



**City and County of San Francisco
YOUTH COMMISSION**

MINUTES

Monday, July 7, 2025

5:00 pm

IN-PERSON MEETING

City Hall, Room 416

**1 Dr. Carlton B. Goodlett Place,
San Francisco, CA 94102**

Youth Commission Membership includes:

Jason Fong (Chair, MYR), Gabbie Listana (Vice Chair, D6), Lucas Liang (Leg Affairs Officer, D4), Jin Valencia-Tow (Leg Affairs Officer, D7), Winnie Liao (Comms Officer, D3), Emily Yang (Comms Officer, MYR), Clarisse Kim (D1), Camryn Marlow (D2), Ethar Alameri (D5), Harper Fortgang (D8), Skylar Dang (D9), Imaan Ansari (D11), Téa Lonné Amir (MYR), Eloise Krehlik (MYR), Ava Oram (MYR).

Present: Jason Fong, Gabbie Listana, Jin Valencia-Tow, Winnie Liao, Emily Yang, Clarisse Kim, Ethar Alameri, Harper Fortgang, Skylar Dang, Imaan Ansari, Téa Lonné Amir, Ava Oram, Lucas Liang, Camryn Marlow, Eloise Krehlik.

Absent: None.

Tardy: None.

The San Francisco Youth Commission met in-person with remote viewing on July 7, 2025, with Chair Fong presiding.

1. Call to Order and Roll Call for Attendance

Chair Fong called the meeting to order at 5:09pm.

On the call of the roll:

Roll Call Attendance: 15 present.

Clarisse Kim (D1) - present

Camryn Marlow (D2) - present
Winnie Liao (D3) - present
Lucas Liang (D4) - present
Ethar Alameri (D5) - present
Gabbie Listana (D6) - present
Jin Valencia-Tow (D7) - present
Harper Fortgang (D8) - present
Skylar Dang (D9) - present
Imaan Ansari (D11) - present
Téa Lonné Amir (MYR) - present
Eloise Krehlik (MYR) - present
Ava Oram (MYR) - present
Emily Yang (MYR) - present
Jason Fong (MYR) - present

A quorum of the Commission was present.

2. Communications

Alondra Esquivel Garcia, Director of the SFYC, shared communications and meeting announcements with Commissioners.

3. Approval of Agenda (Action Item)

Commissioner Alameri, seconded by Commissioner Marlow, motioned to approve the July 7, 2025 full Youth Commission meeting agenda. No discussion. No public comment. The motion carried by the following voice vote:

Voice Vote: 15 ayes.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - aye
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye
Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye
Ava Oram (MYR) - aye
Emily Yang (MYR) - aye

Jason Fong (MYR) - aye

Action: Agenda Approved.

4. Approval of Minutes (Action Item)

a. June 16, 2025 (Packet Materials)

Commissioner Lonné Amir, seconded by Commissioner Marlow, motioned to approve the June 16, 2025 full Youth Commission meeting minutes. No discussion. No public comment. The motion carried by the following voice vote:

Voice Vote: 15 ayes.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - aye
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye
Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye
Ava Oram (MYR) - aye
Emily Yang (MYR) - aye
Jason Fong (MYR) - aye

Action: Minutes Approved.

5. Public Comment on matters not on Today's Agenda (2 minutes per comment)

No public comment.

6. Presentation (Discussion and Possible Action)

a. San Francisco Newcomer Resources and Support

i. Presenter: Ana De Carolis and Richard Whipple, OCEIA

Ana De Carolis and Richard Whipple gave a presentation on the resources and support for San Francisco's newcomers that are provided by OCEIA.

Vice Chair Listana asked if the Immigrant Support Hub will support the new languages that will be included in the threshold of 6,000 LEP, and Carolis said yes it is in the works.

Officer Liao asked what the Youth Commission can do to further support OCEIA's work, and Whipple said the YC's continued advocacy around critical programs in the city budget process is very helpful. Whipple added that we should lead with care as a City.

Chair Fong asked if there are any other policy goals that they can advocate to the BOS and Mayor, and Whipple said it's unfortunate that the funding was not able to be restored for the community ambassador program from the cuts to this year's budget and it is devastating to the communities that this program supports.

Officer Yang asked what workarounds they're doing to focus on youth programming, and Whipple said they're continuing to support their current youth programming to support youth workforce development for immigrants citywide.

7. Legislation Referred

- a. BOS File No. 250655 – Various Codes - Large and Commercial Vehicle Parking Restrictions - Hours and Exceptions
 - i. Presenter: Eufern Pan, Mayor's Office

Officer Liang explained the legislation referred, and Officer Valencia-Tow brought up the questions and concerns of commissioners regarding this legislation. Specialist Zhan also gave further detailed information regarding this legislation.

Commissioner Ansari and Chair Fong are leaning in favor. Commissioner Fortgang asked if they can stay in their RV's until a later date since only a quarter of RV residents are able to be housed now, to which staff said they can apply for a refuge permit. Fortgang also asked if youth and families are prioritized in this process, and Officer Liang said the City's existing rapid rehousing program currently has more slots for families than single adults.

Commissioner Oram asked what happens if the refuge permit doesn't get approved, to which Officer Valencia-Tow said they are allowed to stay in their RV. Commissioner Liao asked if there's a recommended number of slots for rapid rehousing, to which Valencia-Tow said it would be approximately 430. Specialist Zhan restated the data from the legislation to clarify. Commissioner Fortgang said in addition to concerns to backlogging and funding, such as RV inhabitants being undocumented and afraid of being displaced, to which Chair Fong said yes and there are other concerns that he has.

The following questions shall be forwarded: What happens after the funding for rapid rehousing runs out after the first year? (Oram); Is there a formal process for potential appeals or reconsideration? (Fong)

Commissioner Oram said it seems that there are a lot of problems, and they shouldn't move to push it forward with this many questions to the legislation.

Officer Liang, seconded by Commissioner Ansari, motioned to positively recommend BOS File No. 250655, with questions attached. No discussion. No public comment. The motion carried by the following roll call vote:

Roll Call Vote: 15 ayes.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - aye
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye
Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye
Ava Oram (MYR) - aye
Emily Yang (MYR) - aye
Jason Fong (MYR) - aye

Action: BOS File No. 250655 positively recommended, with questions attached

Officer Liao took a point of personal privilege at 5:54pm, and returned at 5:59pm. Chair Fong called for a 5-minute recess at 6:18pm, and returned to order at 6:25pm.

8. 2025 - 2026 Bylaws Amendments (Second Reading)

a. Presenter: Youth Commission Staff

Chair Fong, seconded by Commissioner Alameri, motioned to approve the amendments to the 2025-2026 Youth Commission Bylaws. No discussion. No public comment. The motion carried by the following roll call vote:

Roll Call Vote: 15 ayes.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - aye
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye

Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye
Ava Oram (MYR) - aye
Emily Yang (MYR) - aye
Jason Fong (MYR) - aye

Action: 2025-2026 Youth Commission Bylaws amendments approved, and shall take effect for the 2025-2026 Youth Commission.

Officer Valencia-Tow took a point of personal privilege at 6:36pm, and returned at 6:38pm. Vice Chair Listana took a point of personal privilege at 6:38pm, and returned at 6:45pm.

9. Commission Business (Discussion and Possible Action)

- a. **RESOLUTION NO. 2425-AL-33: [Small Business Protections and Funding]** - Resolution urging the San Francisco Mayor and Board of Supervisors to preserve funding for the Legacy Business Assistance Program and its protected businesses. (Second Reading)
- i. Sponsors: Kim, Yang

Commissioner Kim and Officer Yang said there were some minor changes to the existing clauses to make the resolution stronger, and they read the new clause language into the record.

Commissioner Marlow, seconded by Commissioner Fortgang, motioned to approve Resolution No. 2425-AL-33. No discussion. No public comment. The motion carried by the following roll call vote:

Roll Call Vote: 14 ayes, 1 absent.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - absent
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye
Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye

Ava Oram (MYR) - aye
Emily Yang (MYR) - aye
Jason Fong (MYR) - aye

Action: Resolution No. 2425-AL-33 passes.

- b. **RESOLUTION NO. 2425-AL-34: [2025 Expanding Housing Choice Plan: Small Business Protections]** - Resolution in support of the 2025 Expanding Housing Choice Plan and urging San Francisco Mayor and Board of Supervisors to protect Small Businesses from displacement. (Second Reading)
- i. Sponsors: Kim, Yang

Commissioner Kim said they revised a lot of language in the resolution, and will do further revisions to the language since they're meeting with some individuals who can give further input.

Commissioner Kim, seconded by Officer Yang, motioned to table Resolution No. 2425-AL-34 to the next full Youth Commission meeting on July 21, 2025. No discussion. No public comment. The motion carried by the following roll call vote:

Roll Call Vote: 14 ayes, 1 absent.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - absent
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye
Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye
Ava Oram (MYR) - aye
Emily Yang (MYR) - aye
Jason Fong (MYR) - aye

Action: Resolution No. 2425-AL-34 was tabled to the next full Youth Commission meeting on July 21, 2025.

- c. **RESOLUTION NO. 2425-AL-36: [SFUSD-Wide Climate Action Day]** - Resolution in support of a San Francisco Unified School District (SFUSD)-wide climate action day to expand youth climate literacy and action. (First Reading)

- i. Sponsor: Fortgang

Commissioner Fortgang introduced the resolution and read the language into the record. Commissioners Lonné Amir, Marlow, Oram, Valencia-Tow, Liang, Fong, Listana, Liao, Yang, Alameri, Kim, Dang, and Ansari have agreed to co-sponsor.

Officer Liang took a point of personal privilege at 6:48pm, and returned at 6:51pm.

- d. **MOTION NO. 2425-AL-37: [Motion to Submit Letters of Support for AB 1155: Law Schools: Externships: Compensation]** - Motion to urge the San Francisco Board of Supervisors and Mayor to support Assembly Bill 1155: Law schools: externships: compensation. (First Reading)
 - i. Marlow, Kim, Fong, Liang, Yang

Commissioners read the language of the motion into the record. Commissioner Dang recommended adding a whereas clause about recent federal legislation ([H.R. 1] House Resolution 1: Section 81001, Subsection 455A, Clause 2, Subsection B1, Subsubsection 2AA in the 119th Congress [2025-2026]) that capped graduate school loans. Chair Fong read the new clause language into the record, and it will be paraphrased and cited in the motion.

Commissioner Kim, seconded by Commissioner Oram, motioned to approve Motion No. 2425-AL-37, with amendments. No discussion. No public comment. The motion carried by the following voice vote:

Roll Call Vote: 15 ayes.

Clarisse Kim (D1) - aye
Camryn Marlow (D2) - aye
Winnie Liao (D3) - aye
Lucas Liang (D4) - aye
Ethar Alameri (D5) - aye
Gabbie Listana (D6) - aye
Jin Valencia-Tow (D7) - aye
Harper Fortgang (D8) - aye
Skylar Dang (D9) - aye
Imaan Ansari (D11) - aye
Téa Lonné Amir (MYR) - aye
Eloise Krehlik (MYR) - aye
Ava Oram (MYR) - aye
Emily Yang (MYR) - aye
Jason Fong (MYR) - aye

Action: Motion No. 2425-AL-37 passes, with amendments.

10. Committee Reports (discussion item)

- a. Executive Committee
 - i. Legislative Affairs Officers

Officer Liang and Officer Valencia-Tow had no updates.

- ii. Communication and Outreach Officers

Officer Liao said they would be doing a recap post and a thank you for your service post for graduating seniors, so be sure to check emails.

- iii. General Committee Updates

Vice Chair Listana said thank you to everyone for their work.

- b. Civic Engagement and Education Committee

Commissioner Kim said they had a productive working group session, and they were able to finalize several agenda items.

- c. Transformative Justice Committee

Commissioner Lonné Amir said they didn't have a meeting last week, but they are planning to have a future meeting or working group session.

- d. Housing, Recreation, & Transit Committee

Commissioner Fortgang said they didn't meet last week, but today they had a fun social bonding opportunity with a Twin Peaks hike and got boba together.

11. Staff Report (discussion item)

Specialist Zhan reported back on the add-backs from the BOS after deliberations. Director Garcia said there's an opportunity to meet with elected officials with Switzerland and asked who would be able to attend, the California Lawyers for the Arts opportunity, and the All MAGIC backpack giveaway opportunity. Specialist Ochoa reported on a few of their updates regarding the Youth Commission's participation with the Commission Streamlining Task Force and our effort to remain as a charter-protected city commission.

12. Announcements (this includes Community Events)

Officer Liang said his thanks to Officer Valencia-Tow, since it may be his last full Youth Commission meeting. Chair Fong also said his thanks. Officer Yang thanked Officer Liao for her service since it may be her last full Youth Commission meeting as well. Officer Yang said there is another resolution coming at the next full Youth Commission meeting.

