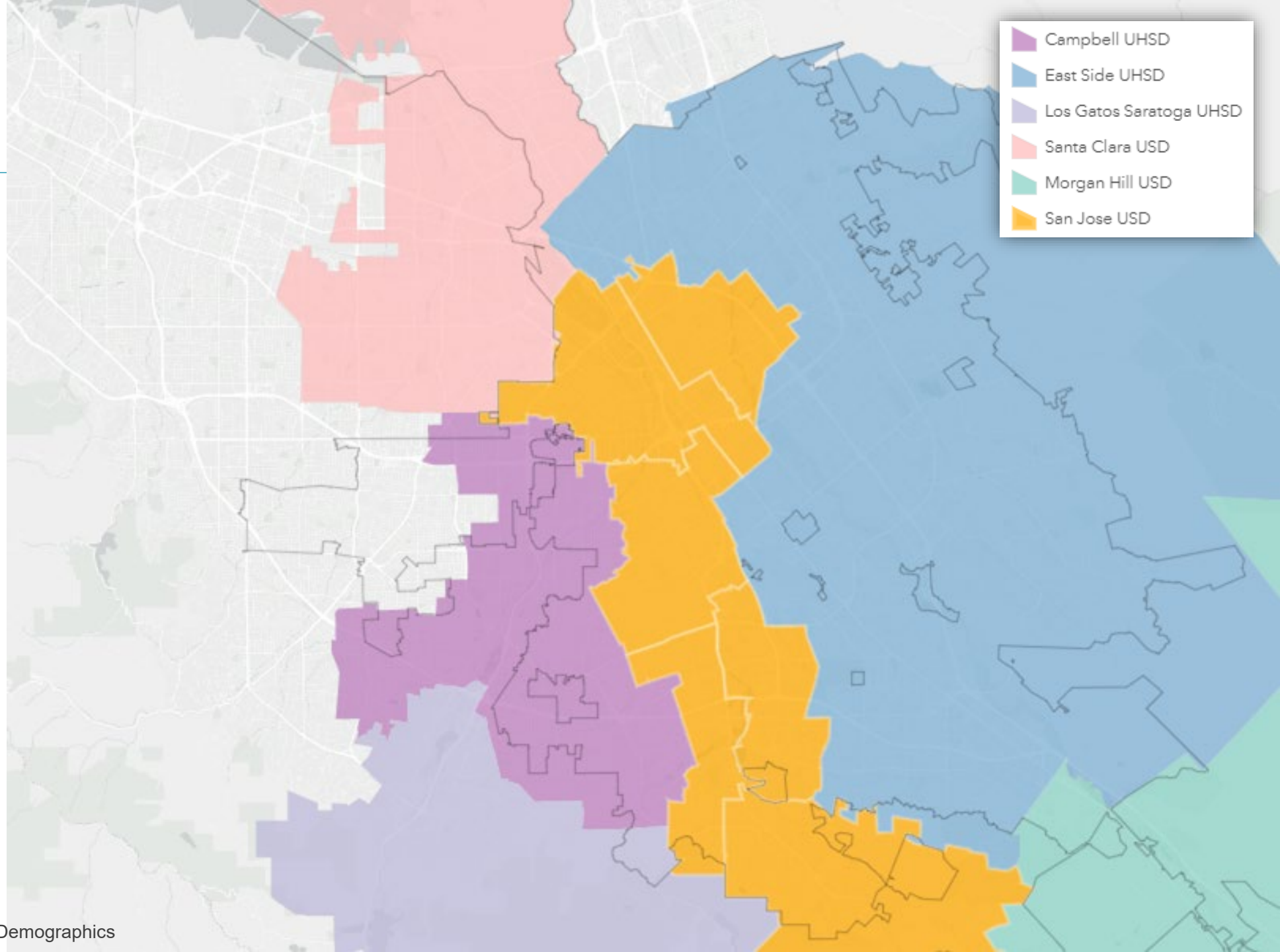
School Service Areas

High School Districts

6 High School Districts in San José Unified School District

Including 6 High Schools:

- Lincoln High
- San José High
- Willow Glen High
- Pioneer High
- Leland High
- Gunderson High



Source: San José Unified School District, Davis Demographics

Social Vulnerability Indicators

List of Social Vulnerability Indicators

- Low-income households
- Race distribution
- Energy cost burden
- Asthma rate
- Age over 80
- People with disabilities
- Internet access
- Limited English households
- Spanish-speaking households
- Asian Pacific Islander language-speaking households

Low-Income Distribution

Low-income is defined as 200% of the federal poverty line,[1] or:

- **$24,980** for an individual
- **$51,500** for a family of four

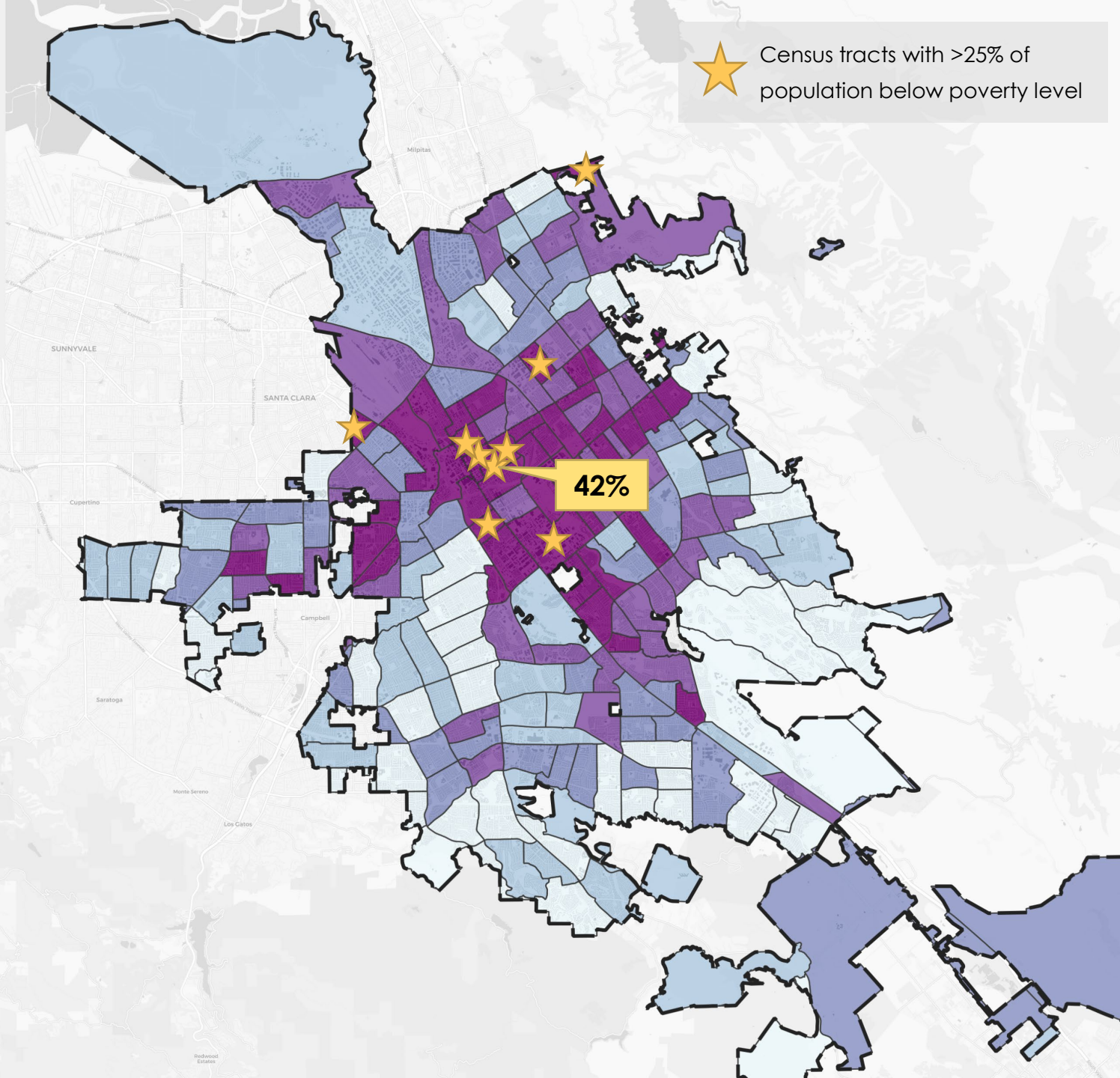
Area Median Income (AMI) is estimated at $104,234.[2]

Number of Buildings by Typology					
Residential Typology	**0-25th percentile**	**26th-50th percentile**	**51st-75th percentile**	**76th-100th percentile**	**Total Buildings**
Single-Family	54,270	48,587	42,834	32,839	178,530
Duplex	780	701	1,740	3,298	6,519
Low-Rise Multifamily	2,520	3,676	6,821	11,038	24,055
High-Rise Multifamily	11	42	145	81	279

[1]Source: U.S. Department of Health and Human Services, 2019 guidelines: https://aspe.hhs.gov/2019-poverty-guidelines

[2]Source: U.S. Census Bureau, San José Quick Facts, estimate for 2018: https://www.census.gov/quickfacts/fact/table/sanJosécitycalifornia,US/PST045219

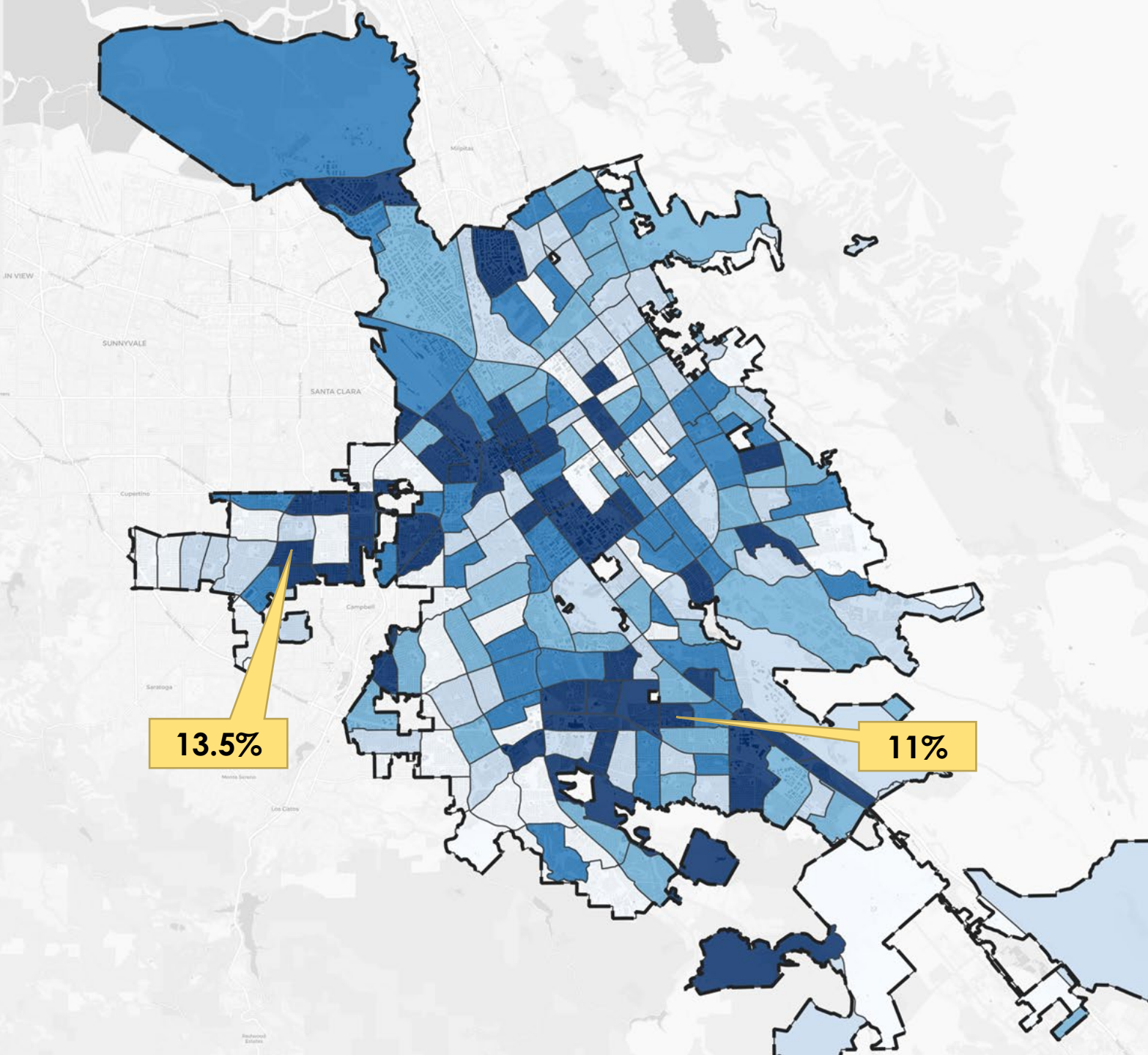
Source: US Census 2013-2017 ACS 5-Yr Estimates



