BAY AREA AIR QUALITY MANAGEMENT DISTRICT

TECHNOLOGY IMPLEMENTATION OFFICE (TIO)
STEERING COMMITTEE

COMMITTEE MEMBERS

Bud Beebe, Sacramento Municipal Utility District (Retired)
Cindy Chavez, Air District Board of Directors (Committee Chair)
Mark Cupta, Prelude Ventures
Ahmad Ganji, San Francisco State Industrial Assessment Center
Rob Rennie, Air District Board of Directors
Michael Montgomery, San Francisco Bay Regional Water Quality Control Board
Jetta Wong, JLW Advising

THIS MEETING WILL BE CONDUCTED UNDER PROCEDURES AUTHORIZED BY EXECUTIVE ORDER N-29-20 ISSUED BY GOVERNOR GAVIN NEWSOM

- **THE PUBLIC MAY OBSERVE THIS MEETING THROUGH THE WEBCAST BY CLICKING THE LINK AVAILABLE ON THE AIR DISTRICT'S AGENDA WEBPAGE AT**

www.baaqmd.gov/bodagendas

- **THE PUBLIC MAY PARTICIPATE REMOTELY VIA ZOOM AT THE FOLLOWING LINK OR BY PHONE**

https://bayareametro.zoom.us/j/87098867159

(669) 900-6833 or (408) 638-0968

WEBINAR ID: 870 9886 7159

- **THOSE PARTICIPATING BY PHONE WHO WOULD LIKE TO MAKE A COMMENT CAN USE THE "RAISE HAND" FEATURE BY DIALING "*9". IN ORDER TO RECEIVE THE FULL ZOOM EXPERIENCE, PLEASE MAKE SURE YOUR APPLICATION IS UP TO DATE**

FRIDAY
MAY 28, 2021
1:00 P.M.

AGENDA

1. **CALL TO ORDER - ROLL CALL**

PLEDGE OF ALLEGIANCE

PUBLIC MEETING PROCEDURE

The Committee Chair shall call the meeting to order and the Clerk of the Boards shall take roll of the Committee members.

This meeting will be webcast. To see the webcast, please visit www.baaqmd.gov/bodagendas at the time of the meeting. Closed captioning may contain errors and omissions and are not certified for their content or form.

Public Comment on Agenda Items *The public may comment on each item on the agenda as the item is taken up. Members of the public who wish to speak on matters on the agenda for the meeting, will have three minutes each to address the Committee. No speaker who has already spoken on that item will be entitled to speak to that item again.*

Staff/Phone (415) 749-

CONSENT CALENDAR (ITEM 2)

2. **APPROVAL OF THE MINUTES OF MAY 15, 2020** **Clerk of the Boards/5073**

The Committee will consider approving the draft minutes of the Technology Implementation Office Steering Committee meeting of May 15, 2020.

END OF CONSENT CALENDAR

REGULAR AGENDA (ITEMS 3-5)

3. **BAY AREA ELECTRIC VEHICLE (EV) ACCELERATION PLAN UPDATE**

K. White/8662
kwhite@baaqmd.gov

The Committee will receive an update on the Air District's Electric Vehicle Acceleration Plan.

4. **CLIMATE TECH FINANCE IMPACT REPORT** **D. Tang/8726**
dtang@baaqmd.gov

The Committee will receive an update on key results and lessons learned that are highlighted in the Climate Tech Finance Impact Report.

5. **CLIMATE TECH FINANCE STRATEGIC PLAN** **D. Tang/8726**
dtang@baaqmd.gov

The Committee will receive an update on the development of a strategic plan for Climate Tech Finance, including its mission statement, key messages, and opportunities for program expansion.

END OF REGULAR AGENDA

6. **PUBLIC COMMENT ON NON-AGENDA MATTERS**

Members of the public who wish to speak on matters not on the agenda for the meeting, will have three minutes each to address the Committee.

7. **COMMITTEE MEMBER COMMENTS**

Any member of the Committee, or its staff, on his or her own initiative or in response to questions posed by the public, may: ask a question for clarification, make a brief announcement or report on his or her own activities, provide a reference to staff regarding factual information, request staff to report back at a subsequent meeting concerning any matter or take action to direct staff to place a matter of business on a future agenda. (Gov't Code § 54954.2)

8. **TIME AND PLACE OF NEXT MEETING**

At the call of the Committee Chair.

9. **ADJOURNMENT**

The Committee meeting shall be adjourned by the Committee Chair.

CONTACT:
MANAGER, EXECUTIVE OPERATIONS **(415) 749-4941**
375 BEALE STREET, SAN FRANCISCO, CA 94105 **FAX: (415) 928-8560**
vjohnson@baaqmd.gov **BAAQMD homepage:**
www.baaqmd.gov

- Any writing relating to an open session item on this Agenda that is distributed to all, or a majority of all, members of the body to which this Agenda relates shall be made available at the Air District's offices at 375 Beale Street, Suite 600, San Francisco, CA 94105, at the time such writing is made available to all, or a majority of all, members of that body.

Accessibility and Non-Discrimination Policy

The Bay Area Air Quality Management District (Air District) does not discriminate on the basis of race, national origin, ethnic group identification, ancestry, religion, age, sex, sexual orientation, gender identity, gender expression, color, genetic information, medical condition, or mental or physical disability, or any other attribute or belief protected by law.

It is the Air District's policy to provide fair and equal access to the benefits of a program or activity administered by Air District. The Air District will not tolerate discrimination against any person(s) seeking to participate in, or receive the benefits of, any program or activity offered or conducted by the Air District. Members of the public who believe they or others were unlawfully denied full and equal access to an Air District program or activity may file a discrimination complaint under this policy. This non-discrimination policy also applies to other people or entities affiliated with Air District, including contractors or grantees that the Air District utilizes to provide benefits and services to members of the public.