13. Adjournment

There being no further business on the agenda, the full Youth Commission adjourned at 7:28pm.

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City Hall, Room 345
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102
Phone: (415) 554-6446, Fax: (415) 554-6140
Email: youthcom@sfgov.org Website: <http://www.sfgov.org/yc>

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Sunshine Ordinance Task Force
City Hall, Room 244
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4689
Phone: (415) 554-7724, Fax: (415) 554-5784
Email: soft@sfgov.org

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[2025 Expanding Housing Choice Plan: Small Business Protections]

Resolution in support of the 2025 Expanding Housing Choice Plan; urging San Francisco Mayor and Board of Supervisors to add amendments to the plan protecting Small Businesses from displacement, support the establishment of the Small Business Rezoning Construction Relief Fund; and California State Legislature to develop legislation for commercial tenant protections and commercial rent control.

WHEREAS, In 2022, The Board of Supervisors reported that San Francisco's small businesses contributed hundreds of millions of dollars to San Francisco's economy each year and made a “significant investment in the economic health of our City and the quality of life of its citizens and visitors;” and

WHEREAS, In 2024, small business contributed 43.5% of the national GDP and in 2023, minority owned small businesses in CA generated \$192.8 billion; and

WHEREAS, Small businesses have employed 360,000 San Franciscans, providing economic security for marginalized and BIPOC families and youth. 27.44% of small businesses in California are family owned, with 92% of those businesses being first-generation owned; and

WHEREAS, Small businesses are critical to young people, providing culturally relevant resources, community spaces, as well as employment and mentorship opportunities; and

WHEREAS, Youth-employment programs such as Enterprise for Youth and JCYC Programs like MYEEP provide San Francisco youth with hands-on experience in

small businesses, bolstering career exposure, financial independence, and community engagement; and

WHEREAS, Commercial corridors are streets with a high concentration of business activity. San Francisco’s commercial corridors support small businesses, showcase the city’s cultural diversity, and generate significant revenue through tourism, retail and dining; and

WHEREAS, The 2025 Expanding Housing Choice Plan aims to increase housing production and density through rezoning for development. This plan focuses on northern and western neighborhoods, underutilized sites, and commercial corridors; and

WHEREAS, The SF Planning Commission found that longer-term impacts of the Expanding Housing Choice Plan were likely to be positive for small businesses, as new households translates to increased consumer spending and foot traffic on commercial corridors. However, short-term impacts of the plan involves displacing small businesses, jeopardizing months of revenue and decreasing the odds of returning to their original storefront; and

WHEREAS, While the 2025 Expanding Housing Choice Plan aligns with the Youth Commission’s Housing Budget and Policy Priorities about expanding affordable housing and lessening restrictions on height limits, the Youth Commission also recognizes the importance of ensuring that small businesses are not displaced due to housing rezoning and development; and

WHEREAS, On April 17, 2025, the SF Planning Commission held a hearing on Expanding Housing Choice: Small Business Strategies and identified that the proposed rezoning will affect 37 commercial corridors and their 5,680 registered businesses.

1 1,052 of these businesses are on parcels suitable for development and 47 are legacy
2 businesses. The most affected businesses are bars and restaurants, retail, and
3 medical-related; and

4 WHEREAS, SF Planning estimated that an average of 53 small businesses will
5 face the risk of displacement due to new development – roughly 1-2 businesses per
6 corridor per year; and

7 WHEREAS, Over 80% of San Francisco small businesses are commercial
8 tenants, are not protected by local or state rent control, and are vulnerable to
9 termination and displacement; and

10 WHEREAS, Pandemic debt still hinders small businesses' profits on top of
11 inflation, rising costs of wages, employee retainment, insurance, and utility costs. In
12 2022, a survey from the Office of Small Business found that 1/3 of 802 businesses
13 surveyed anticipated a major change over the next year, and 22% planned to sell or
14 close; and

15 WHEREAS, Small business employees make \$30,000 to \$80,000 annually. The
16 displacement of small businesses will significantly increase rent burdens, crowding, and
17 long commutes for these workers; and

18 WHEREAS, San Francisco mom & pop landlords are progressively replaced by
19 large corporate real estate, who increases the burden on commercial tenants through
20 lengthy leases. These leases often contain over 40 pages of difficult language and
21 sometimes require tenants to contribute towards property taxes; and

1 WHEREAS, In addition to the challenges mentioned above, BIPOC-owned small
2 businesses face language barriers when negotiating leasing terms and are at a
3 disadvantage when navigating these new rezoning proposals; and

4 WHEREAS, As of July 2025, the current Expanding Housing Choice Plan does
5 not contain any plan or specific protections for small businesses after the construction of
6 new units, increasing the odds for future small business displacement; and

7 WHEREAS, SF-based nonprofit Small Business Forward determined that the
8 most important small business support services are potential relocation assistance
9 (such as scalable tenancy lengths, right to return, and relocation payments) and small
10 business corridor vibrancy support (like good neighbor construction policies and
11 discouraging long-term vacancies); and

12 WHEREAS, The San Francisco Planning Department recommends early
13 notifications and referrals to the Office of Small Business, implementing a construction
14 mitigation fund, and upholding AB 2011: Commercial Relocation and SB 1103. AB 2011
15 enables the development of mixed-income and 100% affordable housing projects on
16 underutilized commercial corridors and requires relocation assistance including
17 payments depending on the number of years a businesses has existed for and other
18 criteria. SB 1103 requires clear lease terms and fair commercial lease practices that
19 protect small businesses; and

20 WHEREAS, District 7 Supervisor Melgar's office proposed the establishment of
21 the Small Business Rezoning Construction Relief Fund, which funds grants and loans to
22 Small Businesses displaced by rezoning. The main source of money for this fund is
23 through small businesses' gross receipts tax—businesses can choose to designate up

1 to 4% of their gross receipts tax liability for deposit in the Small Business Rezoning
2 Construction Relief Fund, established in Administrative Code Section 10.100-335; and
3 therefore be it

4 RESOLVED, The San Francisco Youth Commission recognizes that both small
5 businesses and affordable housing are integral to supporting youth livelihoods as key
6 places of culture and community; and be it

7 FURTHER RESOLVED, The San Francisco Youth Commission acknowledges
8 that building more affordable housing units will address San Francisco's housing crisis
9 and has the potential to bolster small business activity through increased foot traffic.

10 However, affordable housing should not come at the expense of displacing small
11 businesses; and be it

12 FURTHER RESOLVED, The San Francisco Youth Commission urges the Mayor,
13 Board of Supervisors, and Planning Department to include comprehensive strategies to
14 protect small businesses from displacement in the 2025 Expanding Housing Choice
15 Plan. Suggestions include developing early notification systems for rezoning,
16 establishing relocation and developer's assistance payments modeled by AB 2011,
17 upholding Right to Return Policies, Good Neighbor Construction Policies, and micro-
18 retail requirements, as well as considering additional recommendations by the San
19 Francisco Planning Department, Small Business Forward, and San Francisco youth and
20 families; and be it

21 FURTHER RESOLVED, The San Francisco Youth Commission urges the
22 California State Legislature to further develop legislation that allows for commercial

1 tenant protections and some degree of commercial rent control, especially in cities like
2 San Francisco whose economy and culture rely on small businesses; and be it

3 FURTHER RESOLVED, The San Francisco Youth Commission urges the Mayor
4 and Board of Supervisors to support the District 7 Supervisor Melgar's Small Business
5 Rezoning Construction Relief Fund Ordinance, District 7 Office's efforts to increase
6 small business tenant protections, and when fiscally responsible, allocate money
7 towards the fund in order for the program to give substantial financial assistance to
8 displaced businesses.

1 [2025 Expanding Housing Choice Plan: Small Business Protections]

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3 Supplemental Information:

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5 See attached [Figure 1, Figure 2]

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Existing Regulations

- **Zoning controls** in neighborhood commercial districts, such as Active Use requirements and Formula Retail restrictions.
- **Conditional Use Authorization** to open a new business where a Legacy Business was located.
- **AB2011 Commercial Relocation**, requiring relocation payments akin to up to 18 months of rent for projects using the program.
- **Senate Bill 1103** protects qualifying small-businesses from unexpected rent increases, hidden fees, and other unclear lease terms.

Figure 1

Draft Recommendations to Support Small Businesses

- **Early notifications and referrals to OSB:** when a project application is filed.
- **Relocation payments:** modeled on AB2011.
- **Micro-retail:** requiring smaller retail spaces (between 100 sf to 1,000 sf) in larger developments.
- **Expanding availability of commercial space:** through the new zoning district, Residential Transit Oriented – Commercial (RTO-C).
- **Zoning incentives and flexibility:** such as waiving CUAs for use size limits (for non-formula retail projects using the Local Program).
- **Other ideas:** construction mitigation fund (pending additional resources); construction liaison & “good neighbor” practices

Figure 2

[SFUSD-Wide Climate Action Day]

Resolution in Support of a San Francisco Unified School District (SFUSD)-wide Climate Action Day to Expand Youth Climate Literacy and Action.

WHEREAS, Climate change threatens San Francisco youth in the short- and long-term; and

WHEREAS, San Francisco is already experiencing heightened intensity and frequency of extreme weather events exacerbated by higher global temperatures, including heat waves, air pollution from wildfires, and flooding¹; and

WHEREAS, Young people are particularly vulnerable to the physical and mental health effects of climate change such as heat stroke, lung disease, respiratory infections, and climate anxiety²; and

WHEREAS, SFUSD aims to graduate students who are prepared “to thrive in the 21st century” and learning about the causes and threats of climate change and strategies to take action is critical for preparing students to face one of the biggest threats to young people in the 21st century³; and

WHEREAS, Understanding the relationship between humans and the environment equips youth with the knowledge and tools to address climate change and environmental justice issues in their communities; and

WHEREAS, While SFUSD has implemented environmental science initiatives across grade levels, including environmental-focused Career, Technical, and

¹ David Ackerly et al., “California’s Fourth Climate Change Assessment: San Francisco Bay Area Region Report” (University of California, Berkeley, 2018).

² “Climate Change and Children’s Health | US EPA,” US EPA, January 14, 2025.

³ San Francisco Unified School District, “SFUSD Vision 2025: Reimagining Public Education in San Francisco for a New Generation,” June 2014.

Educational Pathways at six high schools, these efforts must be expanded to ensure that all students graduate as climate-literate citizens⁴; and

WHEREAS, In 2024-2025, the Youth Commission conducted a survey about climate education with over 400 responses in which SFUSD students expressed interest in climate curriculum that extends to subjects beyond science and explores climate change beyond classrooms through interactive field trips and internships; and

WHEREAS, The Youth Commission has consistently supported climate efforts in their annual Budget & Policy Priority Report, most recently writing recommendations to expand electrification, climate resilience, and climate literacy in the 2025-2026/2026-2027 Budget & Policy Priority Report with input from the San Francisco Environmental Department (SFE) and SFUSD climate educators⁵; and

WHEREAS, The primary long-term recommendation in the recent Budget & Policy Report is to create a district-wide day of climate action, building on SFE's annual Climate Action Youth Summit; and

WHEREAS, On April 18, 2025, SFE held their second Climate Action Youth Summit that brought together 3,000 attendees themed around "Climate Action Across Careers" with student and adult-led showcases highlighting the range of careers that connect to climate action⁶; and

WHEREAS, This year's summit featured double the number of youth-led action projects, including students at Jefferson Elementary School who audited 85 pounds of

⁴ "SFUSD Teaches Environmental Literacy and Climate Justice to All K-12 Students | SFUSD," SFUSD, April 15, 2022.

⁵ "San Francisco Youth Commission 2024-2025 Budget & Policy Priorities: Fiscal Year 2024-2025 | 2026-2027," March 3, 2025.

⁶ "Second Annual Climate Action Youth Summit Champions Climate Action in Every Career," SF Environment, April 18, 2025.

1 trash, students from the ACCESS program who led interactive waste-sorting stations,
2 and students from SOTA who led a sustainable fashion show⁷; and

3 WHEREAS, Establishing a district-wide day of climate action would further
4 expand the impact of this summit by enabling all SFUSD students to participate in
5 climate action as a part of their regular school day; and

6 WHEREAS, Other cities are exploring similar ways to expand climate literacy,
7 including New York City, which holds four annual district-wide climate action days where
8 every school engages in climate-related field trips, lessons, and community action
9 projects⁸; and

10 WHEREAS, This year's district-wide climate action days in New York City themed
11 around waste, energy, health, and water were a major success with teachers reporting
12 over 170 impact stories, including Green Careers guest speakers, beach clean-ups,
13 creation of rainwater capture systems, sorting of cafeteria waste, environmental
14 documentary screenings, and a climate action STEAM fair – with many of these actions
15 led by students for other students⁹; and

16 WHEREAS, The SFUSD district-wide day of climate action would be developed
17 by SFUSD students, teachers, SFE, and the San Francisco Youth Commission; and
18 therefore be it

19 RESOLVED, That the San Francisco Youth Commission strongly supports the
20 creation of a City-wide youth climate action day that involves all SFUSD schools across

⁷ Catherine O'Connor, Mary. Sorting out plastic waste at a San Francisco school," KALW, January 27, 2025; "Second Annual Climate Action Youth Summit Champions Climate Action in Every Career," SF Environment, April 18, 2025.