Race Distribution

Black or African American Alone (not Hispanic or Latino)

Number of Buildings by Typology					
Residential Typology	0-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile	Total Buildings
Single-Family	35,508	47,641	54,609	40,772	178,530
Duplex	1,368	1,309	1,314	2,528	6,519
Low-Rise Multifamily	4,109	5,636	4,859	9,451	24,055
High-Rise Multifamily	36	9	43	191	279

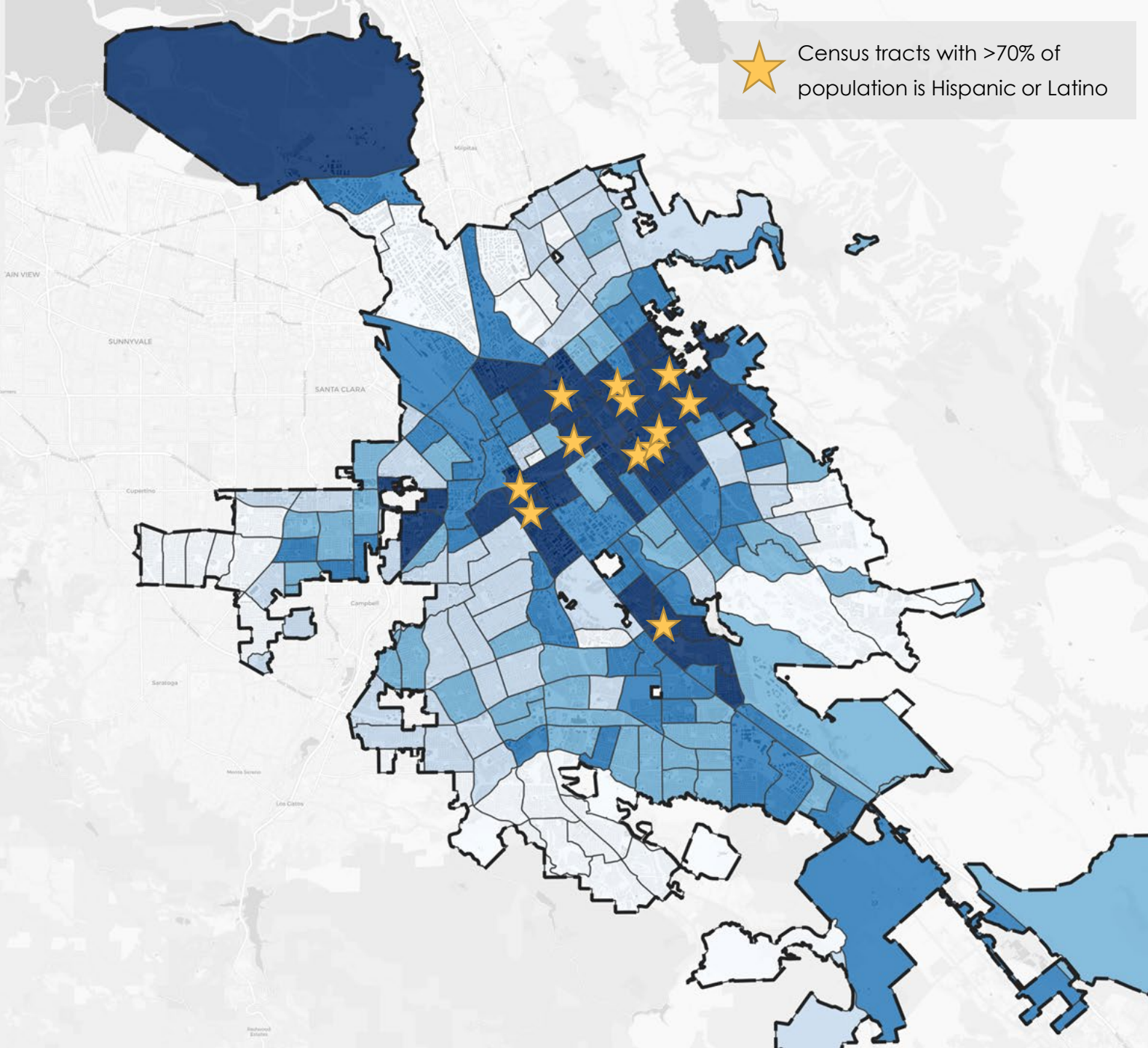


Source: US Census 2013-2017 ACS 5-Yr Estimates

Race Distribution

Hispanic or Latino

Number of Buildings by Typology					
Residential Typology	0-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile	Total Buildings
Single-Family	27,560	53,091	51,086	46,793	178,530
Duplex	322	863	1,514	3,820	6,519
Low-Rise Multifamily	2,496	4,254	7,351	9,954	24,055
High-Rise Multifamily	35	9	167	68	279

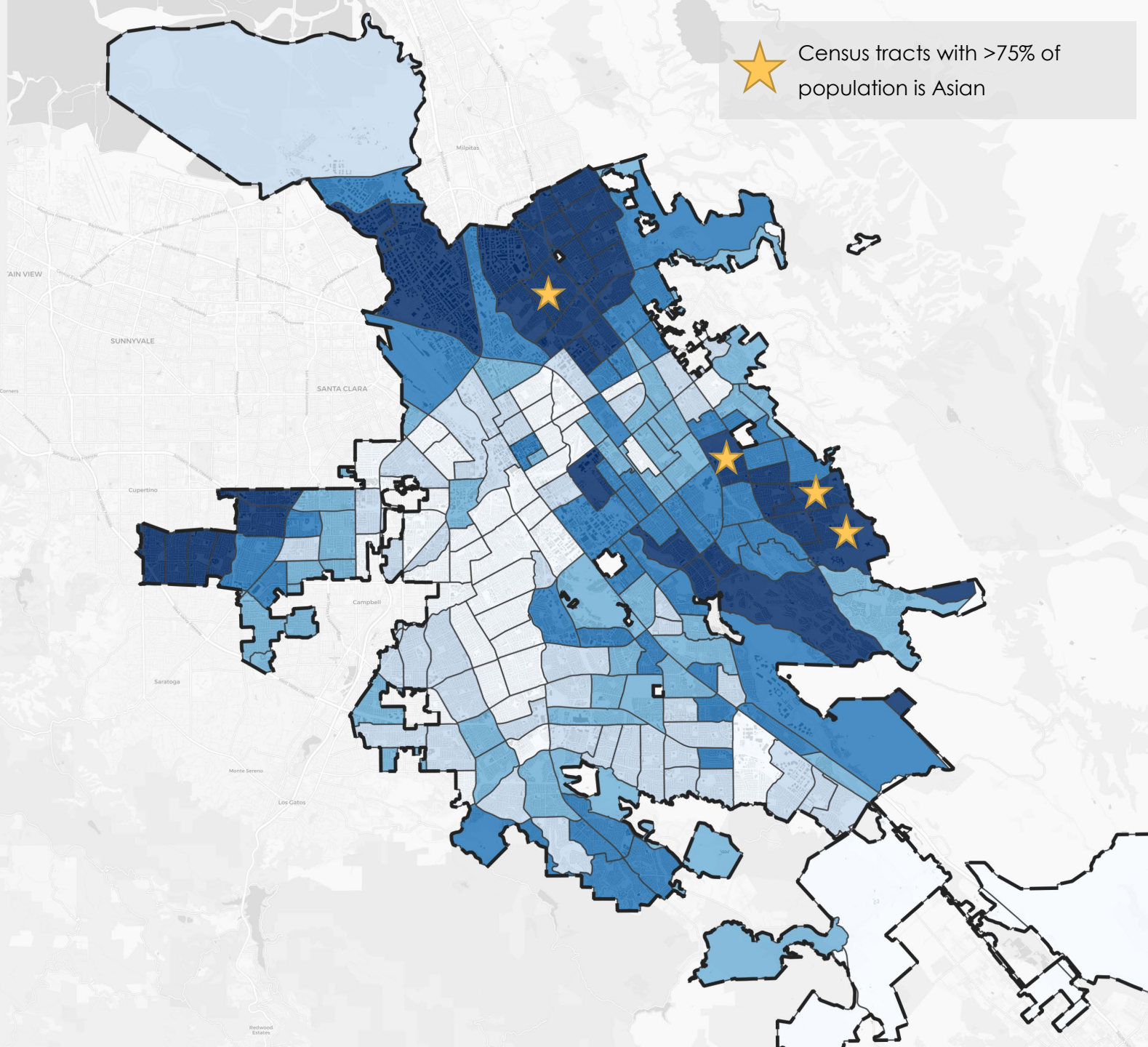


Source: US Census 2013-2017 ACS 5-Yr Estimates

Race Distribution

Asian Alone (not Hispanic or Latino)

Number of Buildings by Typology					
Residential Typology	0-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile	Total Buildings
Single-Family	52,661	43,735	34,958	47,176	178,530
Duplex	3,279	2,087	757	396	6,519
Low-Rise Multifamily	5,059	5,586	7,516	5,894	24,055
High-Rise Multifamily	38	82	120	39	279