Auxiliary aids and services including, for example, qualified interpreters and/or listening devices, to individuals who are deaf or hard of hearing, and to other individuals as necessary to ensure effective communication or an equal opportunity to participate fully in the benefits, activities, programs and services will be provided by the Air District in a timely manner and in such a way as to protect the privacy and independence of the individual. Please contact the Non-Discrimination Coordinator identified below at least three days in advance of a meeting so that arrangements can be made accordingly.

If you believe discrimination has occurred with respect to an Air District program or activity, you may contact the Non-Discrimination Coordinator identified below or visit our website at www.baaqmd.gov/accessibility to learn how and where to file a complaint of discrimination.

Questions regarding this Policy should be directed to the Air District's Non-Discrimination Coordinator, Terri Levels, at (415) 749-4667 or by email at tlevels@baaqmd.gov.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
375 BEALE STREET, SAN FRANCISCO, CA 94105
FOR QUESTIONS PLEASE CALL (415) 749-4941

EXECUTIVE OFFICE:
MONTHLY CALENDAR OF AIR DISTRICT MEETINGS

MAY 2021

TYPE OF MEETING	DAY	DATE	TIME	ROOM
Board of Directors Mobile Source and Climate Impacts Committee	Thursday	27	9:30 a.m.	Webcast only pursuant to Executive Order N-29-20
Board of Directors Technology Implementation Office (TIO) Steering Committee	Friday	28	1:00 p.m.	Webcast only pursuant to Executive Order N-29-20

JUNE 2021

TYPE OF MEETING	DAY	DATE	TIME	ROOM
Board of Directors Meeting	Wednesday	2	9:30 a.m.	Webcast only pursuant to Executive Order N-29-20
Board of Directors Community Equity, Health and Justice Committee	Thursday	3	9:30 a.m.	Webcast only pursuant to Executive Order N-29-20
Board of Directors Meeting	Wednesday	16	9:30 a.m.	Webcast only pursuant to Executive Order N-29-20
Board of Directors Legislative Committee	Wednesday	16	1:00 p.m.	Webcast only pursuant to Executive Order N-29-20
Board of Directors Stationary Source and Climate Impacts Committee	Monday	21	9:00 a.m.	Webcast only pursuant to Executive Order N-29-20
Board of Directors Mobile Source and Climate Impacts Committee	Thursday	24	9:30 a.m.	Webcast only pursuant to Executive Order N-29-20

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Cindy Chavez and Members
of the Technology Implementation Office Steering Committee

From: Jack P. Broadbent
Executive Officer/APCO

Date: May 21, 2021

Re: Approval of the Minutes of May 15, 2020

RECOMMENDED ACTION

Approve the attached draft minutes of the Technology Implementation Office Steering Committee (Committee) meeting of May 15, 2020.

DISCUSSION

Attached for your review and approval are the draft minutes of the Technology Implementation Office Steering Committee meeting of May 15, 2020.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Marcy Hiratzka
Reviewed by: Vanessa Johnson

Attachment 2A: Draft Minutes of the Committee Meeting of May 15, 2020

Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, California 94105
(415) 749-5073

DRAFT MINUTES

Summary of Board of Directors
Technology Implementation Office Steering Committee Meeting
Friday, May 15, 2020

1. CALL TO ORDER – ROLL CALL

Technology Implementation Office (TIO) Steering Committee (Committee) Chairperson Cindy Chavez called the meeting to order at 1:01 p.m.

Present: Committee Chairperson, Cindy Chavez; Ex-Officio Board of Directors (Board) Member, David Hudson; and Members Bud Beebe, Ahmad Ganji, Michael Montgomery, Janea Scott, and Jetta Wong.

Absent: Members Mark Cupta and Marilyn Waite.

Also Present: None.

2. APPROVAL OF THE MINUTES OF OCTOBER 4, 2019

Public Comments

No requests received.

Committee Comments

None.

Committee Action

Member Beebe made a motion, seconded by Ex-Officio Board Member Hudson, to approve the Minutes of October 4, 2019; and the motion carried by the following vote of the Committee:

AYES:	Beebe, Chavez, Ganji, Hudson, Montgomery, Scott, Wong.
NOES:	None.
ABSTAIN:	None.
ABSENT:	Cupta, Waite.

3. ELECTRIC VEHICLE (EV) PROGRAM UPDATE

Damian Breen, Deputy Air Pollution Control Officer of Technology, introduced Anthony Fournier, Technology Implementation Officer, who gave the staff presentation *Update on EV Incentive Programs*, including: light-duty EV programs; Clean Cars for All (CCFA) program; application trends; grants awarded by month; geographic distribution of program awards; High Mileage Fleet program; Fiscal Year Ending (FYE) 2019 Charge! Program, geographic distribution of 2019 awards and facility types; EV market research and surveys; most important factors in car-buying; what are your biggest concerns related to driving an EV: familiarity with EV incentives; how incentives influence decision making; and questions for the Steering Committee.

Public Comments

No requests received.

Committee Comments

The Committee and staff discussed the reason for the consistent increase in cumulative number of applications received between September 2019 and April 2020; appreciation for the user-friendliness of the CCFA website; whether the website language specifying that portable charging is still awaiting approval from the California Air Resources Board (CARB) is still accurate, and the suggestion that that technology be made publicly available as soon as possible; whether there is a limit to application capacity; whether the Air District has been made aware of any infrastructure issues (wiring, panels) that the installers have to troubleshoot; how the California Energy Commission's (CEC) data from its biennial assessment of EV charging infrastructure and California Electric Vehicle Infrastructure Project (CALeVIP) program may assist the Air District; whether California air districts are sharing data with each other from their respective EV programs; targeted outreach methods that resulted in a significant increase of Charge! Program applications from multi-family dwelling owners; whether the Air District has any lessons learned or best practices regarding EV charging infrastructure installations at multi-family dwellings that can be shared with property owners and managers in California; the suggestion of targeting school districts, community colleges, and tenants of multi-family dwellings for Charge! Program outreach; the observation of higher Charge! program participation in Santa Clara and San Francisco Counties, and the need for higher participation of Air District EV programs in the other Bay Area counties; and the observation that amount of Clean Cars for All program applications have increased in 2020, despite the COVID-19 pandemic.