⁸ "Climate Action Days," NYC Public Schools.

⁹ "Climate Action Hub," Office of Energy & Sustainability: NYC Public Schools Sustainability Hub.

1 grades to participate in activities such as field trips, community action, guest speakers,
2 etc. that encourage climate literacy; and therefore be it

3 FURTHER RESOLVED, That the San Francisco Youth Commission urges the
4 Mayor and Board of Supervisors to urge SFUSD and SFE to support a district-wide
5 climate action day; and therefore be it

6 FURTHER RESOLVED, That the San Francisco Youth Commission staff shall
7 transmit copies of this resolution to the Mayor, Board of Supervisors, SFE, San
8 Francisco Commission on the Environment, and the San Francisco Board of Education.

[Supporting EV Charger Implementation]

Resolution In Support of Expanding Electric Vehicle (EV) Charger Concentration Throughout San Francisco.

WHEREAS, An EV (Electric Vehicle) is defined as any vehicle using electricity as a primary source of power including but not limited to electric cars, bicycles, scooters, hover boards etc.; and

WHEREAS, Vehicle emissions are the leading contributor to carbon dioxide emissions – accounting for 45% of San Francisco's total emissions in 2022, and EVs have shown incredible success in reducing the City's greenhouse gas emissions, responsible for an annual 1.8% reduction of emissions between 2018-2022 according to a recent UC Berkeley study¹²; and

WHEREAS, Expanding affordable and convenient EV charging in San Francisco will contribute to meeting Climate Action Plan goals that 25% of all registered private vehicles are electric by 2030 and greenhouse gas emissions are net-zero by 2040³; and

WHEREAS, In 2024, San Francisco had the second highest EV adoption rate in metropolitan areas in the nation at 34% with 28,000 registered EVs⁴; and

WHEREAS, In order to meet the growing demand and adoption of EVs, San Francisco needs 1760 charging stations by 2030. As of July 2, 2025, however, there are

¹ Greg Wong, "Electric Vehicles Already Curbing SF Bay Area Emissions," *San Francisco Examiner*, July 13, 2025, https://www.sfexaminer.com/news/climate/electric-vehicles-already-curbing-sf-bay-area-emissions/article_ac9a75d4-f20e-11ee-8cbb-df334085a859.html.

² Robert Sanders, "EVs Are Lowering Bay Area's Carbon Footprint," *Berkeley News*, April 4, 2024, <https://news.berkeley.edu/2024/04/04/evs-are-lowering-bay-area-s-carbon-footprint/>.

³ San Francisco Environment Department, "San Francisco's Climate Action Plan: 2025 Update," <https://www.sfenvironment.org/CAP-2025>.

⁴ Nadja Popovich, "The Bay Area Leads the U.S. National Shift to Electric Vehicles," *The New York Times*, March 12, 2024, <https://www.nytimes.com/2024/03/12/us/bay-area-electric-vehicles.html>.

only 1,179 charging stations installed, thus 581 new charging stations must be installed at the minimum⁵; and

WHEREAS, The International Energy Agency (IEA) recommends for metropolitan cities like San Francisco to have a 10:1 ratio for EVs drivers to public EV chargers, however San Francisco's ratio for EV charging is far greater and severely misses the benchmark recommendations of by the IEA⁶; and

WHEREAS, In 2024, The San Francisco Examiner reported that “70% of San Francisco residents live in multi-unit housing and 67% of registered vehicles are parked in multi-unit housing spaces and street parking” without easy access to EV chargers⁷; and

WHEREAS, EVs require a charger to function, and there are different types of chargers. Public level 2 chargers are used in public spaces such as grocery stores to charge vehicles for longer durations of usage. DC fast chargers are privatized and used for a short, quick charges and last shorter durations, such as at-home charging; and

WHEREAS, Public curbside charging – EV chargers owned and operated by the City installed along street curbsides – is more accessible, enabling charging outside of homes, however EV charging ports are most concentrated in San Francisco’s Downtown Neighborhood and Financial District as of 2020; and

WHEREAS, In April 2025, Board President Mandelman launched the EV Curbside Charging Pilot Program to study the feasibility of installing public curbside

⁵ San Francisco Environment Department, “San Francisco’s Electric Vehicle (EV) Curbside Pilot Program Delivers the First Public Curbside Chargers,” press release, April 25, 2025, <https://www.sfenvironment.org/press/san-francisco-s-electric-vehicle-ev-curbside-pilot-program-delivers-first-public-curbside>.

⁶ International Energy Agency, *Global EV Outlook 2025*, “Electric vehicle charging” section, published May 2025, <https://www.iea.org/reports/global-ev-outlook-2025/electric-vehicle-charging>.

⁷ Benjamin Schneider, “The Bay Area Has Twice as Many Parking Spots as People and There’s a Hidden Toll,” *San Francisco Examiner*, March 3, 2022, https://www.sfexaminer.com/archives/the-bay-area-has-twice-as-many-parking-spots-as-people-and-there-s-a/article_2ef9ce1e-1b53-5b51-a0e7-935ac32beb97.html.

1 chargers, informing pilot charger installations in Duboce Triangle and Dogpatch. In July
2 2025, Mayor Daniel Lurie opened a new 24/7 public EV charging station in the Bayview
3 Plaza. These efforts, along many others, have helped the City nearly double its EV
4 charging capacity since 2019⁸⁹; and

5 WHEREAS, The SF Standard found that the highest number of EVs registered
6 were in Bernal Heights and the Mission, with around 2,500 sold in 2023. Other areas
7 with high concentrations of single-family housing and families, such as the Richmond,
8 Sunset, and Noe Valley, also had around 2,300-2,400 sales of EVs. This demonstrates
9 that EVs are used primarily by families¹⁰; and

10 WHEREAS, The SF Environment Department projects that over 100 Public Level
11 2 Chargers and 20 Public DC fast chargers are needed in the South and Southeast
12 Districts of San Francisco, especially for Districts 9, 10, and 11 each, to meet the
13 demand of constituent adoption of EVs (see figure 1); and

14 WHEREAS, Many youth and their families would be more incentivized to
15 purchase an electric vehicle and therefore lessen their environmental impact if there
16 were more chargers throughout the city; and

17 WHEREAS, EV purchase likelihood was highest amongst young people between
18 the ages of 18 to 29. Furthermore, teenagers and young adults are the most climate
19 aware generation, utilizing the Internet and social media to be aware of the impending

⁸ San Francisco Environment Department, "EV Curbside Pilot Program."

⁹ "Mayor Lurie Opens 24/7 Electric Vehicle Fast Charging in Bayview," *SF.gov*, July 9, 2025, <https://www.sf.gov/news-mayor-lurie-opens-247-electric-vehicle-fast-charging-in-bayview>.

¹⁰ Noah Baustin, "Did Tesla Sales Stay Strong in California Despite Controversy Around Elon Musk?" *The San Francisco Standard*, February 20, 2023, <https://sfstandard.com/2023/02/20/tesla-sales-california-san-francisco-la-market-share-evs-elon-musk/>.

1 danger of climate change. Young people are the fastest growing consumer base of EVs,
 2 and utilizing this could be impactful to advance the city's climate goals¹¹; and

3 WHEREAS, Youth most often frequent community spaces and shopping centers
 4 such as malls. Stonestown Galleria recently installed more chargers in its parking lot;
 5 and

6 WHEREAS, Permitting for EV chargers is currently around 70 days in San
 7 Francisco, the second slowest in the entire state. This long process disincentivizes
 8 business owners and other people to install chargers in their neighborhoods¹²; and

9 WHEREAS, Public Vehicle Charging disparities are present in California. In
 10 comparison to white, wealthy neighborhoods, low-income Black and Hispanic-majority
 11 neighborhoods tended to have less access to public chargers, especially in multi-unit
 12 housing areas; and

13 WHEREAS, The San Francisco Youth Commission advocated for scaling up
 14 public EV charging stations in the 2024-2025 Budget Policy Priorities¹³; and therefore
 15 be it

16 RESOLVED, The San Francisco Youth Commission supports the San Francisco
 17 Environment Department in expanding public, fast, and more accessible EV charging,
 18 continue collecting EV charging distribution data, supporting youth in becoming more
 19 informed about electrification opportunities for themselves and families, and long-term
 20 plans to develop a mobility electrification hub – a place for all constituents to gain

¹¹ Statista, "Likelihood of Purchasing an Electric Vehicle in the U.S. by Consumer Age Group,"
<https://www.statista.com/statistics/1277794/electric-vehicle-purchase-likelihood-in-the-us-by-consumer-age-group/>.

¹² Chih-Wei Hsu and Kevin Fingerma, "Public Electric Vehicle Charger Access Disparities Across Race and Income in California,"
Transport Policy 100 (2021): 59–67, <https://doi.org/10.1016/j.tranpol.2020.10.003>.

¹³ San Francisco Youth Commission, "Budget and Policy Priorities, FY 2024–25" (PDF), City and County of San Francisco Youth
 Commission, <https://www.sfgov.org/youthcommission/sites/default/files/24-25%20Budget%20and%20Policy%20Priorities%20-%20B%26A%20Presentation.pdf>.

1 various EV resources such as EV ridership exploration, rebate programs, informational
2 events, etc.; and therefore be it

3 FURTHER RESOLVED, The San Francisco Youth Commission hereby urges the
4 Mayor and Board of Supervisors to expedite the permitting process for San Francisco
5 Environment to install more EV charging stations for all neighborhoods throughout the
6 City, especially in South and Southeast San Francisco including Districts 9,10, and 11;
7 and therefore be it

8 FURTHER RESOLVED, The San Francisco Youth Commission urges the Mayor
9 and Board of Supervisors, SFE, and SFMTA to scale up current EV charging
10 infrastructure by considering installation of level 2 and 3 chargers in public, off-street
11 parking; and therefore be it

12 FURTHER RESOLVED, The San Francisco Youth Commission hereby urges the
13 Mayor and Board of Supervisors to prioritize installing more curbside EV chargers near
14 multi-unit and single family housing, especially lower-income and BIPOC communities,
15 as well as youth-accessible spaces such as community centers, libraries, shopping
16 centers and malls to increase equity and accessibility; and therefore be it

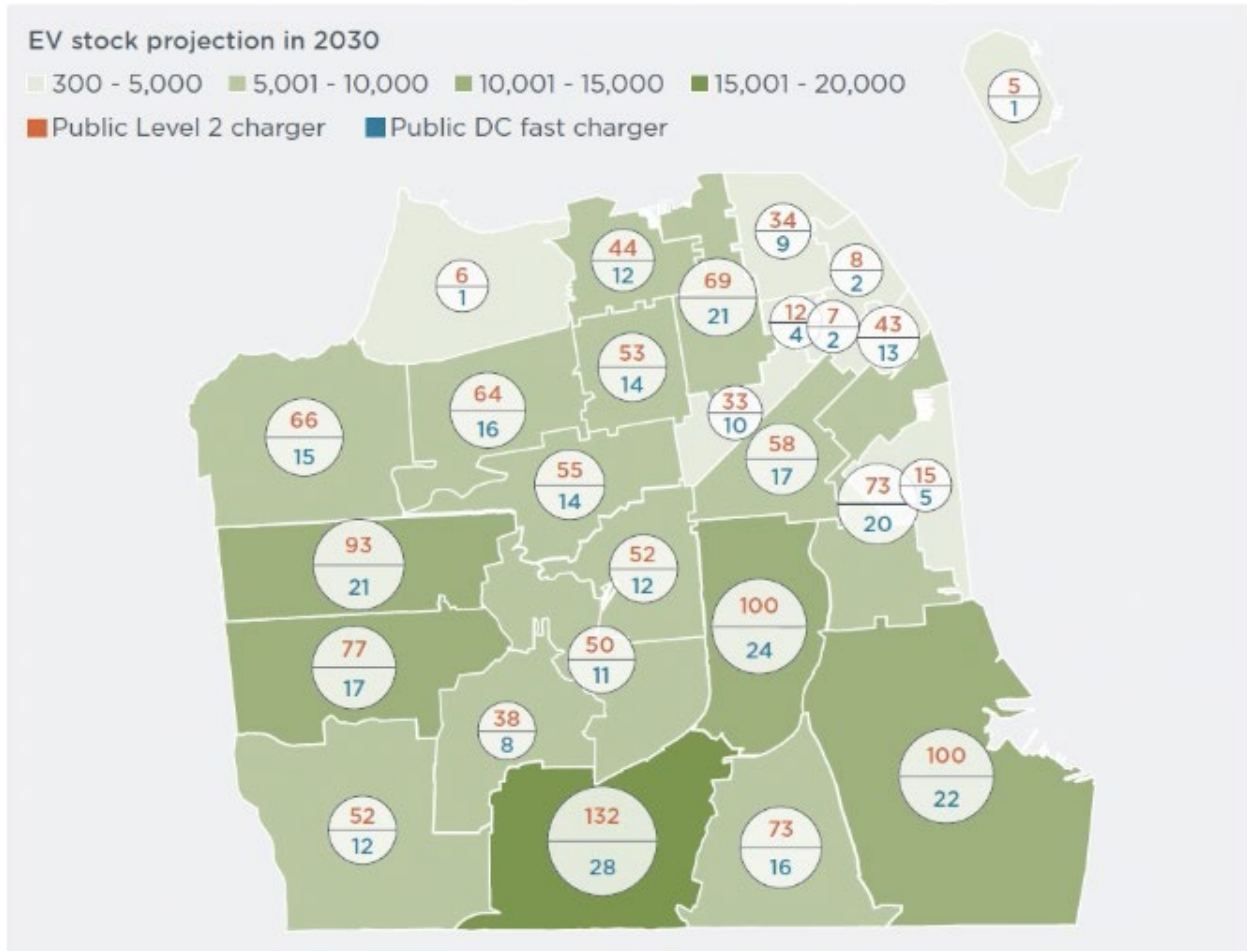
17 FURTHER RESOLVED, The San Francisco Youth Commission hereby urges the
18 San Francisco Environmental Department to collect data on youth EV mobility usages
19 to best inform places to install EV chargers to effectively serve youth in San Francisco.