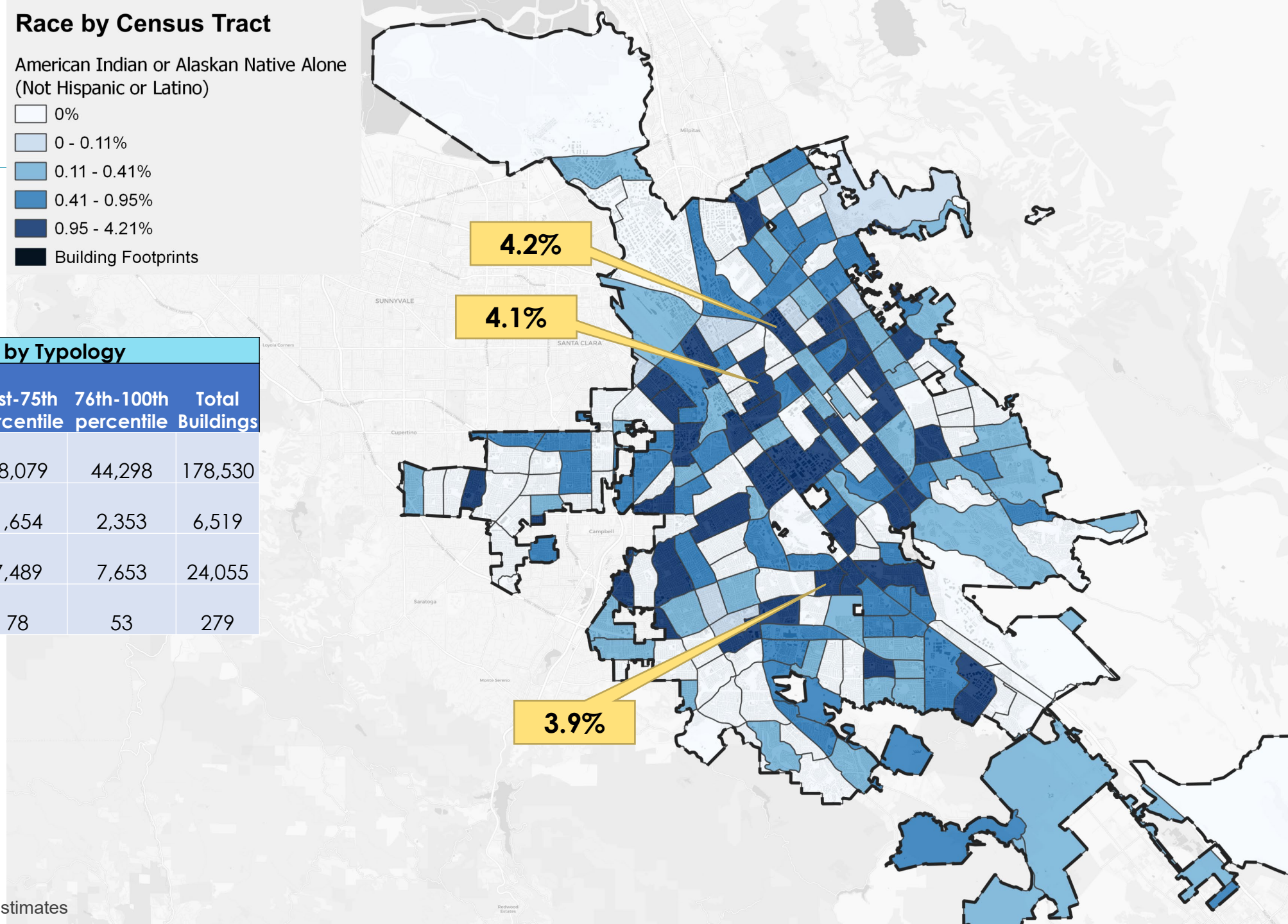


Source: US Census 2013-2017 ACS 5-Yr Estimates

Race Distribution

American Indian or Alaskan Native Alone (not Hispanic or Latino)

Number of Buildings by Typology					
Residential Typology	0-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile	Total Buildings
Single-Family	67,684	18,469	48,079	44,298	178,530
Duplex	1,909	603	1,654	2,353	6,519
Low-Rise Multifamily	6,905	2,008	7,489	7,653	24,055
High-Rise Multifamily	58	90	78	53	279

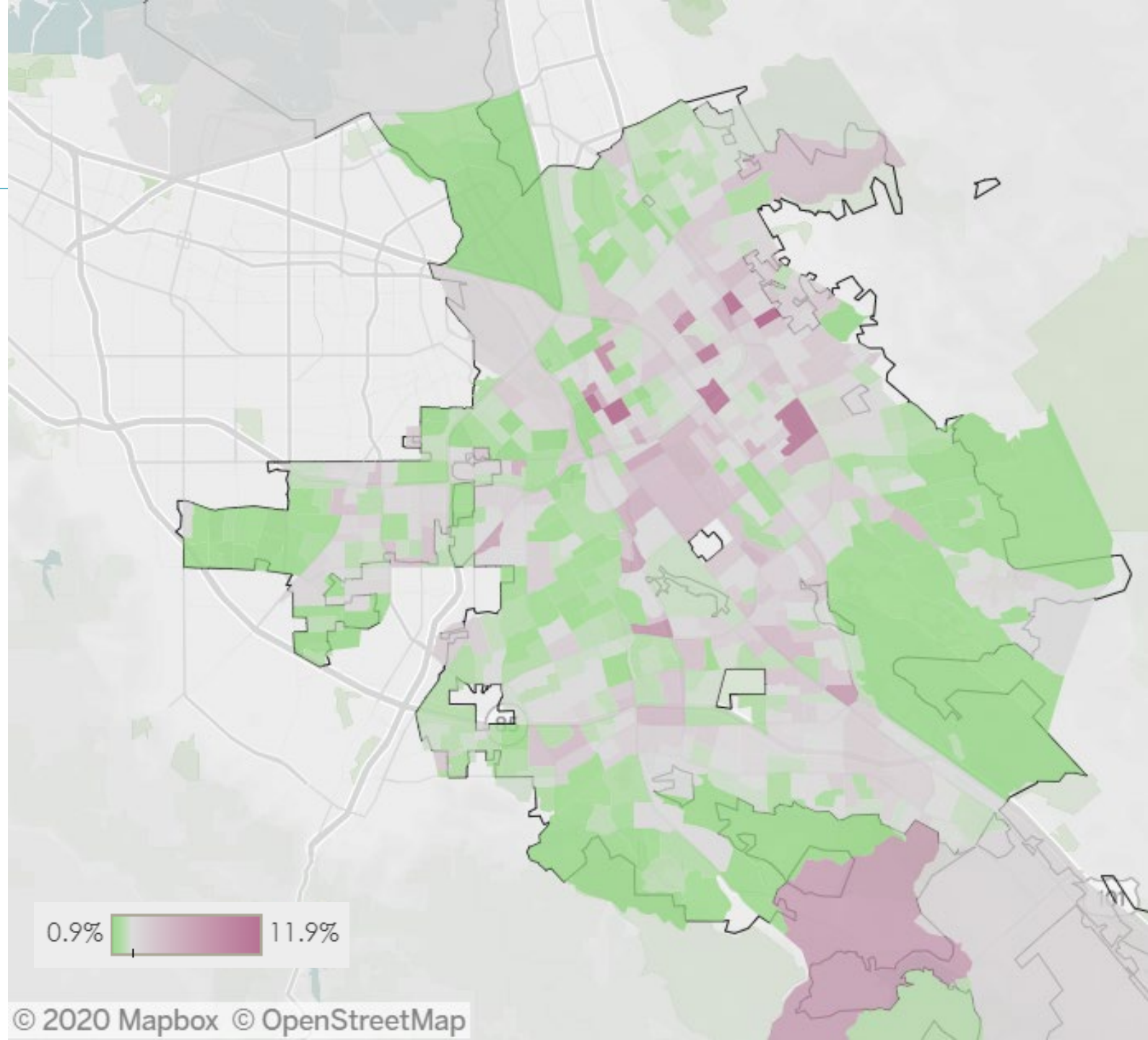


Source: US Census 2013-2017 ACS 5-Yr Estimates

Energy Cost Burden

Percentage of households by Census tract with an energy cost burden (electricity + gas) over 5% of household income

- **Census tracts range from 0 to 540 energy burdened households**
- **Average U.S. energy burden:** 3.23%
- **Average energy burden in San José:** 2.35%



Source: Greenlink
https://public.tableau.com/profile/the.greenlink.group#!/vizhome/SanJosé01_15/Dashboard1

Emergency Room Visits for Asthma

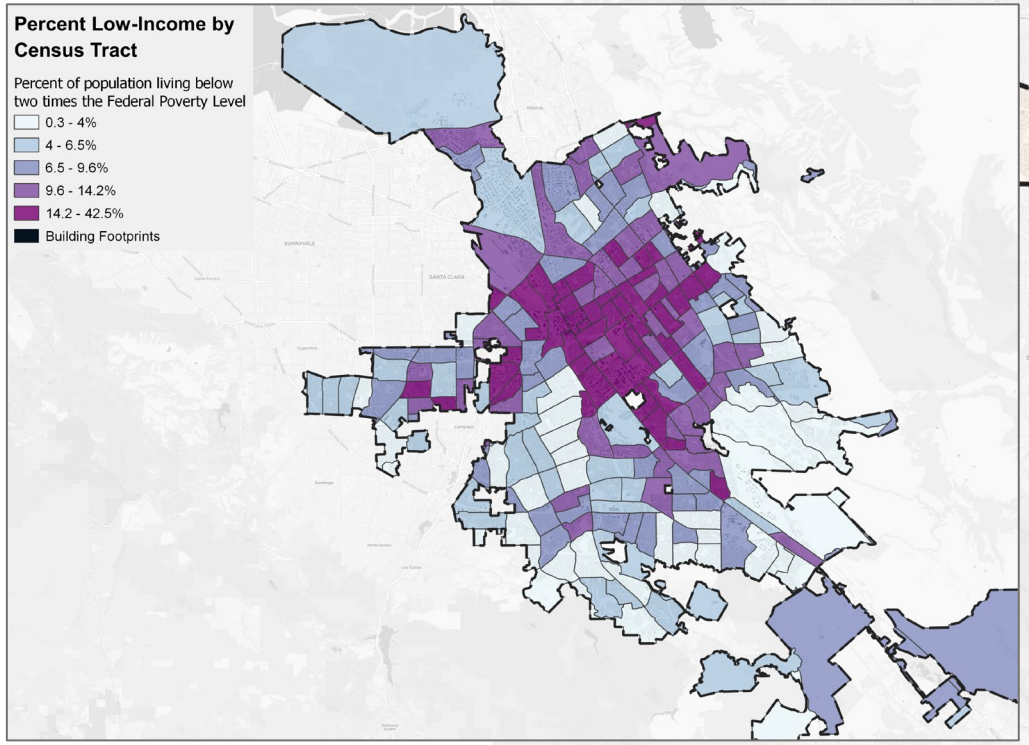
Age adjusted rate of emergency department visits for asthma by census tract **per 10,000 people**

Age-Adjusted Rate of Emergency Department Visits for Asthma by Census Tract per 10,000 people

Age-Adjusted Rate of Emergency Department Visits for Asthma by Census Tract per 10,000 people (CalEnviroScreen)

- 1 - 13
- 13 - 25
- 25 - 37
- 37 - 53
- 53 - 80

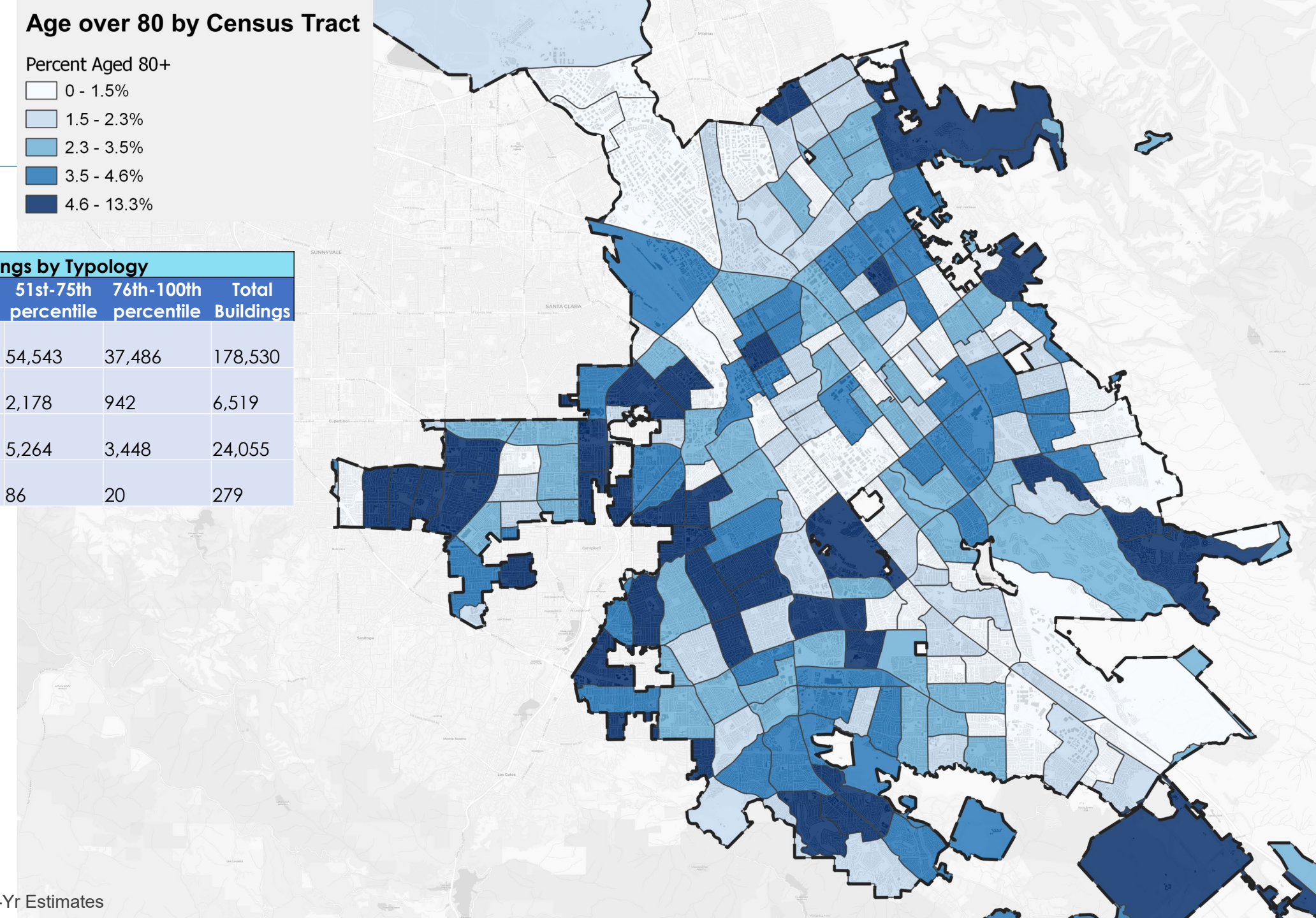
For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