Committee Action

None; receive and file.

4. CLIMATE TECH FINANCE PROGRAM OVERVIEW UPDATE

Mr. Breen introduced Derrick Tang, TIO Manager, who gave the presentation *Climate Tech Finance Program Update,* including: program overview; program status; pre-funded projects (first and five-year impacts); climate project pipeline and its expansion; Climate Catalyst Revolving Loan fund; and partnership and growth opportunities.

Public Comments

No requests received.

Committee Comments

The Committee and staff discussed the nature of residential battery system projects; the request for a compilation of the Air District's lessons learned regarding this program, for sharing purposes; the announcement that one of the six pre-approved projects in this program has been funded (the lender has received the executed loan guarantee and the funds should be available next week); whether the remaining businesses whose projects have yet to be funded are anticipated to be impacted by the COVID-19 pandemic; the average amount of time of each step in the process, from application to receiving funds, and whether those amounts of times can be improved; the suggestion the program fund an electric panel retrofit as a project; the potential loan value that could be derived from the Air District's commitment of $1 million for the six pre-funded projects, and the suggestion that the Air District keeps tracking its commitments for this program, as doing so may identify and/or release other capital; how a continual facilitation of strategic investments (grant and loan programs) by public agencies indicates to the public that low-carbon technology is a priority; whether the Air District is focusing on one financing vehicle over the other (loan guarantees versus direct loans) within this program at this time; and the request for staff to report back on opportunities that were revealed after the COVID-19 pandemic.

Committee Action

None; receive and file.

5. PUBLIC COMMENT ON NON-AGENDA MATTERS

No requests received.

6. COMMITTEE MEMBER COMMENTS

Professor Ganji observed that utilizing the Air District's expertise as leverage can gain the confidence of new project applicants and lenders.

Ex-Officio member Hudson requested that the Air District identifies more battery-boosted EV fast charger and hydrogen fuel cell projects.

7. TIME AND PLACE OF NEXT MEETING

At the conclusion of the meeting, it was announced that the next meeting would be at the Call of the Chair, but after the meeting adjourned, the next meeting was scheduled for Friday, May 28, 2021, at 1:00 p.m., via webcast, pursuant to procedures authorized by Executive Order N-29-20 issued by Governor Gavin Newsom.

8. ADJOURNMENT

The meeting adjourned at 2:36 p.m.

Marcy Hiratzka
Clerk of the Boards

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Cindy Chavez and Members
of the Technology Implementation Office Steering Committee

From: Jack P. Broadbent
Executive Officer/APCO

Date: May 21, 2021

Re: Bay Area Electric Vehicle (EV) Acceleration Plan Update

RECOMMENDED ACTION

None; receive and file.

BACKGROUND

The Bay Area's nine counties are home to approximately 7.6 million people and 5.3 million light duty vehicles, with an additional 600,000 vehicles passing daily through the region from adjacent areas. Tailpipe emissions from these light duty vehicles account for approximately 28% of greenhouse gas (GHG) emissions and a significant portion of other pollutants (31% of carbon monoxide and 12% of nitrogen oxide) in the Bay Area. These air pollutants increase adverse health problems, so the transition to clean vehicles will play a key role in reducing health and climate impacts.

California has set a goal of five million EVs sold by 2030, with the sale of new conventional light-duty vehicles phased out by 2035. The Air District has also set as a target that 90 percent of vehicles in the Bay Area should be zero emissions by 2050. The Bay Area and California share the goal of cutting greenhouse gas emissions to 80 percent below 1990 levels by 2050.

For the past 10 years, the Bay Area Air Quality Management District (Air District) has developed and implemented programs to monitor the EV market and increase the adoption of EVs in the Bay Area. Air District efforts have included the development and implementation of region-wide EV plans, outreach and awareness activities, and direct financial incentives for vehicles and charging infrastructure.

In partnership with the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC), the Air District released the Bay Area Plug-In Electric Vehicle Readiness Plan in 2013. This plan was developed to provide guidance and best practices to help stakeholders, utilities, and other government agencies accelerate the adoption of electric vehicles in the Bay Area.

In 2018, Air District staff began developing the Bay Area EV Acceleration Plan (Plan). This plan aims to update and supplement the 2013 Readiness Plan and includes an update on the EV ecosystem, results of our EV market research study, recommendations to address the barriers to EV adoption, and strategies to increase racial and social equity in the EV market.

As of August 2020, there were a total of 200,645 electric vehicles registered and operating on Bay Area roads, representing 3.6% of the region's light duty fleet according to data from the California Department of Motor Vehicles. Of those EV registrations in the Bay Area, 62% were BEV's, 37% were PHEVs, and 1% were FCEVs.

As of June 2020, there were 9,500+ publicly available charging ports in the Bay Area, including Level 1, Level 2, and DC Fast. To remain on track to meet our goals, the Bay Area is estimated to need 40,000 public charging ports.

DISCUSSION

The Plan is the result of collaboration among Bay Area EV stakeholders, local and regional government agencies, and community outreach and participation. The Plan intends to help the Bay Area achieve the EV goals described in the Air District's 2017 Clean Air Plan and MTC Plan Bay Area 2050.

The development of the Plan began in late 2018. Staff conducted a thorough review of the 2013 EV Readiness Plan to determine where the Bay Area currently stood on the projected EV forecasts and estimated infrastructure needed to support large-scale adoption on EVs.