20 FURTHER RESOLVED, The San Francisco Youth Commission supports the
21 implementation of expanding EV charging in the San Francisco Climate Action Plan to
22 reach the City's goal of achieving net zero green house gas emissions by 2040.

1 **[Supporting EV Charger Implementation]**

3 **Supplemental Information:**

5 See attached document [Figure 1, ICCT 2030 Charging Demand Report]



1

2 Figure 1

City charging infrastructure needs to reach 100% electric vehicles: The case of San Francisco

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Keywords: Cities, electric vehicles, charging infrastructure

Introduction

Cities in the United States are increasingly setting ambitious vehicle electrification targets to achieve their air quality and climate change mitigation goals. Although electric vehicle (EV) uptake across U.S. cities in 2019 is still in its early stages, cities aim to greatly accelerate electrification. Several cities have set goals to increase EV uptake. Houston aims for EVs to make up 30% of new vehicles sold in 2030.¹ In Memphis, the city has set a goal of EVs making up 30% of total vehicle travel by 2035.² Seattle and Sacramento have set goals of EV's making up 30% of vehicles owned by 2030, and 35% of total vehicles by 2025, respectively.³ Complete electrification goals include Denver's

1 Evolve Houston, "Electric vehicle roadmap" (2019), <https://www.evolvehouston.org/>

2 City of Memphis, "Memphis Area Climate Action Plan", (2020), https://shelbycountytg.gov/DocumentCenter/View/37431/Memphis-Area-Climate-Action-Plan-2019-FINAL_4_JANUARY-2020

3 Seattle Office of Sustainability & Environment, "2017 Drive Clean Seattle Implementation Strategy" (2017), https://www.seattle.gov/Documents/Departments/Environment/ClimateChange/Drive_Clean_Seattle_2017_Report.pdf; City of Sacramento, "Electric vehicle strategy" (2017), https://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric_Vehicles/EVStrategy_171206_FINAL_DRAFT_CityOfSacramento.pdf

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and Los Angeles' for 100% zero emission vehicles across the entire vehicle stock by 2050 and San Francisco's for 100% of new vehicles by 2030.⁴

Achieving widespread EV adoption requires increased charging infrastructure deployment to improve EV functionality and convenience for EV drivers. Home charging currently provides the majority of EV charging energy demand. It is usually the least expensive charger type to install and charge from. However, moving beyond early adoption to the broader market means providing more charging options for drivers. For example, drivers without home charger access, such as those in apartments or without designated off-street parking, require more conveniently placed charging elsewhere.

To support continued EV growth, charging infrastructure will have to keep growing and evolving to meet city needs. There is a correlation between the uptake of EVs and public charging infrastructure growth in U.S. cities; the markets with the most EVs tend to have the most comprehensive charging infrastructure.⁵ To sustain continued growth in EV adoption, government agencies can proactively plan their infrastructure to match vehicle electrification goals. Although each plan needs to be tailored to the unique local circumstances, there are generally applicable steps. The initial steps include gathering data on EV adoption, baseline infrastructure deployment, and charging behavior to analyze the charging infrastructure required to support their EV plan. The subsequent steps include identifying infrastructure gaps, developing policies to fill the gaps, reevaluating early deployment lessons, and continually examining updated data.⁶

This working paper provides the first such analysis for a U.S. city to quantify its charging needs to support a 100% EV sales goal. The analysis quantifies charging infrastructure needs at the zip code level for San Francisco to meet the city's goal of reaching 100% EV sales by 2030. It estimates the public, workplace, and home charger needs for passenger vehicles from 2020 through 2050 as the fleet continues to turnover to electric after the 100% EV sales phase in. It also considers additional city-level interventions aiming to reduce the personal vehicle travel demand and assesses their impacts on the charging infrastructure needs. In addition, the analysis also estimates, with less granularity, charging infrastructure for growing electric ride-hailing and urban delivery truck fleets.

Analysis

Adapting an approach applied in a previous study,⁷ we assess the public Level 2 charger and direct current (DC) fast charger needs based on San Francisco's goals for EV market growth through 2050. The EV stocks, informed by the EV uptake rate and the vehicle stock-turnover model, are used as a primary input to the analysis. Charging behavior in early EV markets and assumptions regarding increasing average charger utilization are

4 City and County of Denver Department of Environmental Health & Southwest Energy Efficiency Project, "Opportunities for vehicle electrification in the Denver Metro area and across Colorado" (2017), <https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/EV/EVFinalReport.pdf>; Los Angeles Mayor's Office of Sustainability, "L.A.'s Green New Deal" (2019), https://plan.lamayor.org/sites/default/files/pLAN_2019_final.pdf; San Francisco Mayor's electric vehicle working group, "Proposed electric vehicle roadmap for San Francisco" (2019), https://sfenvironment.org/sites/default/files/fliers/files/sfe_tr_ev-roadmap.pdf

5 Peter Slowik and Nic Lutsey, *The surge of electric vehicles in United States cities*, (ICCT: Washington DC, 2019), <https://theicct.org/publications/surge-EVs-US-cities-2019> and Anh Bui, Peter Slowik, & Nic Lutsey, *Update on electric vehicle adoption across U.S. cities*, (ICCT: Washington DC, 2020), <https://theicct.org/publications/ev-update-us-cities-aug2020>

6 Dale Hall and Nic Lutsey, *Electric vehicle charging guide for cities*, (ICCT: Washington DC, 2019), <https://theicct.org/publications/city-EV-charging-guide>

7 Michael Nicholas, Dale Hall, and Nic Lutsey, *Quantifying the electric vehicle charging infrastructure gap across U.S. markets*, (ICCT: Washington DC, 2019), <https://www.theicct.org/publications/charging-gap-US>

primary inputs used to estimate the numbers of home, public, and workplace chargers needed across the city. The following summarizes the key methodological steps, including how city interventions are investigated to quantify their impacts on charging needs.

EV fleet composition

Figure 1 shows the EV adoption trends and EV stock in the city, and the estimated stock by 2050 accounting for fleet turnover and considering the city’s goal of 100% EVs sales by 2030. The projected annual vehicle registration data is based on Department of Motor Vehicle data and trends through 2019.⁸ The city goal reflects a rapid increase in EV share of new vehicles; resulting in the increase of the city’s registered EVs from about 20,000 in 2020, to 180,000 in 2030, to 350,000 in 2040, and to 370,000 in 2050. This trend, based on the underlying vehicle retirement characteristics, results in 39% of the city’s light-duty vehicle stock being electric in 2030, 92%, in 2040, and 96% in 2050. The city’s new EVs include both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs), with a shift from new sales being 75% BEV in 2019 to 100% BEVs in the mid 2030s. This city EV path amounts to a substantial acceleration compared to the fastest path publicly discussed by California state regulators.⁹ The San Francisco metropolitan area is assumed to lag the city EV trend by several years.

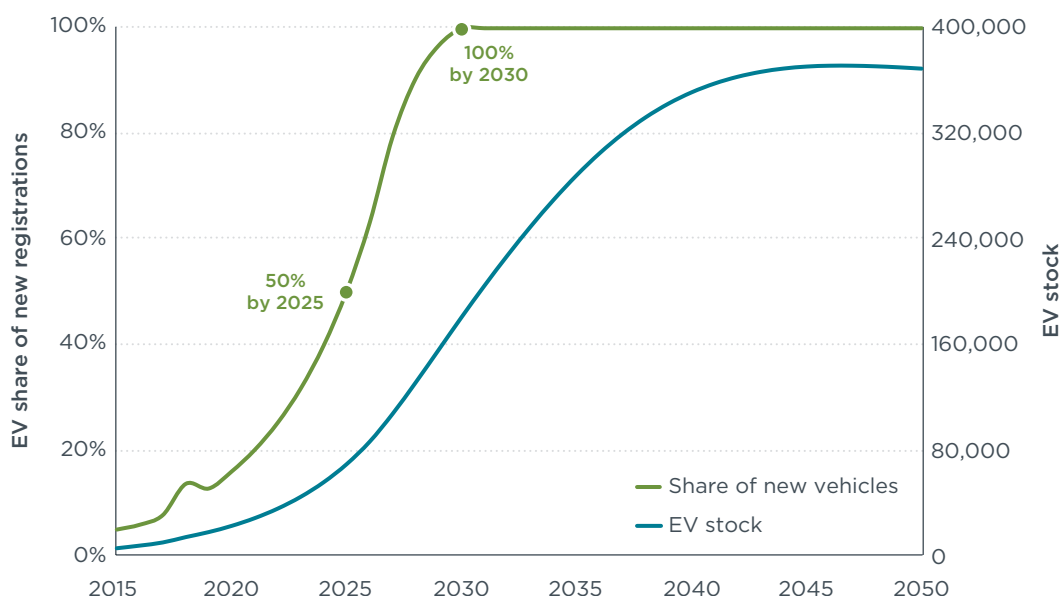


Figure 1. Assumed San Francisco new vehicle EV share and total EV stock from 2015 to 2050.

Several additional assumptions are important in the vehicle stock turnover model, which accounts for new vehicles entering the fleet, and older vehicles retiring. Projections assume a city-wide 1% annual decline in the absolute number of new light-duty vehicle sales, reflecting the recent trend in the data. Although zip code level EV shares differ across San Francisco through 2019, all the zip codes are assumed reach 100% new electric vehicle sales by 2030. Relative differences between vehicle ownership per capita

⁸ California Department of Motor Vehicles, Vehicle fuel type count by zip code (May 28, 2020), <https://data.ca.gov/dataset/vehicle-fuel-type-count-by-zip-code>

⁹ California Air Resources Board, “Advanced Clean Cars II Regulations: Informational Update” (May 28, 2020), <https://ww3.arb.ca.gov/board/books/2020/052820/20-5-3pres.pdf>

by zip code remain identical to 2018 across all years, reflecting general density, housing, and parking patterns across the city.

Additional local inputs are critical in establishing the baseline charging needs by zip code. Local job and population growth were provided by the city, and housing characteristics, and vehicle ownership are from the American Community Survey.¹⁰ These are integrated in future zip code-level trends. The EVs in each zip code have varying reliance on public chargers as determined by their home charger access. The home charger access is informed by the EV owners' housing characteristics (i.e., detached, attached, and apartments) and we assume EVs are universally adopted by new vehicle buyers across different housing types going forward. In the model, this means by 2040, the percentage of new EV owners by housing type ultimately resembles the percentage of the residents by housing type in each zip code.

Charging energy demand

The total energy demand of each type of charger is calculated as the product of the total number of EVs applicable for the given charger type, charging events per vehicle per day based on a California survey,¹¹ and the assumed energy consumption per event.⁵ Public charger energy demand and home charging demand increase with the growth in EVs registered in each zip code. The workplace charging demand increases with the number of commuter EVs going into each zip code, which includes both intra-city commuters and those commuting into the city from outside of the city.