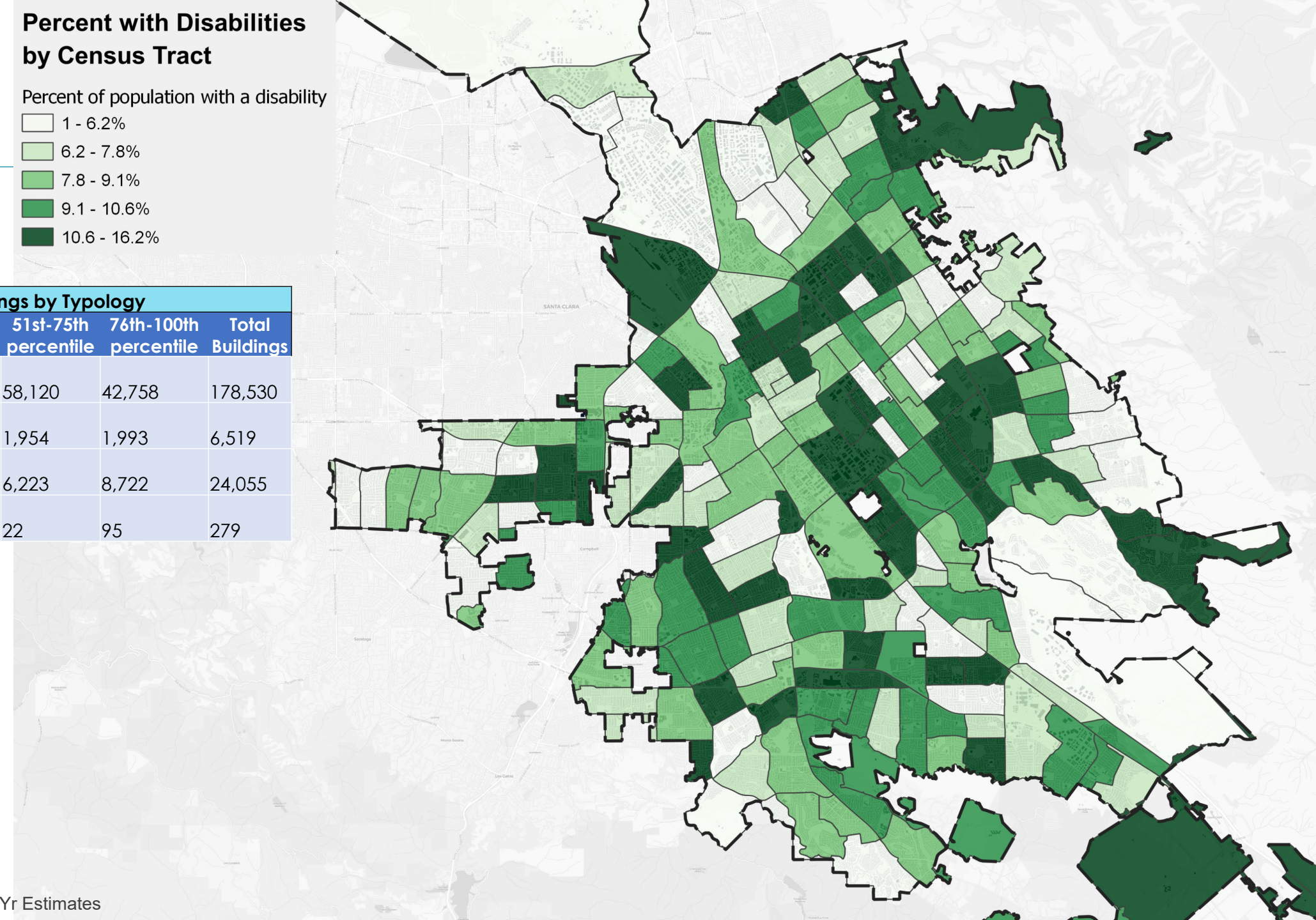
People over the Age of 80

Number of Buildings by Typology					
Residential Typology	0-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile	Total Buildings
Single-Family	35,864	50,637	54,543	37,486	178,530
Duplex	1,855	1,544	2,178	942	6,519
Low-Rise Multifamily	7,725	7,618	5,264	3,448	24,055
High-Rise Multifamily	154	19	86	20	279



Source: US Census 2013-2017 ACS 5-Yr Estimates

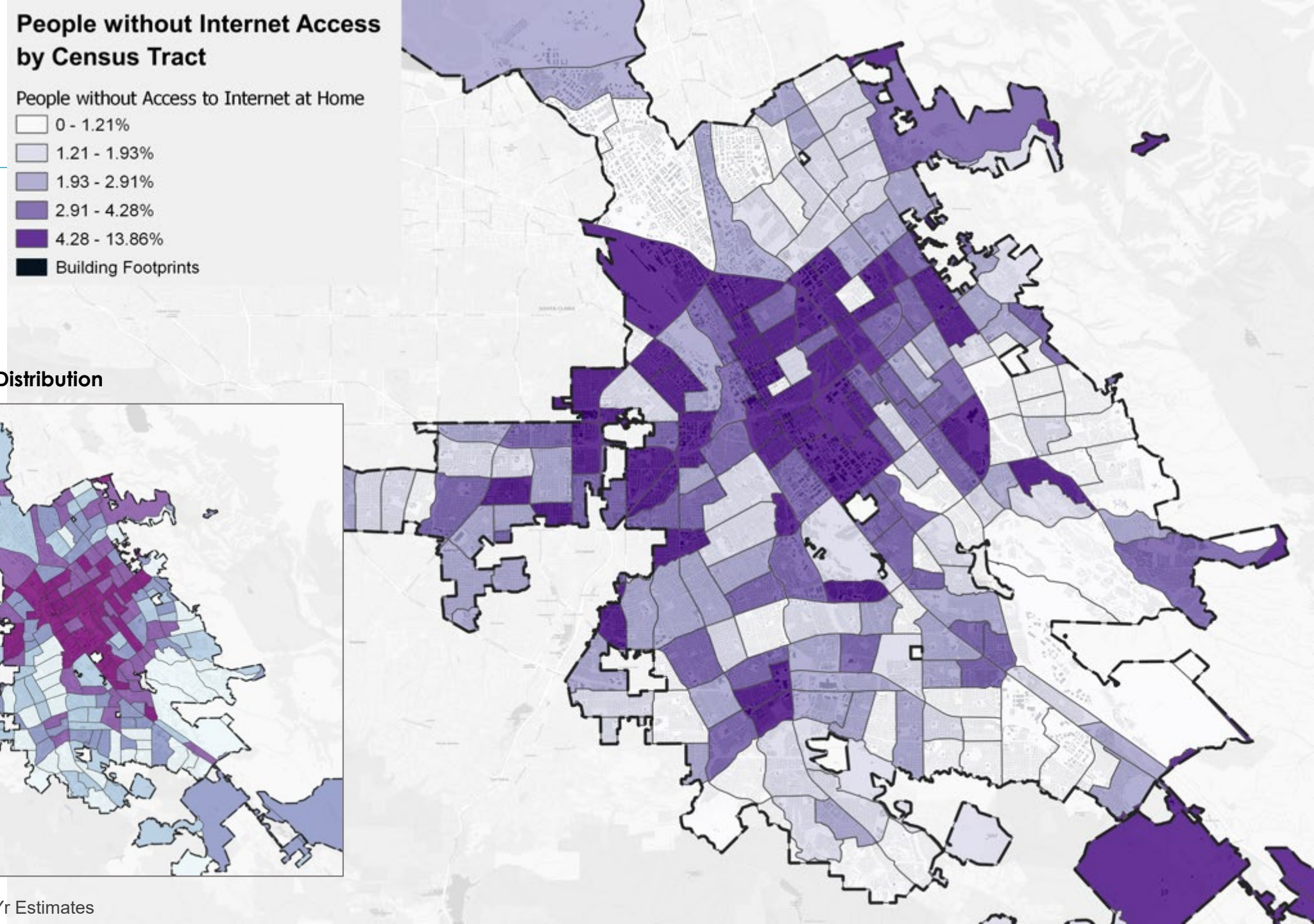
People with Disabilities



Number of Buildings by Typology					
Residential Typology	0-25th percentile	26th-50th percentile	51st-75th percentile	76th-100th percentile	Total Buildings
Single-Family	38,555	39,097	58,120	42,758	178,530
Duplex	840	1,732	1,954	1,993	6,519
Low-Rise Multifamily	3,899	5,211	6,223	8,722	24,055
High-Rise Multifamily	37	125	22	95	279

Source: US Census 2013-2017 ACS 5-Yr Estimates

Internet Access



For Comparison: Low-income Distribution

Source: US Census 2013-2017 ACS 5-Yr Estimates

Limited English Households

Limited English Speaking Households by Census Tract

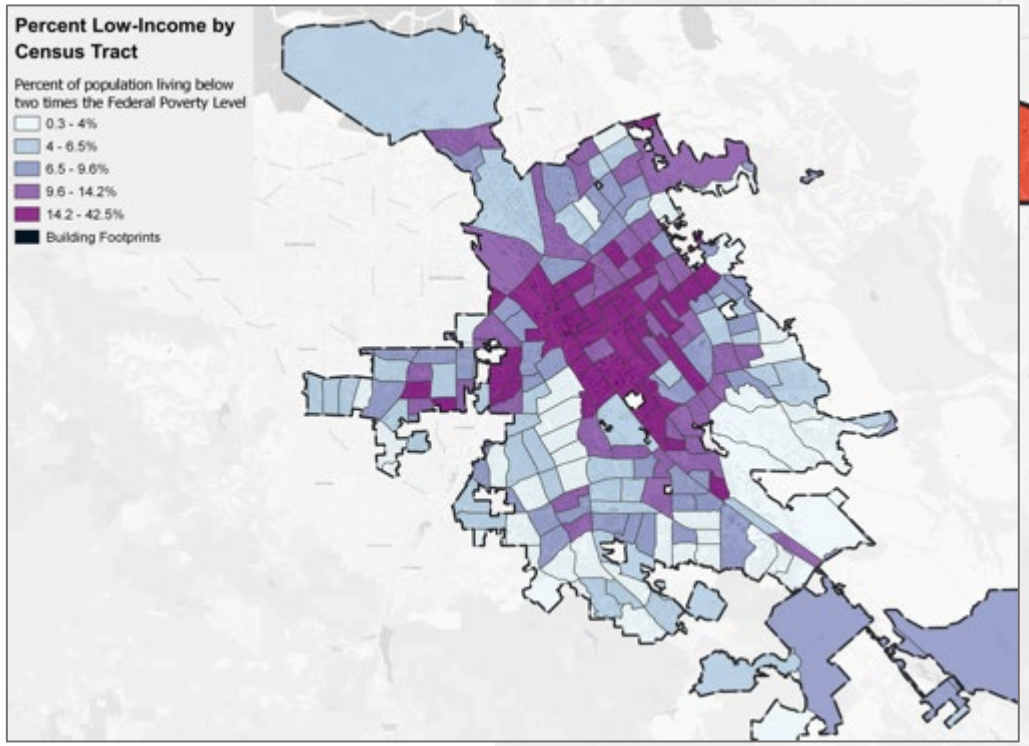
Percent of limited English speaking households