Staff then began a baseline assessment of internal and external EV data and literature, focusing on the local, regional, state, and national level. Data sources reviewed included:

- California Department of Motor Vehicle registration data;
- California Energy Commission, Zero-Emission Vehicle, and Infrastructure Statistics; and
- U.S. Department of Energy, Alternative Fuels Data Center, Station Locator.

Staff analyzed this data and developed graphics and summaries to inform the Plan. Additionally, staff compiled a comprehensive list of other publicly available data summaries, rebates, incentives, outreach programs, and Disadvantaged Community (DAC) specific programs.

From August 2019 to September 2019, the Air District held four stakeholder outreach meetings throughout the Bay Area (North Bay, San Francisco, East Bay, South Bay) and one webinar. More than 40 EV industry partners including representatives from government organizations, Community Choice Aggregators, Electric Vehicle Supply Equipment (EVSE) technology and software companies, automotive manufactures, universities, school districts, ride- hailing companies, and elected officials. The goal was to collect input from these stakeholders on the type of information, data, tools, and resources that would be useful to their work and accelerate EV adoption in the Bay Area.

The Air District partnered with the Center for Sustainable Energy (CSE) from August 2019 - May 2020 to study vehicle market stakeholders in the Bay Area to understand their barriers to EV adoption. The following target audiences were identified for this analysis:

- Bay Area residents;
- Ride-hail drivers;
- Multi-unit dwelling property owners and managers;
- Fleet vehicle manager; and
- Car dealerships.

Using a mixed-method approach, CSE analyzed these consumers and businesses perspectives on EV adoption and infrastructure across the Bay Area. Their research began with a summary of existing literature on EV adoption, charging behaviors and EV infrastructure for each target group identified above. A combination of surveys, focus groups and semi-structured interviews was used to collect data from the five target groups. CSE's approach provided insights into sentiments across the diverse geographic and socioeconomic landscape of the Bay Area, ultimately informing targeted outreach and incentive strategies that will be actionable in the Air District's Plan.

The results of the stakeholder meeting and EV market research and survey identified the barriers to EV adoption, solutions to those barriers, and prioritize and suggest responsible parties for implementing those solutions.

Using feedback from our partners, research, data, and resources, staff developed the following goals to accelerate EV adoption in the Bay Area:

- Increase Air District support for low-income and frontline communities;
- Establish an interim goal of 1.5 million EVs in the Bay Area by 2030;
- Enact EV ready reach codes by 2030 in 100% of Bay Area Cities and Counties;
- Enact EV Charging Station Permitting Streamlining procedures and policies by 2022 in 100% of Bay Area Cities and Counties; and
- Seek more ambitious CalGreen EV ready parking space standards in the 2022 Title 24 Code Update (for both existing and new buildings).

The draft EV Acceleration Plan is now available for public review. A webinar presentation was held on April 15, 2021, where 45 participants attended. The public comment period closed on April 28, 2021 and comments received were reviewed for inclusion in the final document.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Karissa White
Reviewed by: Tin Le, Derrick Tang, and Anthony Fournier

Attachment 3A: Draft Bay Area EV Acceleration Plan

MARCH 2021
Bay Area Air Quality
Management District

BAY AREA ELECTRIC VEHICLE ACCELERATION PLAN

A plan to accelerate transportation electrification in the Bay Area.

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

Table of Contents

Executive Summary

With the first introduction of commercially available light-duty electric vehicles[1] (EV) in 2010, the Bay Area Air Quality Management District (Air District) began programs to monitor the EV market and increase EV adoption in the Bay Area. To identify and prioritize EV market maturation efforts, the Air District and the Metropolitan Transportation Commission (MTC) developed and released the Bay Area Plug-in Electric Vehicle Readiness Plan in 2013[2]. The Air District's efforts have also included development and implementation of region-wide outreach and awareness activities, supporting legislative action to accelerate EV adoption, and direct financial incentives. The Bay Area EV Acceleration Plan (Plan) aims to update and supplement the 2013 Readiness Plan, including an update on the EV ecosystem, results of our EV market research, and recommendations to address the barriers to EV adoption.

One of the greatest changes since we released the 2013 Readiness Plan is the maturation of the EV market past the "innovators" and "early adopters" technology cycle. Additionally, as EVs near cost parity with conventional cars and fighting climate change becomes a greater priority in our society, governments must adjust programs and priorities. To this end, the Air District released a Clean Air Plan in 2017[3], which included a goal to increase the EV share in the Bay Area to 90% by 2050. This EV Acceleration Plan is meant to help the Bay Area achieve that goal in an equitable manner.

The recommendations highlighted in this Plan speak to the importance of addressing historic disenfranchisement in frontline communities[4] as we pursue our aggressive EV adoption and market acceleration goals. Our analysis and suggestions related to increasing equity are

[1] EVs are defined here as Battery Electric Vehicles (BEV), Hydrogen Fuel Cell Electric Vehicles (FCEV), and Plug-in Hybrid Electric Vehicles.