Several additional factors account for commuter patterns. Based on the California survey, 80% of EV drivers in San Francisco are assumed to be vehicle commuters in 2020. The percentage of EV drivers that commute gradually decreases through 2050 and approaches the percentage of all drivers that commute with their vehicles—including both internal combustion engine and electric vehicles—which was approximately 42% in 2017.¹² Approximately 26% of the city's commuters travel to work somewhere outside of the city.¹³ Based on this number and the American Community Survey's data on commute modes, we estimate 5.4%, or approximately 23,000, of the light-duty vehicles in the city commute out of the city for work. From the same sources, 68,000 light-duty vehicles are estimated to commute into San Francisco for work daily. These commuter light-duty vehicles coming into San Francisco represent approximately 15% of the 440,000 vehicles traveling into San Francisco for any purpose daily. Both the intra-city and out-of-city commuters are allocated to the zip codes according to the city's job distribution, including future job projections from the Land Use Allocation data provided by city officials. The intra-city commuter vehicles follow the city EV adoption rate, and the out-of-city commuter EV share lags the city EV share by several years.

Charging events per day varies among drivers with different EV technologies (i.e., plug-in hybrid or full battery electric) and their access to home charging based on their

10 American Community Survey, accessed March, 2020, <https://www.census.gov/programs-surveys/acs>.

11 Gil Tal, Jae Hyun Lee, & Michael Nicholas, *Observed charging rates in California*. (University of California, Davis, CA: 2018). https://itspubs.ucdavis.edu/publication_detail.php?id=2993

12 Calculated using commute mode reported in the 2017 American Community Survey data and the vehicle sales data. The change of the percentage of EV owners that commute with EVs year-to-year is related to the EV adoption rate (i.e., percentage of EVs in the overall LDV fleet). It is calculated by assuming that as EV adoption rate reaches 100%, the EV drivers commute with EV reach 45%—the percentage of current vehicle owners that commute with their vehicles. The percentage of EV owners commuting with EVs each year is interpolated based on the initial year's EV adoption rate.

13 San Francisco Municipal Transportation Agency, "2015 Transportation Fact Sheet", (2015), <https://www.sfmta.com/reports/2015-transportation-fact-sheet>

housing characteristics.⁵ Across the years, charging events per day stays constant and the energy consumption per event increases by 9% in 2050 compared to that in 2020, accounting for an incremental increase of electric crossover and sport utility vehicles in the EV stock over time.

Charging infrastructure: Public, home, and workplace chargers

The public charging infrastructure needs, including public Level 2 and DC fast chargers, are projected by dividing the daily energy demand projections by the daily maximum amount of energy supplied by the chargers. The utilization rate in terms of charging hours per day of public Level 2 chargers linearly increases from three hours a day in 2020 to plateauing at eight hours a day in 2025 and thereafter. The utilization rate of DC fast chargers increases from two hours a day in 2020 to also plateauing at eight hours a day in 2025 and thereafter. There is little evidence that chargers currently meet such high average utilization. Eight hours of utilization is based on idealized charger usage in a dense urban EV market—where a maturing charging infrastructure network has co-evolved with vehicles, moving from basic geographic coverage toward capacity-serving. Higher charging utilization can be facilitated by charging coordination among EV drivers and charging providers, pricing, transparency about which chargers are in-use or available, and synergies with regard to the charging patterns and behavior among private EV drivers and ride-hailing drivers. Lower charger utilization than what is assessed here would require greater infrastructure deployment.

The public Level 2 chargers are assumed to have constant 6.6 kilowatt (kW) power across all years. The average charging power of DC fast chargers are assumed to increase linearly from 50 kW in 2020 to 115 kW in 2035, accounting for improved on-vehicle and charging equipment technologies. This is an advanced and rapidly improving network moving toward faster charging, and power capacity in many cases could be 150 kW or more. Greater charging power would require less charging infrastructure deployment, and vice versa.

Home chargers needed by zip code are estimated from the total number of EVs with owners that have access to home chargers, divided by the average number of vehicles in a vehicle owning household to account for EVs in the same household sharing a single charger. Workplace charger projections are calculated based on the total workplace charging events per day required by the intra-city and out-of-city commuters. Ten percent of all commuters with an EV are estimated to have had access to workplace chargers in 2017 and the percentage grows to 14% in 2050. The total workplace chargers needed is based on each workplace charger supporting 1.5 charging events a day.

City-level interventions

In addition to the central analysis presented above, three city-level interventions are investigated to determine their effect on EV charging infrastructure needs. The three interventions are: 1) a sustainable trip goal (i.e., shifting commutes from personal vehicles to transit and pedestrian modes), 2) congestion pricing (i.e., reduced vehicle travel to a portion of the city with a pricing mechanism), and 3) deploying curbside chargers (i.e., equipping city parking with EV chargers). The three interventions reflect how cities are simultaneously seeking to meet their EV goals while also developing roadmaps for other goals related to mode shift, demand shifting, and parking.

We assume San Francisco's goal of 80% sustainable trips by 2030¹⁴ is achieved by all of the zip codes, with each zip code experiencing a constant annual growth rate from its own 2018 sustainable mode share percentage, as calculated using the American Community Survey. As an example, increasing sustainable trips from 60% to 70% leads to a reduction in vehicle trips from 40% to 30% of all trips, resulting in a 25% overall reduction in vehicle trips. That reduction in vehicle trips is assumed to be uniform across the entire vehicle fleet, meaning the EV charging demand is reduced by the same magnitude. The charger projection reduction, as a result of the sustainable trip increase, is calculated as the daily EV charging energy consumption reduction in kilowatt-hours (kWh) divided by the daily maximum energy the chargers can provide in each year. For home chargers, the charging energy demand reduction is also included, but the home charger units are not reduced as EV owners are assumed to still install home chargers when possible, regardless of the reduction in vehicle trips.

For congestion pricing, we assess a hypothetical congestion pricing scheme starting in 2030 that introduces a price on trips entering the downtown core in northeast San Francisco.¹⁵ Although the pricing scheme details are not further specified, it is assumed to reduce the traffic in the congestion-priced zone by 15%, based on the goals and metrics identified in San Francisco County Transportation Authority's Congestion Pricing Study.¹⁶ Like the sustainable trips, congestion pricing also impacts the EV charging demand and subsequently the EV charger projection. For the non-commuter trips originating from each zip code, only the portion of trips going into the congestion-priced zones are reduced by 15%. The portion of the trips going into these zones is determined based on the traffic movement between the zip codes. In lieu of more detailed travel pattern data, traffic movement based on the distribution of the city's jobs in each zip code are used as a proxy. All commuter trips going into the applicable congestion priced zip codes is reduced by 15%.

Curbside chargers are treated as a city intervention because their deployment requires policy and coordination among agencies. The assessment of curbside chargers assumes that 10% of all on-street parking spaces near apartment buildings are fitted with curbside chargers by 2050. By doing this, we consider these curbside chargers as mainly serving residential charging demand. The annual number of parking spaces with curbside chargers installed increases at the same rate as the EV stock share; reaching 1.5%, or 300 chargers, by 2025 and 4.1%, or 800 chargers, by 2030. The number of parking spaces near the apartment buildings is determined based on the parking inventory data,¹⁷ land use data,¹⁸ and American Community Survey data.¹⁹ The daily usage of each curbside charger is assumed to increase from once per day in 2020 to

14 San Francisco Municipal Transportation Agency, "San Francisco Transportation Sector Climate Action Strategy," 2017, https://www.sfmta.com/sites/default/files/reports-and-documents/2017/12/cap_draft_full_doc-accessible-1.01.pdf

15 In the following ZIP codes: 94102, 94103, 94104, 94105, 94107, 94108, 94109, 94111, and 94133, corresponding to the neighborhoods of Civic Center / Hayes, South of Market, Financial District, East Cut / Rincon Hill, South Park / Potrero / Dog Patch, Chinatown / Nob Hill, Polk Gulch / Russian Hill, Embarcadero / Financial District, and North Beach, respectively

16 San Francisco County Transportation Authority, "San Francisco Downtown Congestion Pricing Study Goals and Evaluation Metrics, (2020)," https://www.sfgta.org/sites/default/files/2020-05/Downtown-Congestion-Pricing_FINAL-Goals-and-Evaluation-Metrics_2020-05-28.pdf

17 On-street parking based on parking census, updated August 24, 2020, <https://data.sfgov.org/Transportation/On-street-Parking-based-on-Parking-Census/9ivs-nf5y>

18 Land Use (updated September 6, 2019), <https://data.sfgov.org/Housing-and-Buildings/Land-Use/us3s-fp9q>

19 The average units in each housing type (i.e., detached, attached, and apartments) are from the land use data, which has the zoning type (e.g., residential, commercial) and residential unit counts by parcel. Using the average units in each housing type, the amount of detached, attached, and apartment buildings in each zip code are estimated from the total residential units. Then parking spaces are allocated to each building type according to the percentages of each type of the building in each zip code.

twice daily in 2050. Curbside charging events provide 13.5 kWh for BEVs and 7 kWh for PHEVs initially and increase incrementally over time. This curbside energy consumption represents a case where the curbside chargers are used like home chargers but shared among drivers without home charger access, leading to a higher energy per event compared to home chargers. Energy demand supplied by curbside chargers is assessed to offset the demand on public chargers.

Ride-hailing and urban delivery trucks

In addition to private passenger vehicle charging, the infrastructure needed to support electric ride-hailing vehicles and the delivery truck fleets in the city is also estimated. Truck and ride-hailing infrastructure needs are adapted from previous ICCT work and briefly summarized here.²⁰

For the ride-hailing charging infrastructure analysis, we estimate the BEV ride-hailing fleet and the charging demand for the San Francisco metropolitan area and assess the additional chargers needed. In 2018 there were 600,000 ride-hailing vehicles in California.²¹ With an assumed constant annual growth rate of 2%, we estimate 74,000 ride-hailing vehicles in San Francisco metropolitan area in 2020. The percentage of BEVs in the ride-hailing fleet is higher than the San Francisco Metropolitan area BEV stock percentage, representing a more aggressive electrification of the ride-hailing fleet. The energy demand of the fleet is calculated based on the EV miles to be supplied by DC fast chargers as determined by the driver types. These numbers are adapted from ICCT's electric ride-hailing fleet charging infrastructure report,²² as shown in Table 1, and we assume the BEV efficiency of 3.73 miles per kWh with 0.5% annual efficiency improvement to 2050. We note that the exact composition of the ride-hailing fleet and breakdown of driver types in the future is highly uncertain given emerging labor policies in California in 2020.²³

Table 1. Ride-hailing driver type distribution and daily miles to be supplied by DC fast charger.

Driver type	Driver breakdown	Average daily miles supplied by DC fast chargers	Percentage of daily miles supplied by DC fast chargers
Part-time with home charging	41%	3	20%
Part-time without home charging	53%	14	100%
Full-time with home charging	3%	32	29%
Full-time without home charging	3%	121	100%

We develop a scenario where the majority of the ride-hailing DC fast charging demand is supplied within the city. As a frequent origin and destination for ride-hailing trips and

20 Michael Nicholas, Peter Slowik, & Nic Lutsey, *Charging infrastructure requirements to support electric ride-hailing in U.S. cities* (ICCT: Washington DC, 2020), <https://theicct.org/publications/charging-infrastructure-electric-ride-hailing-us-032020> and Dale Hall & Nic Lutsey, *Estimating the infrastructure needs and costs for the launch of zero-emission trucks*, (ICCT: Washington DC, 2019), <https://theicct.org/publications/zero-emission-truck-infrastructure>

21 California Air Resources Board, "SB 1014 Clean Miles Standard 2018 Base-year Emissions Inventory Report," (2019), <https://ww2.arb.ca.gov/resources/documents/2018-base-year-emissions-inventory-report>

22 Michael Nicholas, Peter Slowik, & Nic Lutsey, *Charging infrastructure requirements to support electric ride-hailing in U.S. cities* (ICCT: Washington DC, 2020), <https://theicct.org/publications/charging-infrastructure-electric-ride-hailing-us-032020>

23 See for example California Assembly Bill AB-5 of 2019, AB-5 worker status: employees and independent contractors, https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB5, and California General Election November 3, 2020 Proposition 22, Exempts app-based transportation and delivery companies from providing employee benefits to certain drivers, <https://voterguide.sos.ca.gov/propositions/22/>

a key potential charging hub, 10% of the total energy demand of the ride-hailing BEV fleet is at San Francisco international airport (SFO). Of the remaining charging demand, 70% is assumed to occur in San Francisco city and 30% occurs in the San Francisco metropolitan area. Shifting to relatively greater charging demand outside of San Francisco city would require fewer DC fast chargers within the city, and vice versa. The DC fast chargers projected in the central case for the city's LDV fleet are assumed to support about 45 minutes of ride-hailing BEV charging a day, in addition to the private passenger EVs charging of about eight hours a day in 2025. The additional charging time is converted to energy transferred based on the average charge rate of the given year. The remaining BEV charging demand unfulfilled by the public DC fast chargers already projected for the city is then supplied by additional ride-hailing-dedicated DC fast chargers. We also assume the DC fast chargers at SFO are used by ride-hailing BEVs exclusively.