- 0 - 5.3%
- 5.3 - 8.7%
- 8.7 - 12.6%
- 12.6 - 18.9%
- 18.9 - 50.6%
- Building Footprints

Census tracts with >35% of households speak limited English

51%

For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

Spanish-Speaking Households

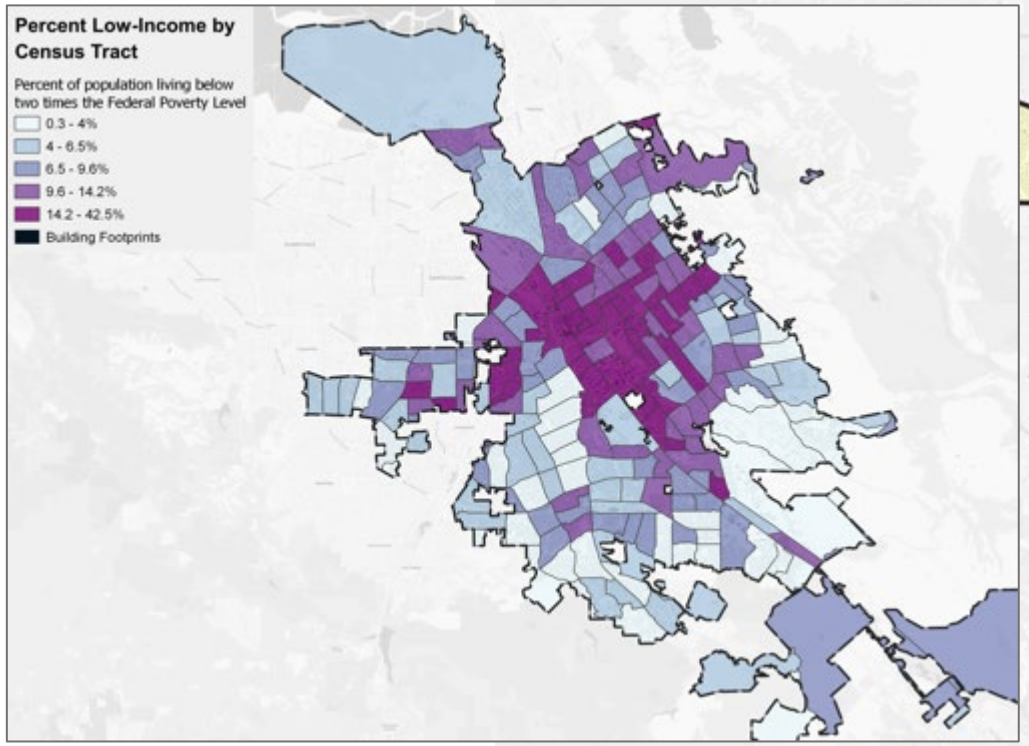
Spanish Speaking Households by Census Tract

Percent of Households where Spanish is Spoken

- 0 - 6.5%
- 6.5 - 12.6%
- 12.6 - 18%
- 18 - 34%
- 34 - 72.1%
- Building Footprints

Census tracts with >65% of households speak Spanish

For Comparison: Low-income Distribution



Source: US Census 2013-2017 ACS 5-Yr Estimates

Asian-Pacific Island Language-Speaking Households

Asian and Pacific Island Language Speaking Households by Census Tract

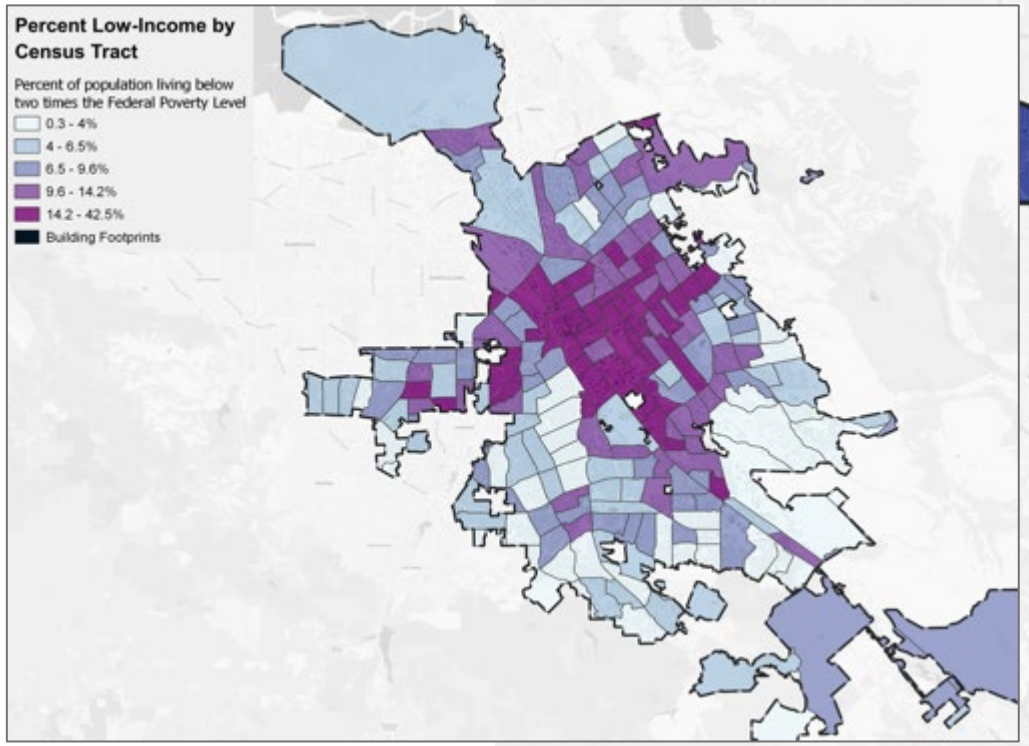
Percent of Households where Asian and Pacific Island Language are Spoken

- 1.8 - 12.1%
- 12.1 - 17.8%
- 17.8 - 28.2%
- 28.2 - 45.2%
- 45.2 - 73.5%
- Building Footprints

Census tracts with >60% of households speak an Asian-Pacific Island language

74%

For Comparison: Low-income Distribution



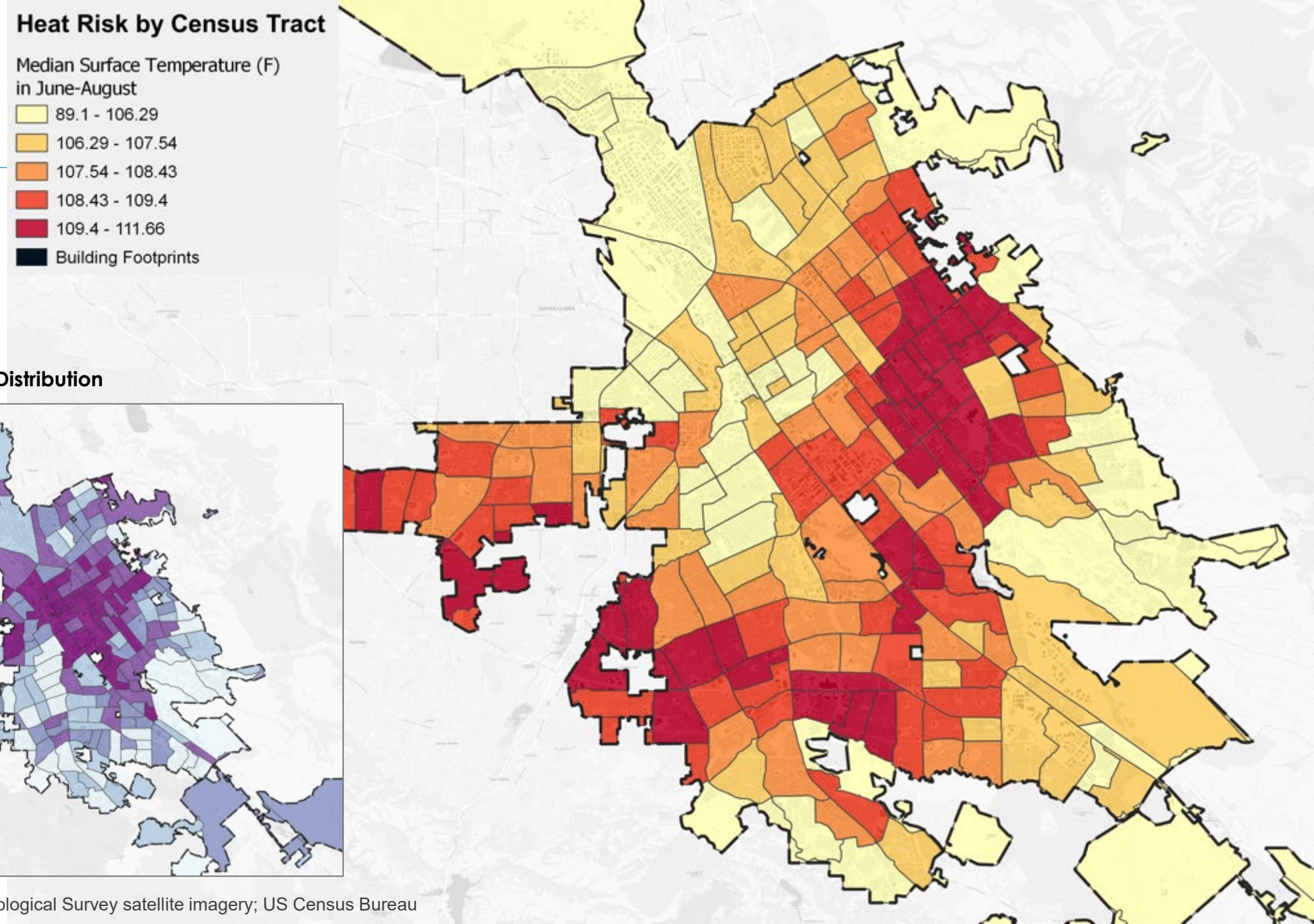
Source: US Census 2013-2017 ACS 5-Yr Estimates

Environmental Risk Indicators

List of Environmental Risk Indicators

- Heat risk
- Pollution burden
- Wildfire risk
- Public Safety Public Shut-off areas