[2] https://www.baaqmd.gov/plans-and-climate/bay-area-pev-program/bay-area-pev-ready

[3] https://www.baaqmd.gov/plans-and-climate/air-quality-plans/current-plans

[4] Frontline communities are those that experience "first and worst" the consequences of climate change. These are communities of color and low-income, whose neighborhoods often lack basic infrastructure to support them and who will be increasingly vulnerable as our climate deteriorates. These are Native communities, whose resources have been exploited, and laborers whose daily work or living environments are polluted or toxic (Ecotrust.org).

included on Page 25 in the Advancing Equity in the EV Market section in this Plan. The following five recommendations form the backbone of our strategy for increasing EV adoption and equity:

1. **Work more closely with frontline communities to better understand their unique needs and barriers to EV adoption.**
2. **Empower influential members of frontline communities and support them with the latest information to share with their communities.**
3. **Focus marketing and outreach efforts on the benefits of EV ownership that address major concerns identified through surveys and highlight people of color.**
4. **Streamline, simplify, and incentivize EV charging infrastructure and EV ready parking spaces, prioritizing installations at or near multi-family buildings.**
5. **Identify additional funding sources from the Federal, State, and local level to support the necessary incentives for a just transition.**

The Air District and our partners collected data and resources, which have informed our development of the following goals to ensure equitable EV acceleration in the Bay Area:

- **Increase Air District support for low-income and frontline communities**
- **Establish an interim goal of 1.5 million EVs in the Bay Area by 2030**
- **100% of Bay Area Cities and Counties enact EV ready reach codes by 2030**
- **100% of Bay Area Cities and Counties enact EV Charging Station Permitting Streamlining procedures and policies by 2022**
- **Seek more ambitious CalGreen[5] EV ready parking space standards in the 2022 Title 24 Code Update (for both existing and new buildings)**

Transportation and air quality policy have historically exacerbated the inequities faced by communities of color.[6] Low-income communities and communities of color continue to be disproportionately impacted by air pollution and climate change[7] and have been left out of the EV market given the economic barriers to entry.[8] For this reason, the vast majority of the Air District's work, funding, and policy attention related to transportation electrification must prioritize and empower our frontline communities across the Bay Area.

[5] California Green Building Standards Code or "CALGreen" (California Code of Regulations, Title 24, Part 11), is the first mandatory green building standards code in the nation and often serves as a model for other state and local governments across the county. CALGreen currently requires 6% of parking spaces in new nonresidential buildings to be Electric Vehicle capable or "EV capable".

[6] Reichmuth, David. 2019. Inequitable Exposure to Air Pollution from Vehicles in California. Cambridge, MA: Union of Concerned Scientists. https://www.ucsusa.org/resources/inequitable-exposure-air-pollution-vehicles-california-2019

[7] Finkelstein et al. Relation between income, air pollution and mortality: A cohort study. CMAJ. 2003; 169: 397-402.

[8] Sierra Club and Plug In America, 2018, AchiEVe: Model State & Local Policies to Accelerate Electric Vehicle Adoption, https://www.sierraclub.org/sites/www.sierraclub.org/files/blog/EV%20Policy%20Toolkit.pdf

This Plan will support and be supported by the transportation electrification goals set out in the Metropolitan Transportation Commission's (MTC) forthcoming Plan Bay Area 2050 and the Air District intends to continue to seek out opportunities for regional collaboration to advance our shared goals.

In line with the Air District's overarching goal of imbuing all of our work with the core tenants of environmental justice, this Plan incorporates principles of equity and inclusion throughout each section, providing special attention to the unique barriers and opportunities for growth in frontline communities. In addition, we have developed a recommendations section specific to tackling the need for greater equity and inclusion in the EV market.

Background

The Air District, created in 1955 by the California state legislature, is responsible for regulating stationary sources of air pollution in the nine-county Bay Area region. As a key component of its multi-portfolio approach to improving air quality, the Air District develops and administers incentive programs to accelerate voluntary emission reductions from the transportation sector. During the past twenty years, the Air District has awarded over $1.3 billion in incentives with an increasing amount going towards zero-emissions technologies.

The Bay Area's nine counties are home to approximately 7.6 million people[9] and 5.3 million light duty vehicles[10], with an additional 600,000 vehicles passing daily through the region from adjacent areas.[11] Three-quarters of Bay Area residents drive to work (64% drive alone and 10% carpool) and 12% take transit to work.[12] Tailpipe emissions from these light duty vehicles account for approximately 28% of greenhouse gas (GHG) emissions (CO_2e) and a significant portion of other pollutants (31% of carbon monoxide and 12% of nitrogen oxide) in the Bay Area. These types of air pollutants increase respiratory ailments like asthma and bronchitis, heightens the risk of life-threatening conditions like cancer, and burdens our health care system with substantial medical costs.[13]

In addition to alternative transit modes that include walking, biking, mass transit, and shared transportation, wide-scale adoption of EVs and electrification of all types of transportation are essential to achieving local, State, and Federal emission reduction targets for greenhouse gases and criteria pollutants. California has set a goal of 5 million EVs sold by 2030 and to phase out sales on conventional vehicles by 2035, and the Air District has set a target of 90% of vehicles in the Bay Area being zero emissions by 2050. The Bay Area and California also share the goal to

[9] United States Census Bureau, American Community Survey, Demographic and Housing Estimates, 2017
[10] California Department of Transportation: Estimated Vehicles Registered by County, 2017
[11] California Department of Transportation: Annual Traffic Volume Reports (1992-2015)
[12] United States Census Bureau, American Community Survey, 2016
[13] Union of Concerned Scientists, Vehicles, Air Pollution, and Human Health, https://www.ucsusa.org/resources/vehicles-air-pollution-human-health

cut greenhouse gas emissions to 80% below 1990 levels by 2050. Rapid growth in the EV market, especially for BEVs, will be a significant part of achieving these goals.