For the delivery truck fleet, we estimate the growing annual portion of the trucks that are electric and the associated depot and ultra-fast chargers needs using the ratio from ICCT's zero-emission truck charging infrastructure report.²⁴ In 2016, there were an estimated 3,700 Class 6 trucks in San Francisco.²⁵ We assume the truck fleet grows 1% a year and the percentage of fully electric trucks in the fleets follows the city's EV stock percentage. Different truck deployment stages have different charger-to-truck ratios. The ratios are based on the findings in ICCT's zero-emission truck charging infrastructure report, as shown in Table 2. We assume the city's electric truck deployment stages with the following timeline: initial deployment from 2016 to 2025, mid-term deployment from 2026 to 2035, and long-term deployment from 2036 to 2050. Finally, we project the delivery truck charging demand based on assumptions regarding the battery capacity, the truck energy efficiency, the route distances, and the charging pattern.²⁶ All the energy charged overnight at the depot is categorized as depot energy consumption and all the remaining energy need is categorized as ultra-fast charger energy consumption.

Table 2. Charging infrastructure needed for electric truck fleet at different deployment stages.

	Initial deployment	Mid-term deployment	Long-term deployment
Timeframe	Until 2025	2026 - 2035	After 2035
Depot chargers per truck (350 kW)	1	0.67	0.5
Ultra-fast chargers per truck (50kW)	0.14	0.04	0.02

Results

The charging needs analysis results are summarized and presented in several different ways. Charging needs are first summarized on a citywide level to convey the scale of increasing infrastructure needs, followed by zip code-level results to illustrate the variation between zip codes. The charging energy requirements are summarized to show the underlying electricity demand that the city, charging providers, and utilities can

²⁴ Dale Hall & Nic Lutsey, *Estimating the infrastructure needs and costs for the launch of zero-emission trucks*, (ICCT: Washington DC, 2019), <https://theicct.org/publications/zero-emission-truck-infrastructure>

²⁵ Emissions Inventory (EMFAC), accessed May 4, 2020, <https://arb.ca.gov/emfac/emissions-inventory>

²⁶ Assumptions used to calculate the delivery truck charging energy demand are 1) 300 kWh of electric truck battery capacity and 80% of that is usable 2) electric truck efficiency was 1.4 kWh per mile with an empty cargo and 1.46 kWh per mile when carrying a full cargo in 2016, 3) truck efficiency increase by 0.5% annually, 4) the truck fleet is divided equally into three groups with one-way route distances of 15, 30, and 50 miles performing 6, 4.4, and 3.7 trips a day (based on a continuous 12 hour workday), respectively, and 5) all electric trucks receive full charge overnight.

expect for a city electrification plan. In each case, the results are shown for the central case as well as the intervention case where additional goals are met that could greatly reduce charging needs.

Charging infrastructure needs

Citywide, the public charging infrastructure needed in the central case is directly related to the amount of EVs in the LDV fleet. Meeting the goal of 100% EV sales shares by 2030 will require a significant deployment of home, workplace, and public charging infrastructure. Table 3 summarizes the overall public and workplace charging infrastructure needs in San Francisco for 2025 and 2030, including comparisons to chargers installed through 2019. By the end of 2019, San Francisco had installed about 41% of the public and workplace charging infrastructure it needs in 2025. To meet its electric vehicle goals, San Francisco public chargers would need to increase from about 800 in 2019, to 2,000 by 2025, and to over 5,100 by 2030. This means 6.1 times more charging is needed by 2030 from what was installed by the end of 2019; or an 18% annual growth rate. For context, the annual growth rate of public chargers in San Francisco was about 20% from 2015 through 2019. The charging needs are greatly reduced in the intervention case. If the city interventions are implemented, chargers needed by 2030 are reduced by 40% and annual public-access charger growth rate is reduced from 18% to 12%.

Table 3. San Francisco public and workplace charging infrastructure deployment needed to reach 100% of new electric vehicles by 2030.

	Year	Central case	Intervention case
Total public access chargers (public, workplace, fast)	2019 ^a	834	834
	2025	2,013	1,612
	2030	5,129	2,900
Electric vehicle stock	2019 ^b	17,000	17,000
	2025	68,605	68,605
	2030	178,421	178,421
Projected future charging compared to 2019	2025	2.4	1.9
	2030	6.1	3.5
2019 as percentage of future chargers needed	2025	41%	52%
	2030	16%	29%
Annual increase in chargers from 2019 to meet 2025 and 2030 needs	2025	16%	12%
	2030	18%	12%

^a 2019 Charger data include public and fast chargers, but exclude workplace chargers due to lack of data

^b 2019 Electric vehicles estimated from California Department of Motor Vehicles data

Charging infrastructure need projections for San Francisco from 2025 to 2050 are shown in Table 4. Home chargers represent the vast majority, approximately 90%, of all charging infrastructure by count in San Francisco. It also is the charger type accounting for the highest total energy demand in the city, as we will discuss in the next section. Home chargers grow from about 32,000 in 2025, to about 80,000 in 2030, and to over 150,000 by 2050. Workplace chargers are the second most abundant charger type. Depending on its development, it has the potential to account for an even larger portion of the total EV charger count and charging demand. In the analysis, we assume only 10% to 14% of the EV commuters have access to workplace chargers.

Table 4. Estimated charging infrastructure needed in San Francisco in 2025 through 2050.

Year	Central case				Intervention case				
	Public Level 2	DC fast ^a	Workplace	Home	Public Level 2	DC fast ^a	Workplace	Home	Curbside
2025	480	147	1,387	31,973	273	84	954	31,973	301
2030	1,412	348	3,369	79,961	435	110	1,557	79,961	798
2040	3,481	680	6,212	147,588	1,099	220	3,239	147,588	1,687
2050	4,104	805	7,107	151,280	1,299	261	3,939	151,280	1,945

^a Does not include DC fast chargers dedicated for ride-hailing

For public charging, we find that by 2030, approximately 1,400 public Level 2 and 350 DC fast chargers are needed. By 2040, public charging infrastructure needs increase to 3,500 public Level 2 and 680 DC fast chargers and grow to 4,100 public Level 2 and 810 DC fast chargers by 2050. As of 2019, there were about 600 public Level 2 and 28 DC fast chargers in San Francisco. To achieve the projected public charging infrastructure size, the public Level 2 network would need to increase by more than two-fold in 10 years and almost six-fold in 20 years. The number of DC fast chargers, although smaller compared to public Level 2 chargers, requires a more than twelve-fold increase by 2030. As also shown in Table 4 and further assessed below, actions to reduce personal vehicle use in the intervention case greatly reduce the need for charging infrastructure.

Several factors can influence how many future chargers are needed. With all three interventions (i.e., sustainable trips, congestion pricing, and curbside charging), the number of public chargers (Level 2 and DC fast chargers) in the intervention case is reduced by about 70% starting 2030 compared to the central case. Table 5 shows the impact of each intervention on each charger type. We find that, out of the three policies, the sustainable trip goal has the most substantial impact on infrastructure projections. Sustainable trip increases lead to a direct decrease in vehicle trips in all zip codes—an approximately 60% decrease in public charging infrastructure projections and 50% decrease in workplace charger projections in 2030. Congestion pricing leads to a 9% reduction in public chargers and workplace chargers starting 2030. And lastly, installing curbside chargers and shifting public charging demand to the curbside chargers can lead to on average 7% reduction in public chargers.

Table 5. Intervention impacts on charger projections from 2025 to 2050.

	Charger type	2025	2030	2040	2050
Sustainable trips	Public Level 2	-174	-833	-2,050	-2,415
	DC fast	-52	-200	-391	-436
	Workplace	-433	-1,673	-2,707	-5,092
Congestion pricing^a	Public Level 2	0	-134	-329	-387
	DC fast	0	-33	-64	-76
	Workplace	0	-320	-586	-668
Curbside chargers	Public Level 2	-33	-89	-198	-231
	DC fast	-11	-24	-42	-49

^a Congestion pricing intervention impact shown here is independent of the sustainable trip goal. When both the sustainable trip goal and congestion pricing are enacted, the congestion pricing further impacts the sustainable trip reduced vehicle travel demand.

At the zip code level, those with more EVs are generally projected to have more public chargers needed. Figure 2 illustrates the projected EV stock and the numbers of public Level 2 and DC fast chargers in each zip code in 2030. The zip codes in the darker green have higher electric vehicle stocks, and vice versa. Public Level 2 and DC fast chargers are shown respectively by the orange and blue numbers within the circles with varying sizes. The size of the circles represents the relative size of the public charger projection in each zip code. Across the years, the differences in the projections between zip codes are similar in scale.

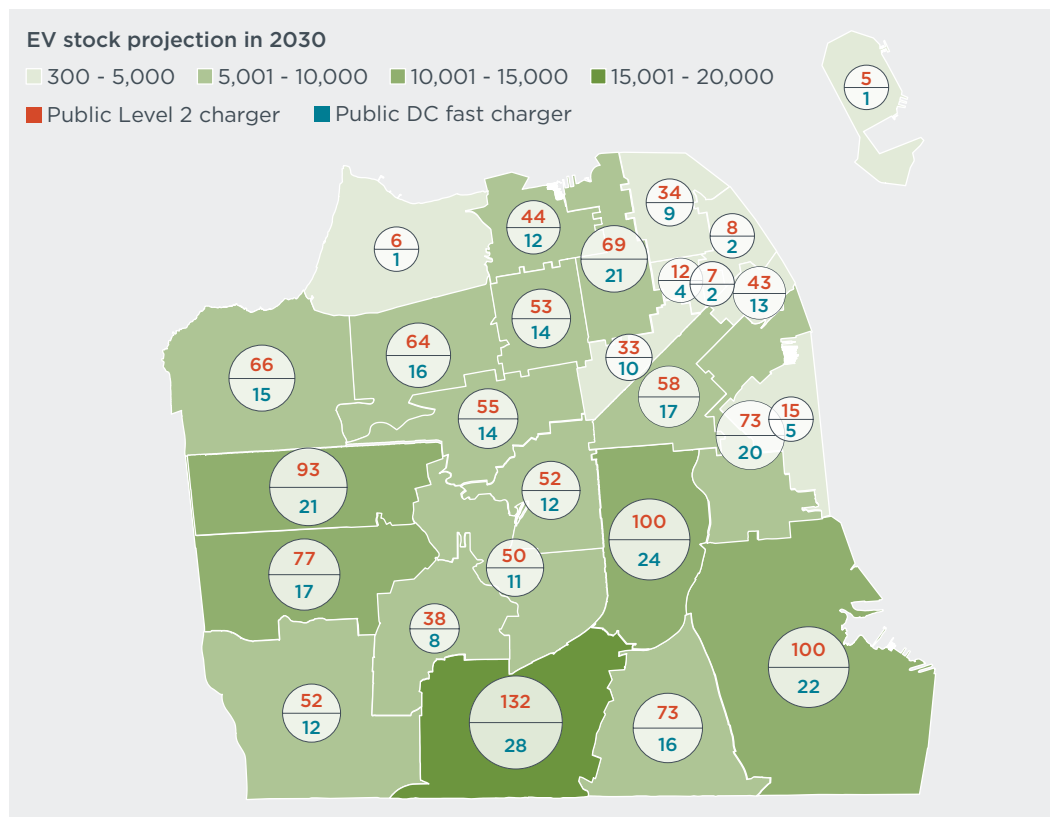


Figure 2. Public Level 2 (orange numbers) and DC fast (blue numbers) chargers needed in 2030.

Since EV stock by zip code is a primary input to the charger projection, the downtown core (northeast San Francisco), with fewer EVs, is projected to need fewer public chargers. Although the result indicates that these zip codes have lower public charging infrastructure needs compared to the zip codes with more EVs in the southern and eastern parts of the city, additional factors are noted. First, the downtown core has the highest workplace charger need, as we will discuss below, and the workplace chargers here are typically located in parking garages. This means these workplace chargers can serve other drivers, especially on weekends and during the nighttime, but this prospect is not investigated further in the analysis. Second, downtown San Francisco's space constraints may make typical public charging stations on lots less feasible. Therefore, commercial curbside chargers and chargers in garages may play an important role here.