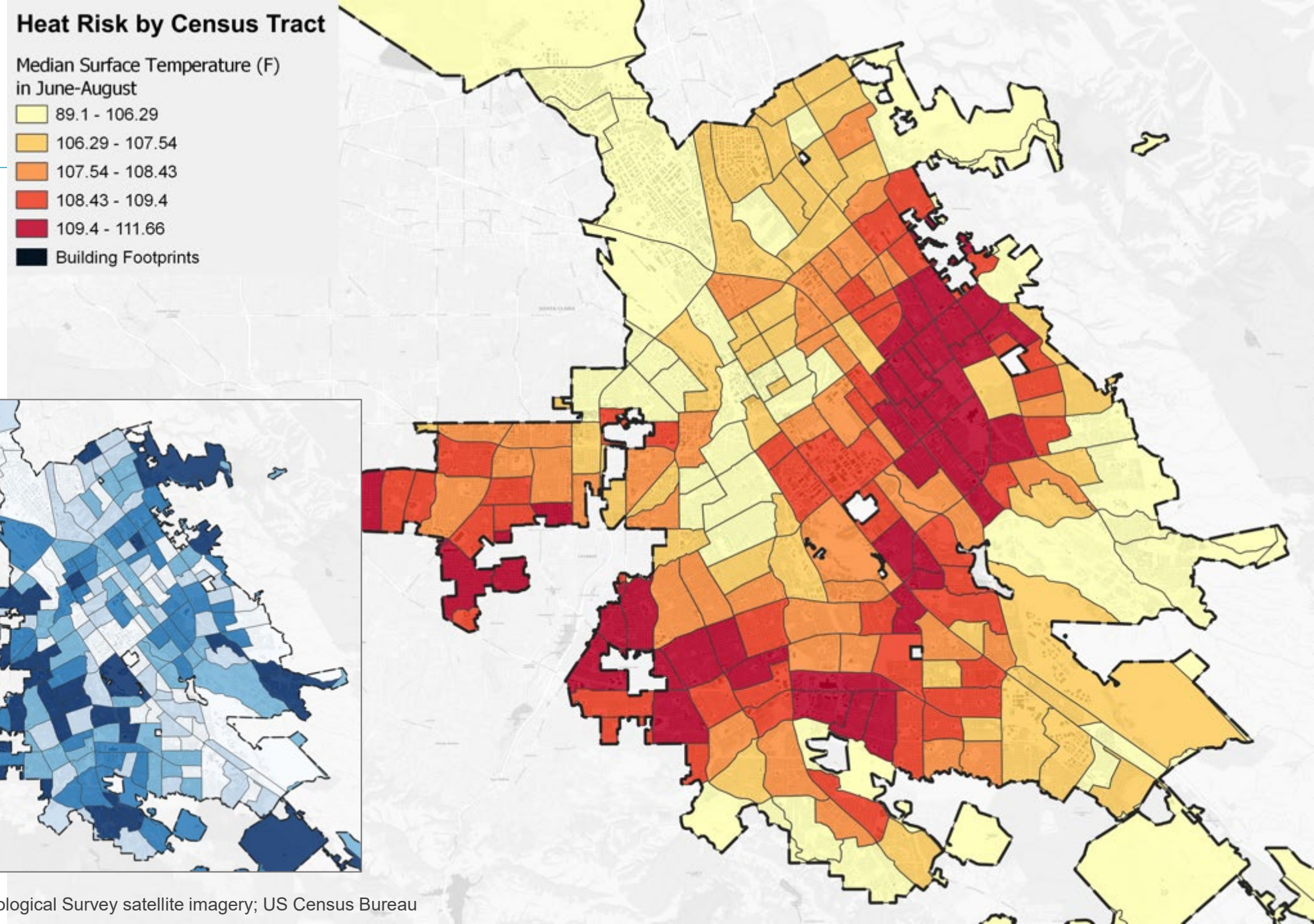
Heat Risk



For Comparison: Low-income Distribution

Source: NPR, based on NASA/U.S. Geological Survey satellite imagery; US Census Bureau

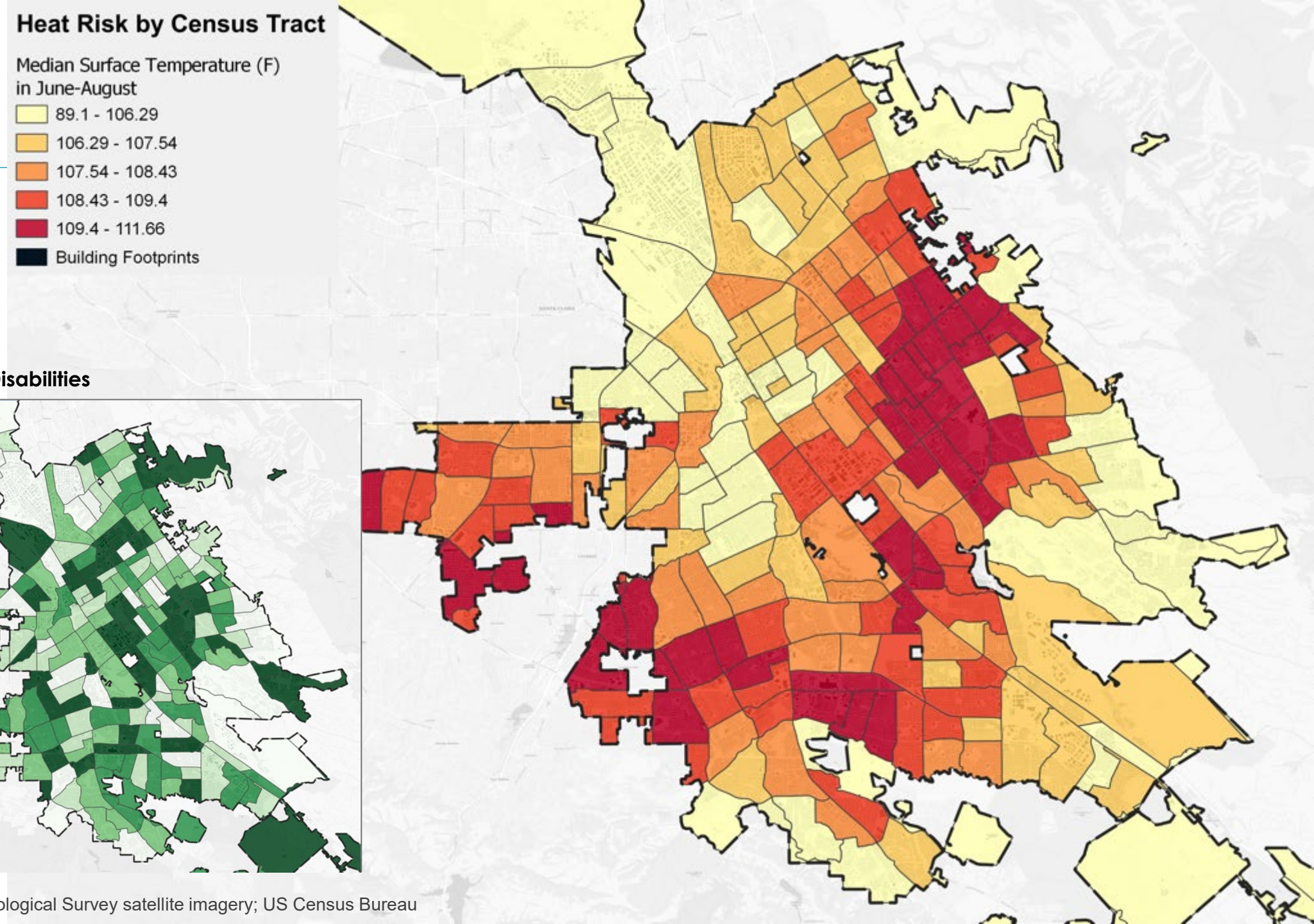
Heat Risk



For Comparison: Age over 80

Source: NPR, based on NASA/U.S. Geological Survey satellite imagery; US Census Bureau

Heat Risk



For Comparison: People with Disabilities

Source: NPR, based on NASA/U.S. Geological Survey satellite imagery; US Census Bureau

Pollution Burden

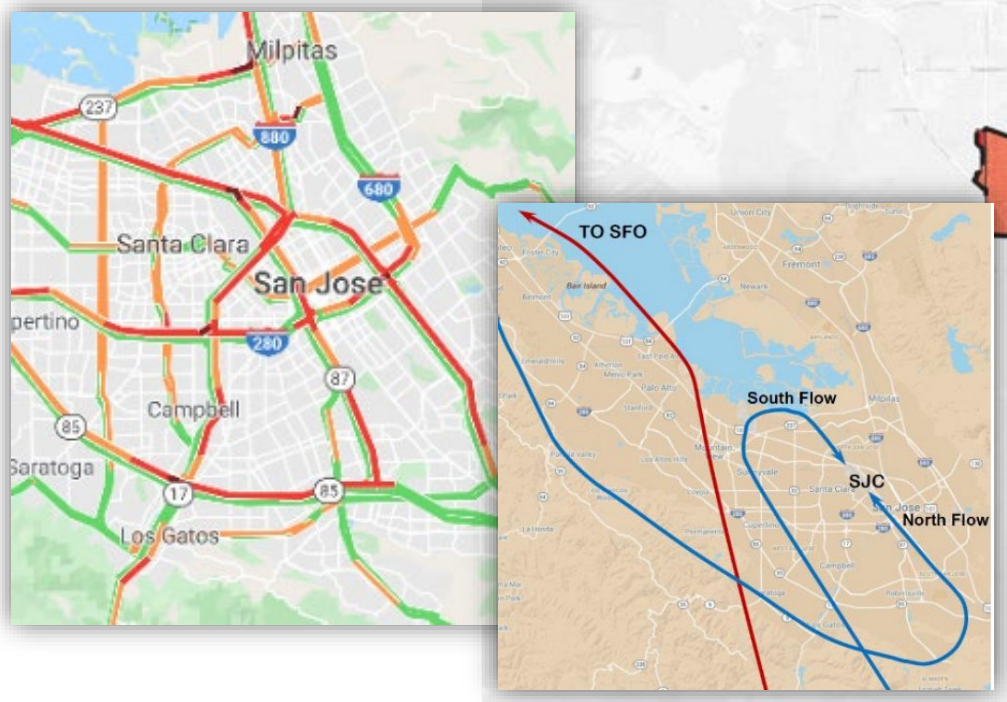
Exposure to Air Pollution by Census Tract

CalEnviroScreen Pollution Burden Score

- 2.2 - 3.5
- 3.5 - 4.13
- 4.13 - 4.69
- 4.69 - 5.59
- 5.59 - 7.73
- Building Footprints