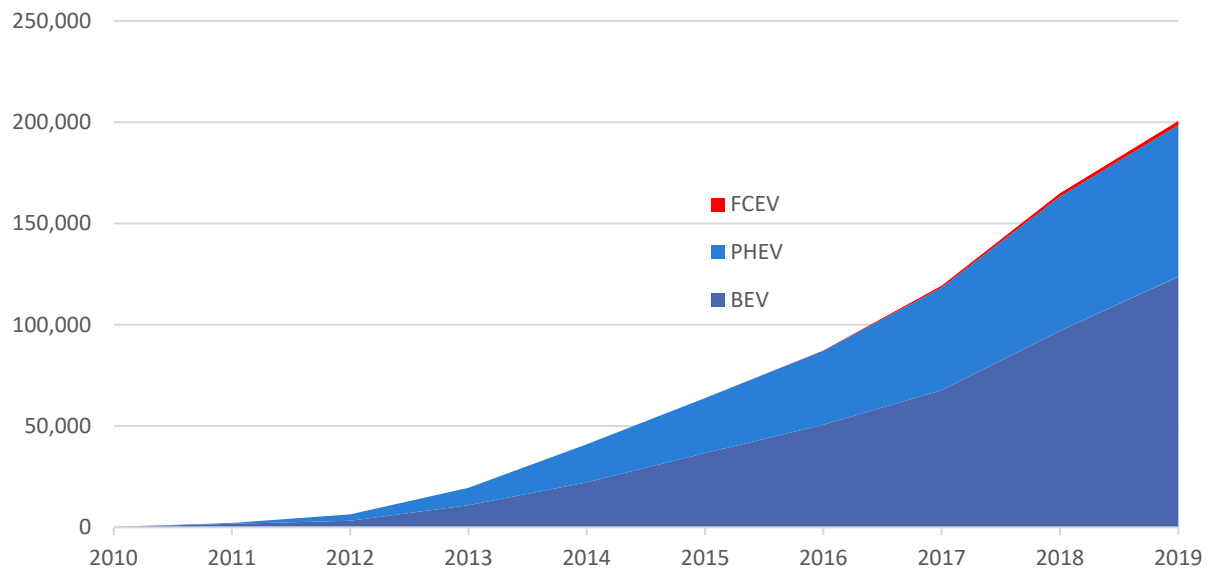
One of the current unknowns is the impact the COVID-19 Pandemic, resulting Shelter in Place orders, and shifts towards remote work will have on transportation in the Bay Area and beyond. Our hope is that remote work and flexible commute options become a mainstay in the workforce, curtailing an increase in single occupancy vehicle sales and trips, as well as reducing traffic congestion, maintaining air quality improvements, and reducing climate impacts. This report is meant to serve as a long-range planning and strategy document, and therefore assumes a worst-case scenario where travel behaviors return following the proliferation of viable vaccines.

Current Bay Area EV Ecosystem

EV Adoption and Sales

California Department of Motor Vehicles (DMV) registration data shows that the Bay Area had 200,645 electric vehicles as of August 2020, representing 3.6% of the region's light duty fleet (Figure 1). As of August 2020, BEVs accounted for 62% of all EVs registered in the Bay Area, PHEVs made up 37%, and FCEVs made up 1%. Compare that to the number of new car sales in Q1-Q3 of 2020 with 77% BEVs, 22% PHEVs, and 1% FCEVs, it is clear the BEVs are growing in prominence, with the Tesla Model 3 making up the vast majority of new sales. As the EV market matures, used EV sales will be an important metric to track; however, such information was not available at the time this publication was finalized.

Figure 1: BEVs, PHEVs, and FCEVs Registered in the Bay Area



Compared to the entire California EV market, the Bay Area is home to a larger share of BEVs and smaller share of PHEVs. Of the entire EV fleet in the Bay Area, Tesla accounts for almost 40% of all registered EVs, followed by Chevrolet with 17%, and Toyota with 10%.[14] Figure 2: Number of EVFigure 2 shows two heatmaps of the State and Bay Area in terms of EV adoption, clearly showing that while Santa Clara clearly leads regionally for the most EV's per county, Los Angeles County leads the State in terms of EV adoption.

Figure 2: Number of EVs in California and Bay Area Counties[15]