Cities need a mix of public Level 2 and DC fast charging infrastructure to satisfy a diverse range of electric vehicle driver travel patterns, charging behavior, and price sensitivities. The ratios of the public Level 2 chargers to DC fast chargers across zip codes in a given year reflect the different charging needs of EV owners based on

their unique characteristics, such as housing type, availability of home charging, and commuting behavior. For example, EV drivers in a zip code with a higher portion of apartment units—leading to less home charging availability—would have a higher reliance on DC fast chargers versus Level 2 chargers compared to EV drivers in a zip code with more home charging available.

The projections of workplace chargers also follow a similar pattern between the zip codes across the different years as they are dependent on the distribution of the city’s jobs in the zip codes based on our method. Figure 3 shows the workplace charger projections in 2030, 2040, and 2050 in each zip code. The blue and red points represent workplace charging needs in the central and intervention cases, respectively. The job growth in each zip code is factored in, but since the scale of growth is small, it did not alter the relative differences between the zip codes significantly. Overall, zip codes with higher percentages of the city’s jobs are projected to have higher workplace charger needs. The three zip codes in the order of the highest workplace chargers needs in 2030 are 94105 (East Cut-Rincon Hill), 94103 (SoMa), and 94107 (South Park-Potrero Hill).



Figure 3. Workplace charger needs in 2030, 2040, and 2050.

EV charging energy demand

The total citywide daily EV charging, as measured in gigawatt-hours (GWh) of energy demand, is significant. We estimate 0.4, 1.1, 2.2, and 2.5 GWh are needed daily by 2025, 2030, 2040, and 2050 for EV charging. For reference, the daily total electricity

consumption of San Francisco was around 15.4 GWh in 2018.²⁷ Table 6 shows the energy consumption by charger types in the central and intervention cases from 2025 to 2050. Home chargers consistently have the highest total energy consumption, followed by DC fast chargers, workplace chargers, and public Level 2 chargers. Home chargers account for more than half of the total EV charging energy demand in both the central and intervention cases. Starting in 2030, we find that the total energy demand under the intervention case (i.e., by achieving sustainable trips and implementing congestion pricing) is less than half of the energy demand in the central case due to the reduced EV travel demand.

Table 6. Projected daily EV charging energy demand (MWh) from 2025 to 2050.

	Year	Public Level 2	DCFC ^a	Workplace	Home	Curbside ^b	Total
Central case	2025	25	84	29	252	0	391
	2030	75	260	75	649	0	1,058
	2040	183	626	147	1,258	0	2,215
	2050	217	741	179	1,369	0	2,506
Intervention case	2025	14	48	21	156	8	247
	2030	23	82	35	223	22	385
	2040	58	202	77	431	49	818
	2050	69	240	100	469	57	936
Percentage Change from central to intervention	2025	-44%	-43%	-28%	-38%	NA	-37%
	2030	-69%	-68%	-53%	-66%	NA	-64%
	2040	-68%	-68%	-48%	-66%	NA	-63%
	2050	-68%	-68%	-44%	-66%	NA	-63%

^a Does not include DC fast charging demand of the ride-hailing fleet.

^b NA = not applicable, as curbside charging was not analyzed in the central case

Most zip codes are similar to the citywide result in terms of proportional patterns of the charging demand supplied by each type of chargers. For most zip codes, home charging (both Level 1 and Level 2) accounts for the largest portion, more than half in most cases, of the energy consumption. The colored segments in Figure 4 show the central case charging energy demand of each type of chargers by zip code in 2030, 2040, and 2050. The black dot represents the intervention case total charging energy demand. For zip codes with predominantly apartments, home charging accounts for less than half of the overall charging demand. Figure 4 shows the top three zip codes with the highest percentage of apartments all have very small home charging energy demand: 94104 (Financial District), 94158 (Mission Bay), and 94105 (East Cut and Rincon Hill) with 100%, 98%, and 97% apartments, respectively. Lastly, the top three zip codes with the most projected EVs, 94112 (Ingleside, Excelsior, and Balboa), 94124 (Bay View and Hunters Point), and 94110 (Mission and Bernal), have three largest EV charging demand across all years.

²⁷ California Energy Commission, Electricity Consumption by County, accessed May 4, 2020, <https://ecdms.energy.ca.gov/elecbycounty.aspx>

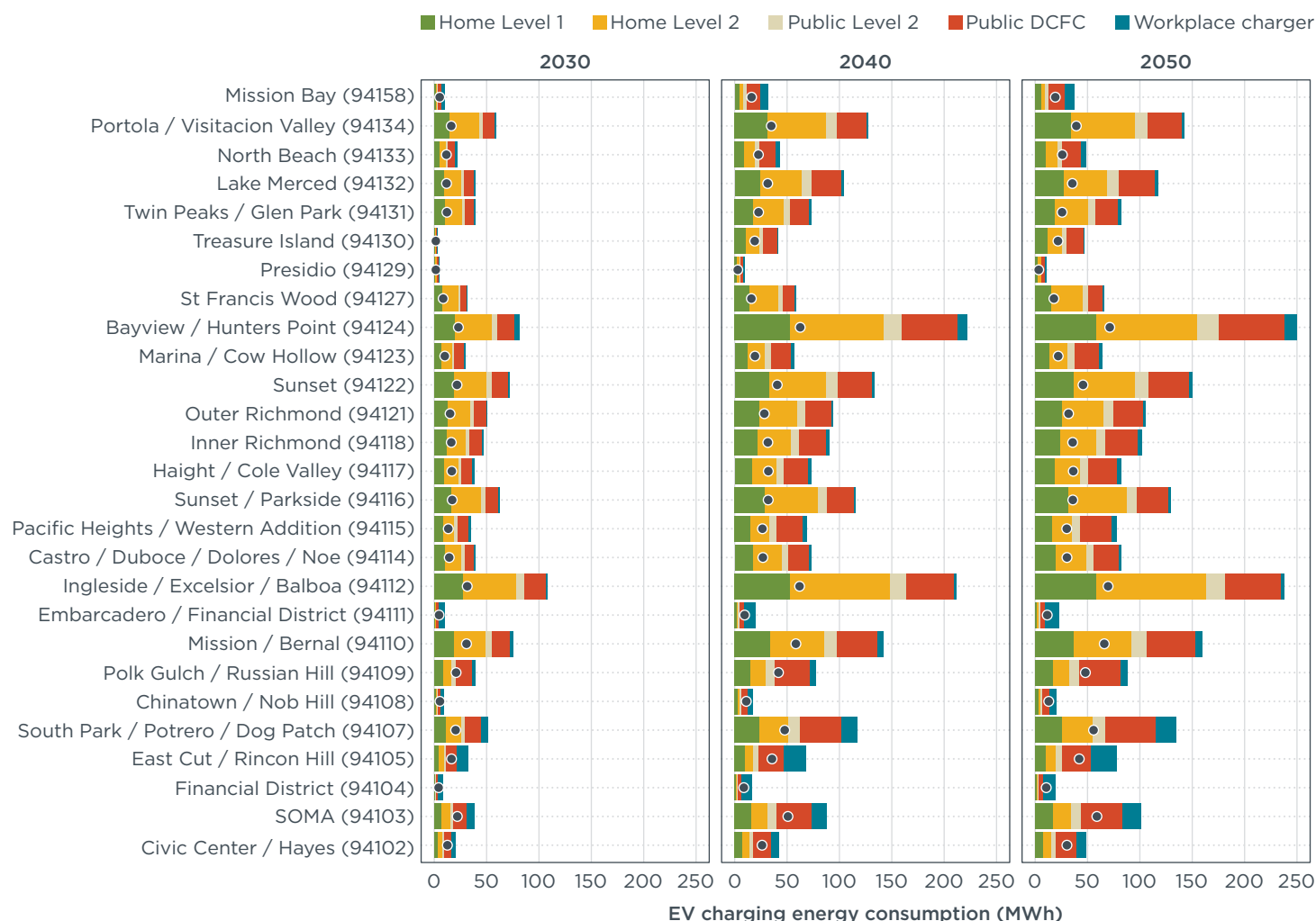


Figure 4. EV charging energy consumption in 2030, 2040, and 2050 for zip codes in San Francisco. The black dots show the reduced total energy consumption in the intervention case.

The proportion of the total charging demand by each charger type largely depends of the inputs regarding energy consumption per event and charging events per day. These inputs are derived from the observed behavior among the early EV adopters across California. In the early market, public charging infrastructure is not yet fully developed. In addition, early EV adopters statewide have on average different housing characteristics and travel behaviors comparing to urban EV drivers, like those in San Francisco. Since early adopters tend to live in single unit detached houses and are operating EVs with a less comprehensive public charging network, we suspect the early adopters' charging behavior can potentially be skewed toward more home charging.²⁸

Ride-hailing and medium-duty vehicles

We conduct more limited analyses on the supporting infrastructure needed for ride-hailing fleet and urban delivery electric truck fleet at the city level. Although fleet-level specific operating behavior and operators' decisions can dramatically influence the

28 Clean Vehicle Rebate Project, EV Consumer Survey Dashboard, <https://cleanvehiclerebate.org/eng/survey-dashboard/ev>

infrastructure layout, we make aggregate estimates for charging needs with assumptions based on two recent ICCT technical analyses.²⁹

Ride-hailing charging infrastructure needs are projected based on an aggressive transition where BEVs reaches 80% of the ride-hailing fleet by 2030 and 100% by 2040, and the fleet size grows by 2% annually. Table 7 shows the daily energy demand and the charging infrastructure needed to support the electric ride-hailing fleet from 2030 to 2050. Based on these assumptions, the estimated daily electricity consumption of the ride-hailing BEV fleet in the city and SFO reaches 179 MWh, 265 MWh, and 308 MWh in 2030, 2040, and 2050, respectively. Depending on the year, this is equivalent to approximately 12% to 17% of the light-duty vehicle EV energy demand citywide. The amount of additional *dedicated* DC fast chargers needed in the city and SFO are about 192, 207, and 238 by 2030, 2040, and 2050; equal to around 55%, 30%, and 30% of the projected DC fast chargers for the LDVs in the city in the central case by 2030, 2040, and 2050, respectively.

Table 7. San Francisco metropolitan area ride-hailing BEV charger needs in 2030, 2040, and 2050.

Year	Number of electric ride-hailing vehicles	BEV share of ride-hailing fleet	Daily energy demand (MWh)	Additional dedicated DC fast chargers needed ^a	Dedicated DC fast chargers at SFO
2030	74,500	80%	179	162	30
2040	115,500	100%	265	171	36
2050	141,000	100%	308	196	42

^a As shown Table 4 above there are 348, 680, and 805 DC fast chargers in the central case by 2030, 2040, and 2050, respectively, before considering electric ride-hailing vehicles

We assumed that there is a minimal capacity for ride-hail drivers to charge on non-dedicated ride-hail chargers of 45 minutes per charger per day. This is because our primary infrastructure analysis above already assumed relatively high utilization of DC fast chargers by the general public of 8 hours per day starting in 2025. Achieving additional capacity would require the coordination between the general public and the ride-hailing fleet, e.g., by having accurate and real-time information on chargers in operation, in use, and queuing.

Many ride-hailing drivers make trips to and from SFO and often wait for trips at the nearby cellphone waiting lot, thus we identified this area as a potential key hub for ride-hailing DC fast charging. Having DC fast chargers at SFO offsets the additional charger needs in the city. This analysis did not evaluate specific areas within the city for dedicated ride-hailing DC fast charger deployment. One option is charging hubs at selected transit stations which could facilitate ride-hailing while complementing transit by providing first and last-mile trips that are electric and shared.

We also assess the charging infrastructure needed to support a fleet of electric delivery trucks in San Francisco. We analyze a total fleet of about 3,800 trucks in 2020 that grows by 1% a year. Table 8 shows the energy demand and the charging infrastructure needed from 2030 to 2050. The electric truck fleet consumes a significant amount of energy—amounting to approximately half of the energy demand of all light duty EVs on the city’s road in the central case across all years. The significant energy consumption

29 Peter Slowik, Sandra Wappelhorst, and Nic Lutsey, *How can taxes and fees on ride-hailing fleets steer them to electrify?*, (ICCT: Washington DC, 2019), <https://theicct.org/publications/taxes-and-fees-electrify-ridehailing> and Dale Hall and Nic Lutsey, *Estimating the infrastructure needs and costs for the launch of zero-emission trucks*, (ICCT: Washington DC, 2019), <https://theicct.org/publications/zero-emission-truck-infrastructure>

is due to the high energy demand per electric truck. Electric delivery trucks have an energy efficiency about five times lower than passenger BEVs and have longer average daily travel distances. The two factors combined leads to an electric truck daily energy consumption more than 30 times higher compared to a passenger BEV.

Charging infrastructure for the electric truck fleets likely will not be shared by the general public, especially the depot chargers. However, the ultra-fast on-route chargers and the electrical equipment upstream from chargers may be shared with other heavy-duty EVs, including the city's electric buses. The city could investigate the feasibility of developing an ultra-fast charging network in partnership with private fleet owners to share the cost of charging infrastructure.