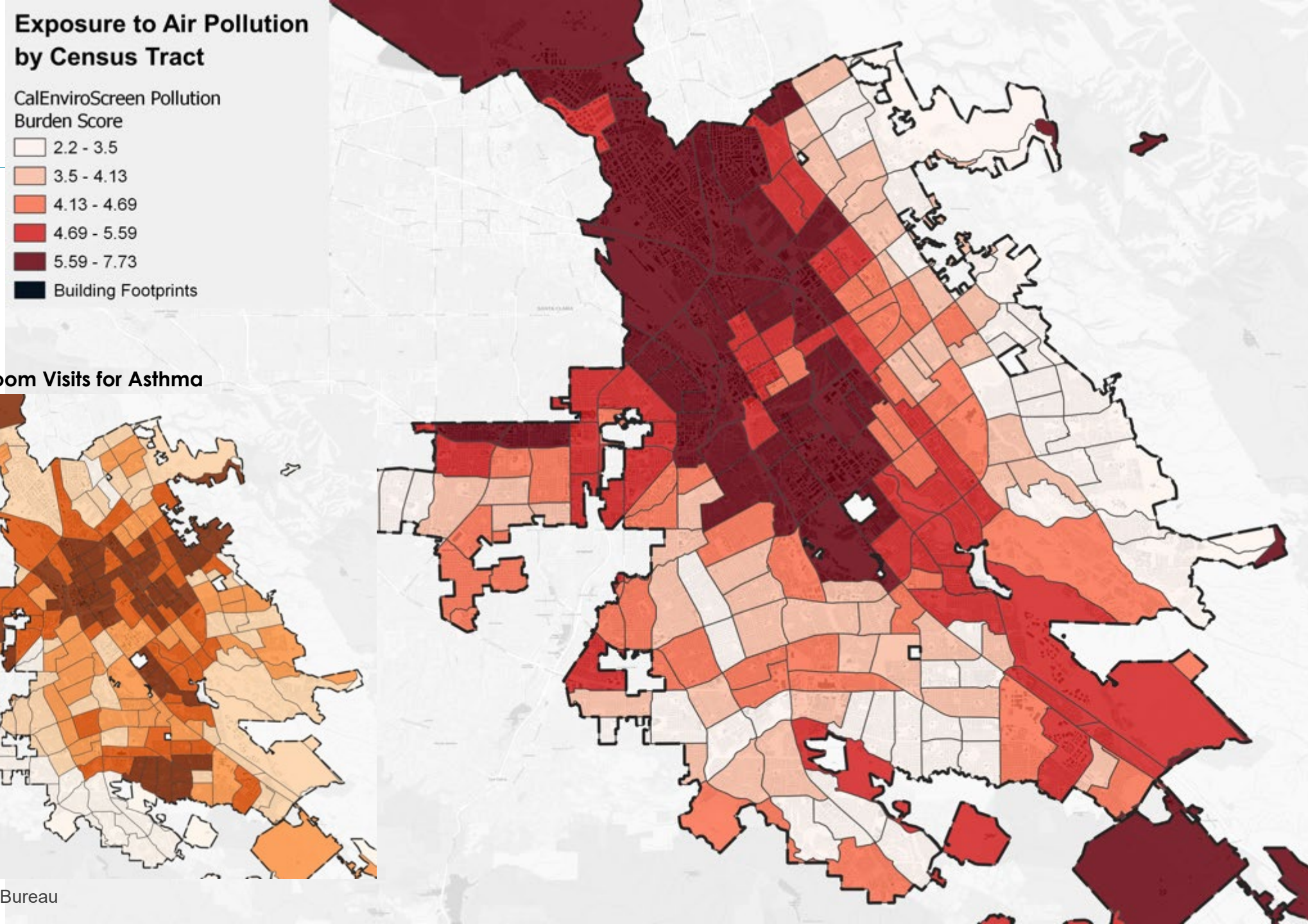
SJC Airport

For Comparison: San José Airport Flight Paths & Major Highways with typical Tuesday morning traffic



Source: Air pollution – CalEnviroScreen; Traffic – Google Maps; Flight path – Fly San José.
Note: This map depicts an average of percentiles from the Pollution Burden portion of CalEnviroScreen scoring, including environmental effects and exposure indicators.

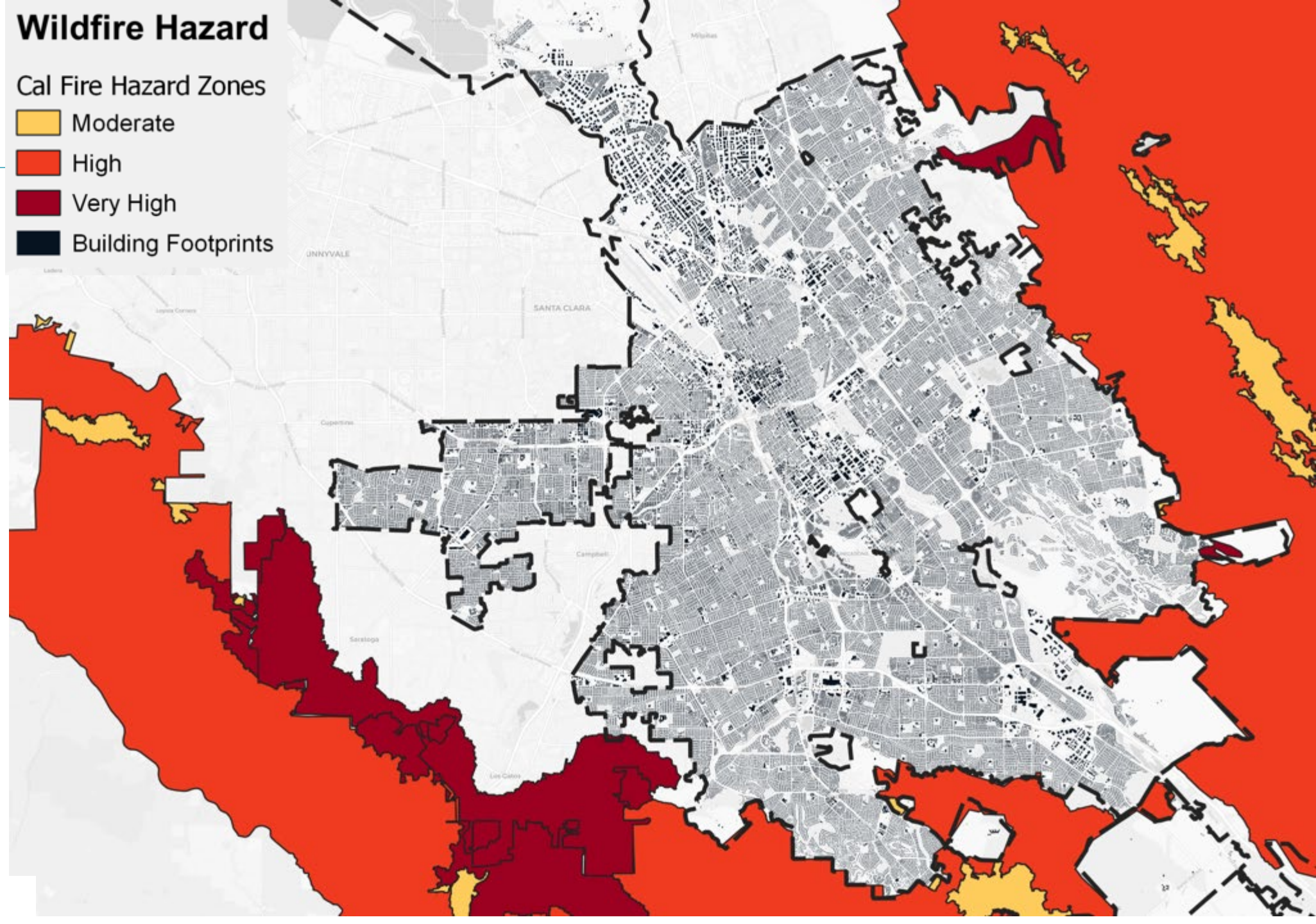
Pollution Burden



For Comparison: Emergency Room Visits for Asthma

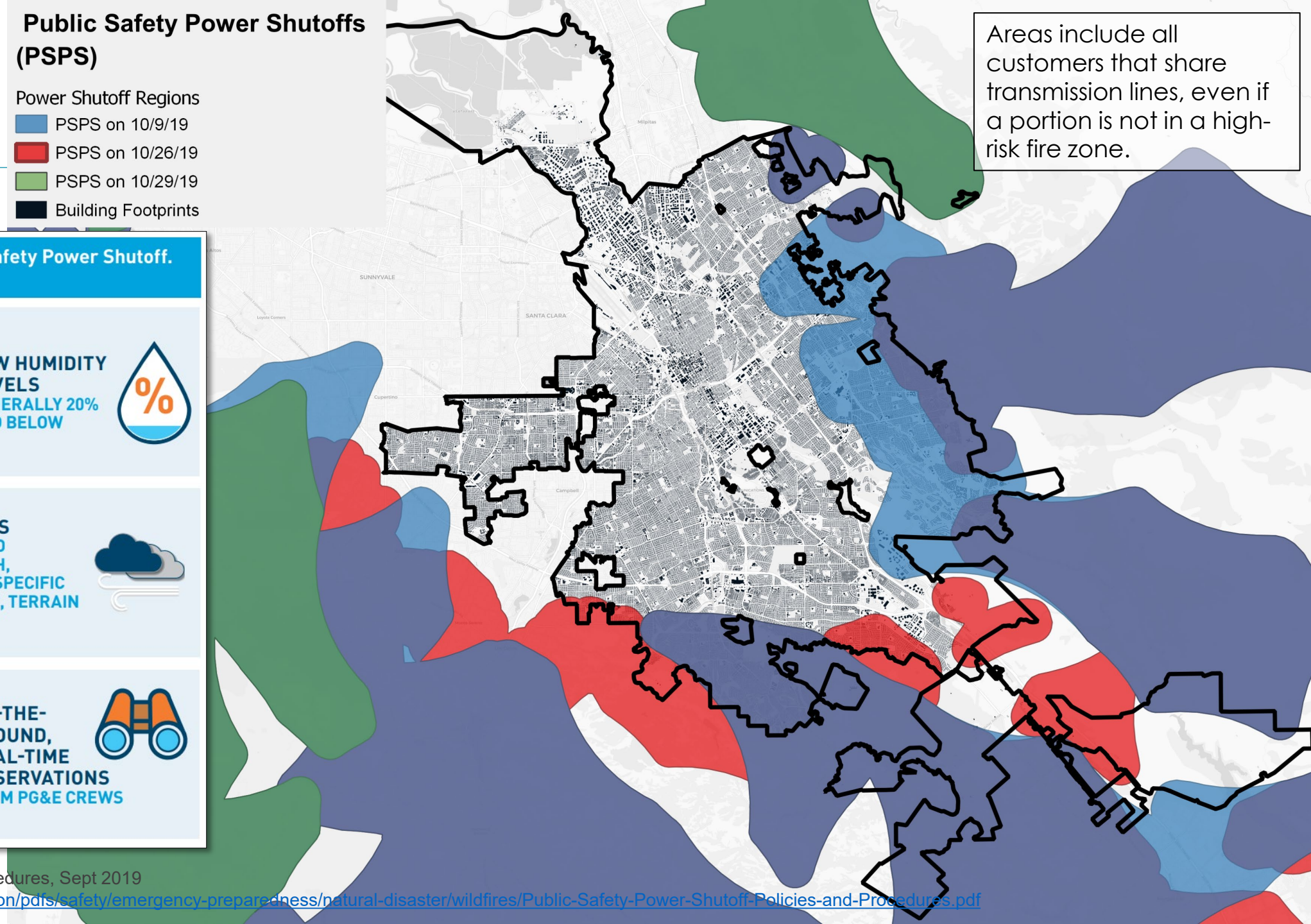
Source: CalEnviroScreen; US Census Bureau