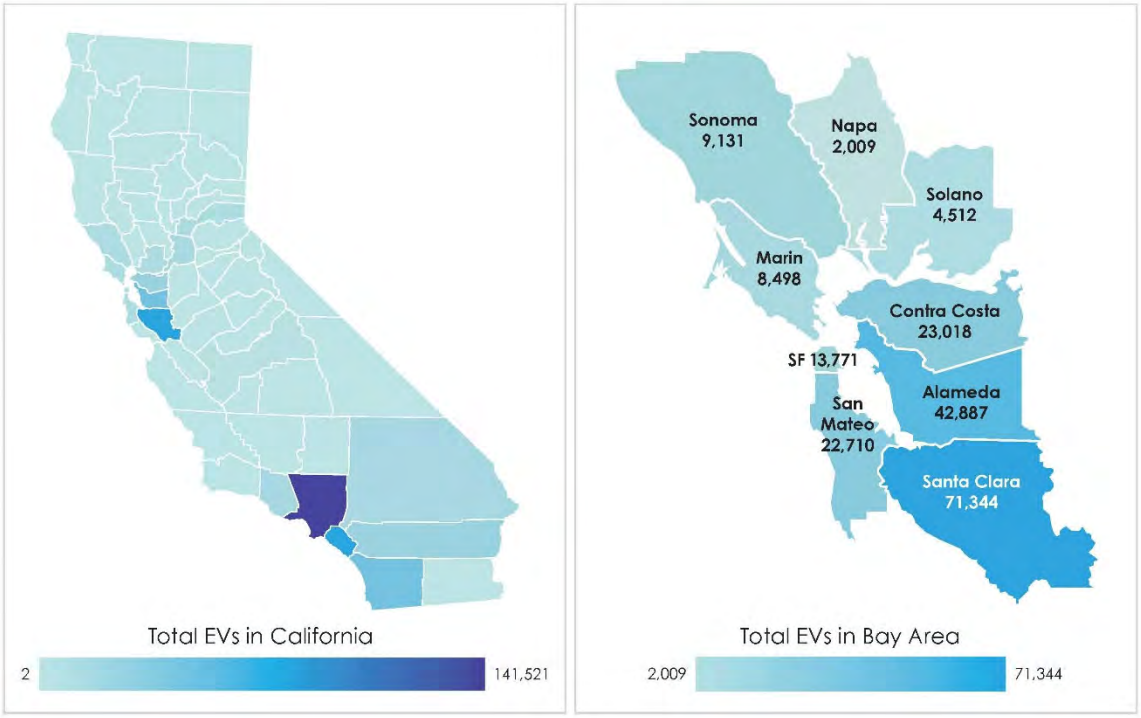
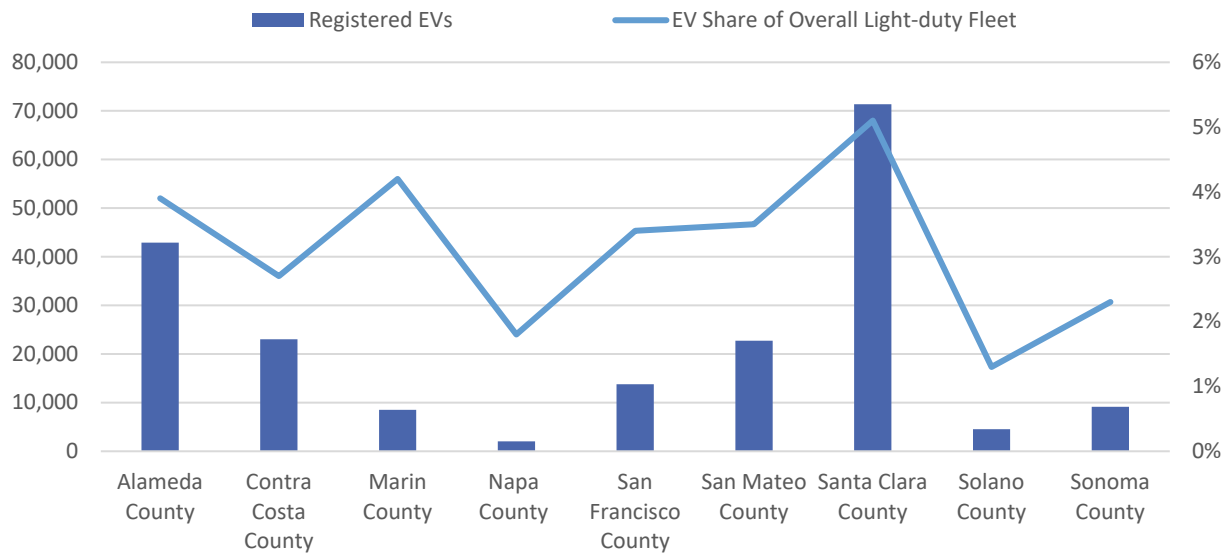


Figure 3 shows the number of EVs registered by Bay Area County and the relative share of EVs in that County's overall light-duty vehicle fleet (i.e. internal combustion and electric vehicles). Santa Clara County continues to lead the region in both raw number of EVs as well as EV share of their overall light-duty vehicle fleet.

[14] California Energy Commission, *Zero Emission Vehicle and Infrastructure Statistics*, data last updated August 28, 2020, www.energy.ca.gov/zevstats