Table 8. Charging infrastructure needs for electrifying urban delivery trucks.

Year	Total electric trucks	Electric truck share	Energy demand (MWh)	Depot chargers	Ultra-fast chargers
2030	1,650	39%	531	1,101	83
2040	3,853	83%	1,070	1,926	121
2050	4,906	96%	1,240	2,453	121

Conclusions

This working paper demonstrates the steps cities can take to utilize local data to estimate charging infrastructure needs to plan for the transition to electric mobility. The research analyzes questions that are highly relevant across many leading local EV markets in the United States and beyond, namely, quantifying the number, type, and distribution of chargers needed to support rapid uptake in cities. The EV charging analysis presents the case of San Francisco based on data inputs for EV growth, vehicle ownership patterns, commuting and housing patterns, EV charging behavior, and home charging access, among others.

The pace and scale of EV and charging infrastructure growth assessed here for San Francisco would be an unprecedented. Several major cities have surpassed 20% electric share of their passenger vehicle sales.³⁰ Providing infrastructure for the EV transition presents uncertainties related to charging equipment and reasonable limits on the utilization of chargers to serve drivers and reduce the number of chargers needed. A key principle for infrastructure planning is to opportunistically take advantage where of EVs are parked most often, as done in this idealized analysis of maturing market with co-evolution of EV charging behavior and infrastructure. Improved EV charger coordination, pricing, and transparency are likely necessary to serve drivers and charging providers. The work leads us to the following conclusions and potential policy implications that could be explored further.

City electric vehicle goals require substantial charging infrastructure deployment.

For San Francisco, achieving the 100% EV sales goal in 2030 means that more than 170 thousand EVs could be on the city's roads that year. Much more charging infrastructure is needed to support these EVs. Publicly accessible charging (i.e., public Level 2, DC fast, and workplace chargers) in San Francisco would need to increase from approximately 800 in 2019, to 2,000 by 2025, and over 5,000 by 2030. This means six times more charging is needed by 2030 from what was installed by the end of 2019. Cities with

³⁰ Dale Hall, Hongyang Cui, Marie Rajon Bernard, Shuyang Li, Nic Lutsey, *Electric vehicle capitals: Cities aim for all-electric mobility*, (ICCT: Washington, D.C., 2020), <https://theicct.org/publications/ev-capitals-of-the-world-2020>

similar electric vehicle adoption goals likely require similar expansion in the availability of public charging infrastructure.

Access to home charging remains a key pillar in the infrastructure ecosystem. While public and workplace charging options are needed to support mass market adoption, the vast majority of EV charging will continue to be at home if 2020 charging patterns persist. Widespread access to overnight home charging, including at homes, multi-unit dwellings, residential curbsides, and other near-home locations, are key to minimizing public charging demand. This analysis finds that over 90% of the total chargers needed across San Francisco in 2030 are home chargers, and home chargers supply over half of the total EV charging demand. This is important as home chargers are typically the least expensive charger type to install and charge from, and lower-power overnight charging can reduce overall grid upgrade costs and provide demand management flexibility.

Achieving city electric vehicle goals and the associated charging infrastructure will require supporting policy. San Francisco will need to see the deployment of charging continue to increase at about 18% per year through 2030. This is approximately in line with charging infrastructure growth rates from the past several years. Increasingly stronger city policies like EV-ready building codes, streamlined permitting, prioritized zoning, and preferential EV parking can continue to encourage private infrastructure investment and lay the groundwork for widespread EV adoption and infrastructure deployment.³¹ Continued public-private collaboration between city agencies, utilities, and charging providers will be essential. Such collaboration is important to identify and address areas that need charging more quickly, and conversely, areas that are less urgent, depending on EV demand and grid considerations associated with charging behavior, power demand dynamics, and timing for grid upgrades.

Implementing cross-cutting city policies to reduce personal vehicle use can be especially important for cities to reduce charging infrastructure needs. The analysis reveals how public EV charging infrastructure needs by 2030 are reduced by 45%, from approximately 5,100 to 2,900 chargers, and annual 2019-2030 public charger growth rate is reduced from 18% to 12%, if the city interventions are implemented. Shifting mobility from private vehicle trips to sustainable modes of transport like transit, reducing trips into the city core through congestion pricing, and equipping curbside parking with EV charging substantially reduce the need for public and workplace chargers. Doing so would require continued collaboration across city agencies to simultaneously support multiple city goals.

As EV adoption and charger deployment goals are implemented, cities can reexamine and adapt to underlying trends, local factors, and limitations. Deeper investigation into the local energy loads, grid capacity, and site viability could inform utility and charging provider plans. City infrastructure planning would ideally update their charging infrastructure modeling using the latest data, incorporating local community feedback, and identifying additional policy support where warranted. Trends related to EV deployment, transit, and special local policies like San Francisco's Slow Streets program through the pandemic recovery present further uncertainties for cities to track. Beyond incorporating universal EV uptake and increased transit and pedestrian trips as done here, more comprehensive assessment of how cities can simultaneously achieve equity and climate goals in their transportation policies is warranted. San Francisco's in-development plans to accomplish such wide-ranging mobility goals offer an important and exemplary first step.

³¹ Dale Hall and Nic Lutsey, *Charging infrastructure in cities: Metrics for evaluating future needs*, (ICCT: Washington, D.C., 2020), https://theicct.org/publications/EV_charging_metrics_aug2020

Appendix

Table A1 shows zip code-level charging needs in 2030 based on the analysis above.

Home charger projections are identical between central and intervention cases.

Table A1. San Francisco charger needs in 2030 for central and intervention cases

Zip code	Neighborhood name	Home Level 1	Home Level 2	Central case			Intervention case			
				Public Level 2	DCFC	Workplace	Public Level 2	DCFC	Workplace	Curbside
94102	Civic Center / Hayes Valley	669	527	33	10	180	16	5	78	55
94103	SOMA	1,295	1,135	58	17	344	29	8	150	59
94104	Financial District	117	70	7	2	230	4	1	100	1
94105	East Cut / Rincon Hill	846	662	43	13	487	23	7	213	7
94107	South Park / Potrero / Dog Patch	1,785	1,995	73	20	287	25	7	129	33
94108	Chinatown / Nob Hill	244	190	12	4	122	5	2	53	32
94109	Polk Gulch / Russian Hill	1,487	1,242	69	21	124	24	7	54	130
94110	Mission / Bernal	2,715	3,706	100	24	131	34	8	66	52
94111	Embarcadero / Financial District	191	161	8	2	266	3	1	117	5
94112	Ingleside / Excelsior / Balboa	3,201	5,011	132	28	61	37	8	31	6
94114	Castro / Duboce / Dolores / Noe	1,510	2,070	52	12	49	15	4	24	32
94115	Pacific Heights / Western Addition	1,313	1,505	53	14	91	13	3	46	68
94116	Sunset / Parkside	1,912	2,911	77	17	41	20	4	20	8
94117	Haight / Cole Valley	1,445	1,745	55	14	79	15	4	40	74
94118	Inner Richmond	1,723	2,225	64	16	76	17	4	38	40
94121	Outer Richmond	1,800	2,487	66	15	35	17	4	18	24
94122	Sunset	2,392	3,418	93	21	52	25	6	26	19
94123	Marina / Cow Hollow	1,144	1,351	44	12	66	9	2	33	45
94124	Bayview / Hunters Point	2,394	3,588	100	22	209	25	6	105	13
94127	St Francis Wood	857	1,417	38	8	24	10	2	12	3
94129	Presidio	143	176	6	1	28	1	0	14	2
94130	Treasure Island	111	117	5	1	5	1	0	3	12
94131	Twin Peaks / Glen Park	1,349	1,974	50	11	53	13	3	27	18
94132	Lake Merced	1,252	1,795	52	12	49	14	3	25	8
94133	North Beach	862	866	34	9	97	13	4	42	42
94134	Portola / Visitacion Valley	1,716	2,663	73	16	40	19	4	20	7
94158	Mission Bay	296	184	15	5	145	7	2	74	5
Total		34,772	45,190	1,412	348	3,369	435	110	1,557	798

1 [CEQA Reform Commendation]

2 **Resolution Commending Governor Gavin Newsom, Senator Scott Weiner,**
 3 **Assemblymember Buffy Wicks, and the California Legislature for Passing CEQA**
 4 **Reforms that Streamline Construction of Urban Homes, Childcare Centers, and**
 5 **Other Essential Facilities.**

6 WHEREAS, The California Environmental Quality Act, or CEQA, although
 7 enacted with good intent, undermined its purpose of protecting California's environment
 8 by allowing individuals and groups to block desperately needed, environmentally
 9 beneficial new homes in already developed urban environments for, oftentimes, reasons
 10 unrelated to environmental quality¹; and

11 WHEREAS, This cudgel against new homebuilding contributed to California's
 12 and San Francisco's worsening cost of housing crisis²; and

13 WHEREAS, According to *The Lowell*, the student publication of San Francisco's
 14 Lowell High School, San Francisco's cost of housing crisis has uniquely harmed youth
 15 by forcing them and their families out of their communities, jobs, and schools, thereby
 16 separating them from their established friends³; and

17 WHEREAS, AB 130, authored by Assemblymember Buffy Wicks of the East Bay,
 18 exempts new housing projects in already developed urban environments from
 19 environmental review under CEQA; and

¹ Rigel Robinson, "When a Statute Loses Its Way: Fulfilling the Original Intent of the California Environmental Quality Act," *Yale Law & Policy Review* 43, no. 1 (Spring 2025), <https://yalelawandpolicy.org/when-statute-loses-its-way-fulfilling-original-intent-california-environmental-quality-act>.

² Ben Christopher, "No More CEQA for Most Urban Housing Development in California," *CalMatters*, June 2025, <https://calmatters.org/housing/2025/06/ceqa-urban-development-infill-budget/>.

³ Serena Miller and Stella Schulte, "An Impossible Situation," *The Lowell*, May 19, 2025, <https://thelowell.org/16572/features/an-impossible-situation/>.

1 WHEREAS, AB 130 is one of the most important pro-housing reforms passed by
2 the legislature in modern California history⁴; and

3 WHEREAS, CEQA had also been mendaciously wielded by individuals acting in
4 bad-faith to block the construction of facilities essential to youth such as childcare
5 centers⁵; and

6 WHEREAS, SB 131, authored by Senator Scott Weiner of San Francisco,
7 exempts child care centers and other essential facilities from environmental review
8 under CEQA; and

9 WHEREAS, AB 130 and SB 131 are, collectively, the most important new laws in
10 modern California history to speed-up construction and lower costs for youth and all
11 Californians while benefiting the environment⁶; and therefore be it

12 RESOLVED, That the Youth Commission commends Governor Gavin Newsom
13 for signing AB 130 and SB 131 into law and for his exceptional legislative advocacy
14 during this year's state budget process that got these critical reforms passed; and be it

15 FURTHER RESOLVED, That the Youth Commission commends Senator Scott
16 Weiner for authoring SB 130 and for his tireless work to help build more homes, lower
17 housing costs, and make California affordable for youth and future generations; and be
18 it

⁴ Corey Smith, "CEQA Reform: A Landmark Milestone," *Housing Action Coalition*, July 7, 2025, <https://housingactioncoalition.org/news/sf-rezoning-map-9gbmr-bxgld>.

⁵ Anne Cottrell and Liz Alessio, "California Environmental Law Nearly Killed a Childcare Facility in Our Community. Enough Is Enough," *San Francisco Chronicle*, May 27, 2025, <https://www.sfchronicle.com/opinion/openforum/article/california-ceqa-reform-20342916.php>.

⁶ Shawn Hubler, "California Weakens Environmental Law to Build More Housing," *New York Times*, June 30, 2025, <https://www.nytimes.com/2025/06/30/us/california-environment-newsom-ceqa.html>.

1 FURTHER RESOLVED, That the Youth Commission commends
2 Assemblymember Buffy Wicks for authoring AB 131 and for her consistent focus on
3 increasing new housing construction and lowering housing costs; and be it

4 FURTHER RESOLVED, That the Youth Commission commends the California
5 Legislature, including San Francisco Assemblymembers Catherine Stefani and Matt
6 Haney, for overwhelmingly approving SB 130 and AB 131; and be it

7 FURTHER RESOLVED, That the Youth Commission urges elected leaders in
8 California and San Francisco to continue pursuing reforms that will increase housing
9 production and lower housing costs; and be it

10 FURTHER RESOLVED, That the Chair of the Youth Commission is authorized to
11 issue Certificates of Honor to Governor Gavin Newsom, Senator Scott Weiner, and
12 Assemblymember Buffy Wicks for their monumental efforts in getting CEQA reforms
13 enacted into law.