Wildfire Risk

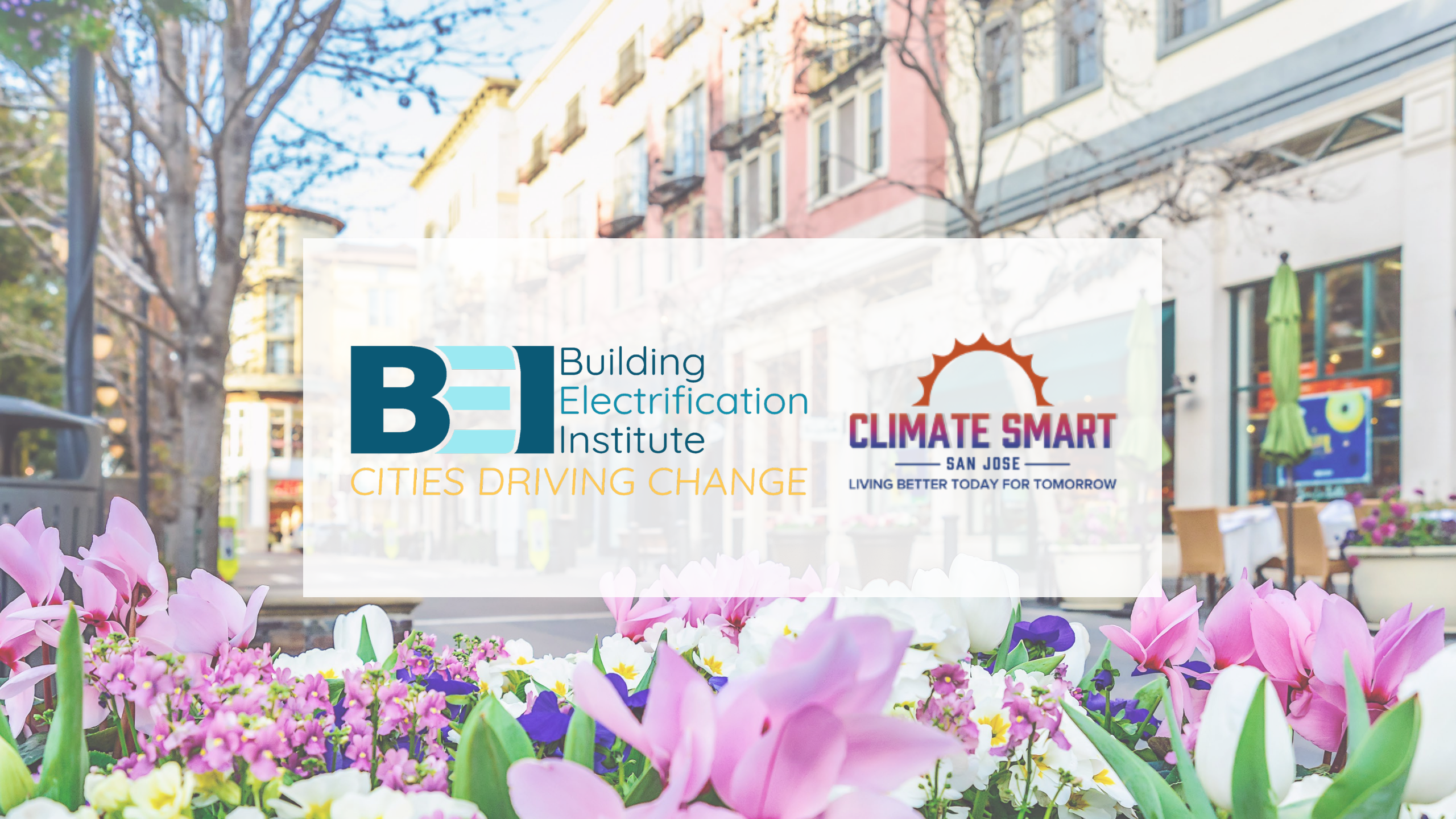


Source: CALFire

Public Safety Power Shutoffs (PSPS)



Source: PG&E PSPS Policies and Procedures, Sept 2019
https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/Public-Safety-Power-Shutoff-Policies-and-Procedures.pdf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Institute
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www.ClimateSmartSJ.org

Existing Building Electrification
Frequently Asked Questions

1. **What is the Framework for Existing Building Electrification?**

   The Framework offers strategies to encourage and incentivize the electrification of homes and businesses in San José. The Framework also explores ways to:

   - Raise awareness of the negative health and climate impacts of using gas and the benefits of using electric appliances
   - Encourage the growth of high-quality local jobs in building electrification
   - Reduce housing and energy costs through new supportive city programs
   - Increase and broaden access to clean, affordable, reliable energy in San José

2. **Why is the Framework needed?**

   The latest climate science shows that nations need to reduce their fossil fuel usage rapidly to avoid catastrophic effects of climate change. The City of San José has recognized the urgency of the climate crisis by:

   - Setting ambitious greenhouse gas (GHG) emission reduction goals in 2018 through Climate Smart San José, the City's climate action plan
   - Declaring a climate emergency in 2019
   - Setting an aspirational goal in 2021 to be carbon neutral by 2030 and evaluating the feasibility of doing so

   Buildings account for 34% of the GHG emissions in San José, the second largest source of its emissions. Within the buildings sector, natural gas represents the largest portion (19%) of the city's total emissions – about as much as per year as the emissions of more than 207,000 passenger vehicles – with most of the emissions coming from natural gas used for space and water heating. San José Clean Energy, San José's primary electricity provider, already has a goal of providing 100% carbon-neutral electricity as a base product to our community. To address the remaining GHG emissions from buildings, the City is evaluating and implementing supportive actions to help the community transition from natural gas to electric and enable residents to take advantage of funding opportunities to make cost-effective upgrades.

3. **Does this Framework require the mandatory elimination of natural gas equipment in San José buildings and homes by 2030?**

   No. The Draft Framework does not propose any mandates to switch out existing natural gas for electric equipment. See Question 1 for what the framework is.

   If the City does consider mandates related to building electrification in the future, it will engage with the public and stakeholders and provide opportunities for input. In April 2022, Council directed staff to evaluate a "replacement at burnout" policy, conduct community outreach, and return in the fall of 2022 with findings. The policy would apply to home equipment that uses natural gas and has reached the end of its useful lifespan.

4. **What are the benefits of building electrification?**

   There are many benefits to switching homes from gas to electric:

   - **Safer, healthier**: Modern electric appliances are safer and better for indoor air quality since they do not emit carbon monoxide or nitrous oxides, as natural gas appliances do.
   - **Lower bills, more efficient**: All-electric homes can help lower energy bills, according to a recent report by Energy + Environmental Economics (E3) titled *Residential Building Electrification in California*.
   - **Fight climate change**: All-electric homes also reduce GHG emissions, especially when powered by carbon-neutral electricity from San José Clean Energy.
   - **New jobs for the community:** Building electrification in San José will also create new, local jobs.

   The Framework helps guide the distribution of a wide range of resources and information to the community (including homeowners, renters and property managers) so that the city can reap the benefits of building electrification. Billions of dollars in federal and state funding are

5. **I just put in a new natural gas water heater/stovetop/dryer/furnace. Does the Framework require me to replace it by 2030?**

   No. There are no proposed mandates in the Framework to switch out existing natural gas for electric equipment.

6. **What community outreach has been done to let people know about the Framework and receive their input?**

   The City has completed significant community outreach and engagement related to the Framework including:

- Fifteen meetings over 7 months with our community-based organization partners, ICAN and Veggielution, to ensure the City included the perspectives of Spanish- and Vietnamese-speaking residents and communities that are most vulnerable to poor air quality and other climate impacts
- Individual meetings with more than 40 community-based organizations, labor organizations, environmental organizations, nonprofits and housing organizations
- Three community forums with community-based organizations, labor organizations and housing organizations
- Five virtual public information sessions to share the development of the Draft Framework with the broader community. Sessions were promoted via social media (Facebook, Twitter, Instagram and Nextdoor) and emails to more than 450 stakeholders, including neighborhood associations.

7. **Would being all-electric make my home less resilient due to grid reliability?**

No, all-electric buildings can actually be a more resilient option. Many gas appliances already require electricity to work or cannot operate safely during emergencies or blackouts. Gas infrastructure is particularly vulnerable to fires or earthquakes and, in the event of a long-term outage due to an earthquake, is expected to take longer to restore to safe operation[1].

Grid infrastructure needs to be upgraded, but with smart planning it will be able to handle the increased demand for electricity caused by converting buildings to electricity, as those changes will occur over a period of decades. Grid upgrades to enable more clean electricity are already in planning stages. In addition, increasing investments in renewable energy, including firm sources like geothermal that produce clean energy 24/7, and energy storage will make the electric grid more reliable. San José Clean Energy and other electric utilities are investing in long-duration storage that can store renewable energy and discharge it at a later time for eight hours or longer.

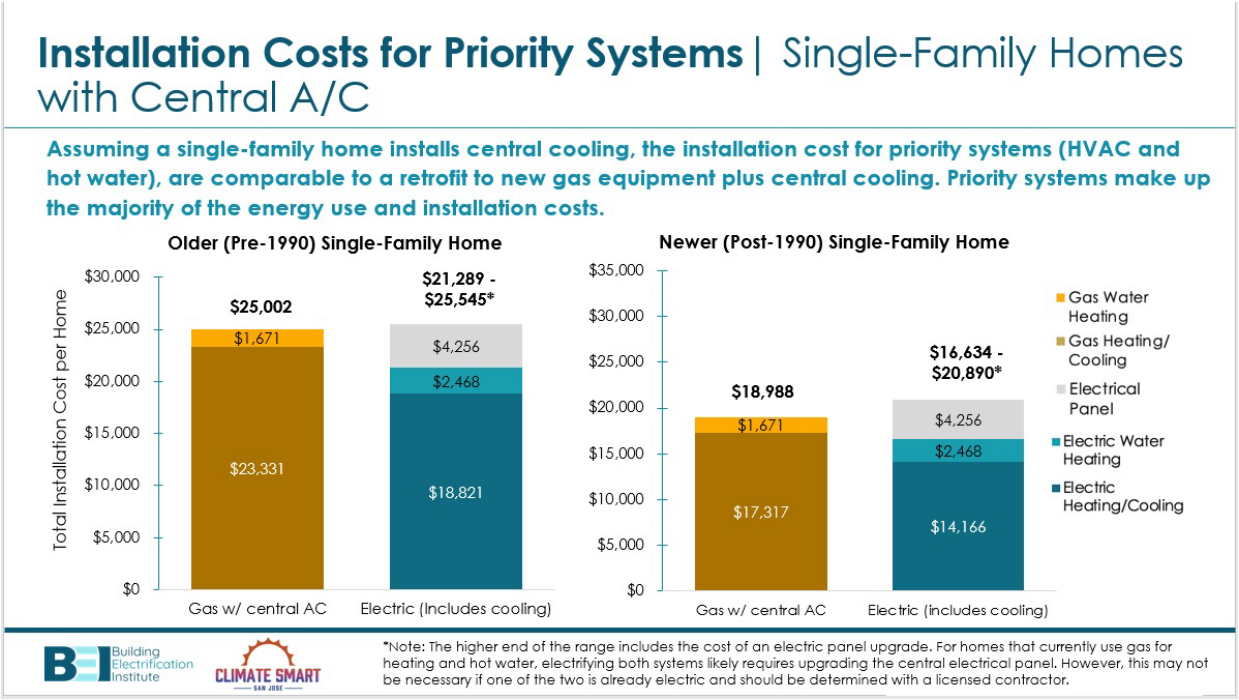
Meanwhile, technological advances are enabling homeowners to make all-electric homes more resilient and carbon-neutral. Electric appliances can use a backup power source such as a generator or batteries, which can be powered by solar. Future technology trends – including the falling price of lithium-ion batteries, the ability to use an electric vehicle battery as a backup power source, and smart electrical panels that distribute power to critical loads in the home – will increasingly allow for backup electric power that is safer and more reliable than gas. San José Clean Energy is now planning ways, such as microgrids, to enhance future grid capacity and resiliency in San José.

[1] https://www.onesanfrancisco.org/sites/default/files/inline-files/Lifelines%20Restoration%20Performance%20Report%20Final.pdf

8. **If I choose to transition from natural gas to electricity, how much would that cost?**

Homeowners can take advantage of existing rebates and incentives to electrify their homes and complete electric panel upgrades. Billions of dollars in additional incentives are expected to become available in coming years through local, state and federal programs.

For single-family homes, installing an electric space heating/cooling system and water heater (without an electric panel upgrade) is estimated to cost between 14%-17% less when compared with choosing a gas furnace with central air conditioning and a gas water heater.



Electric appliances also typically reduce total home energy costs because they are three to four times more efficient than their natural gas counterparts.

Focusing on the biggest gas uses in a single-family home (space and water heating), it could cost between approximately $2,500 (for hot water only) and $22,000 (hot water plus HVAC system) to electrify a home, depending on the extent of the upgrade. This does not include a panel upgrade (estimated at around $4,300) as some single-family homes in San José were built with adequate capacity for full home electrification or have already upgraded their panel. Upgrading the panel of a home can add capacity for electric-vehicle charging.

Please email climatesmart@sanjoseca.gov with any additional questions.