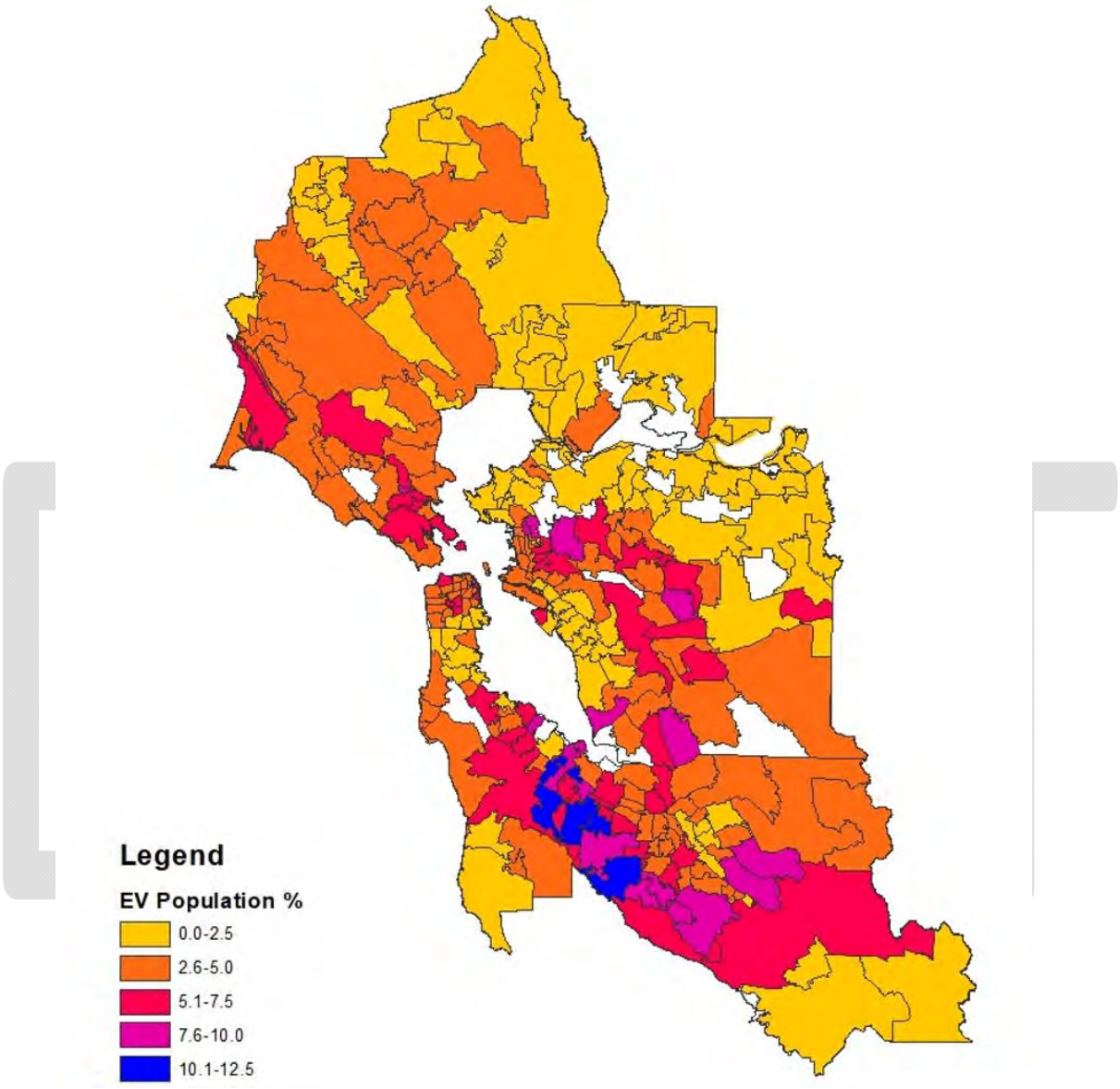
[15] *Ibid.*

Figure 3. County DMV EV Registrations and Corresponding Share of EVs in the Overall Vehicle Fleet



A more granular display of EV registrations across the Bay Area is shown in Figure 4, which is a heat map of EV registrations by zip code. It is clear that parts of Dublin, Fremont, Cupertino, and San Jose are hotspots of EV ownership.

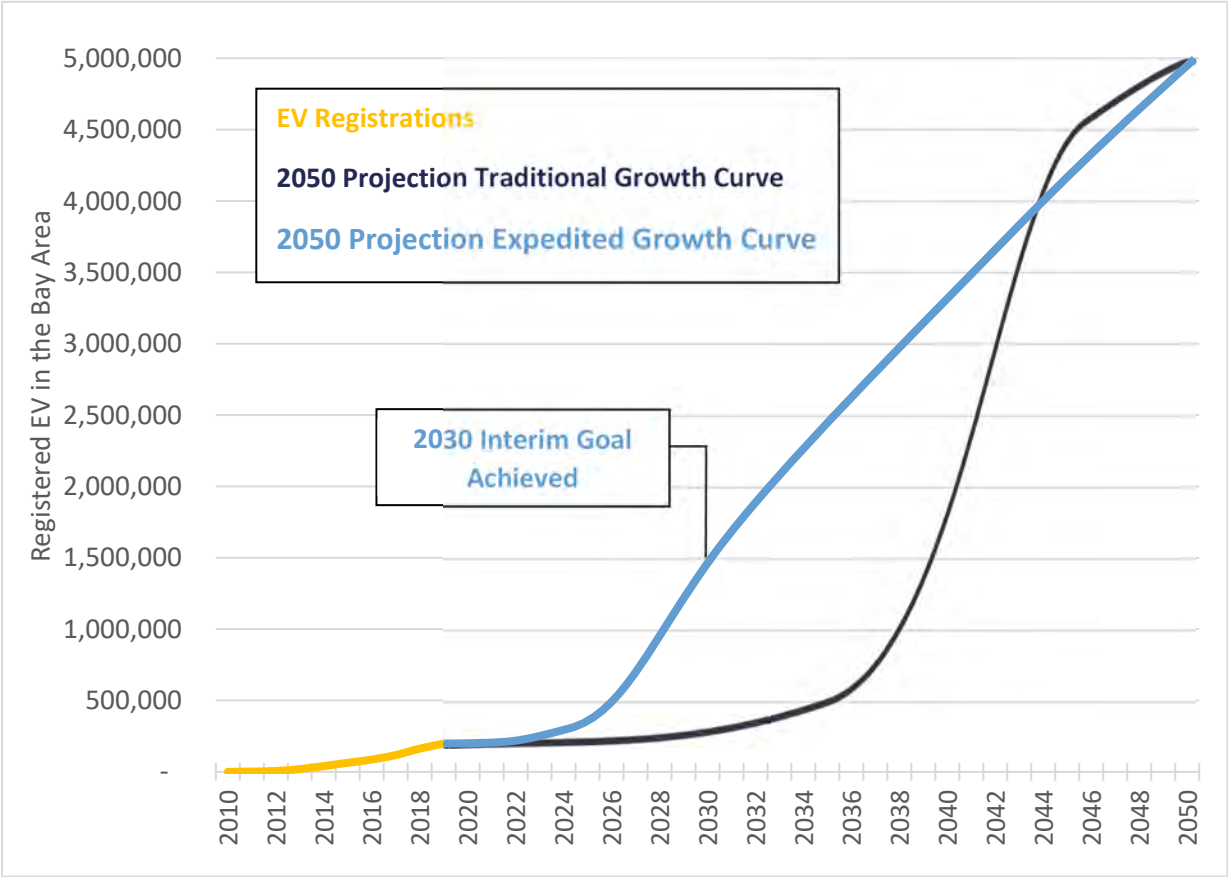
Figure 4. Bay Area EV Registrations by Zip Code



While the Bay Area has seen astonishing growth in EV registrations over the past ten years, Figure 5 provides two potential pathways to reaching the Air District's 2050 goal of EVs accounting for 90% of the fleet (or roughly 5 million EVs). The graph shows historic share of EVs in the Bay Area based on DMV data through 2019, then charts two different trajectories (i.e. traditional and expedited) to reaching our 2050 goal. The projections assume EVs achieve cost parity with internal combustion engine (ICE) vehicles in 2024, resulting in varying degrees of impact based on the projection trajectory (traditional assuming economic stagnation and only a slight uptick in new EV sales as charging continues to be a large barrier to adoption, and expedited assumes consumer demand increases as price outweighs range anxiety). The graph also considers the enactment of a ban on new ICE vehicle sales in 2035 as outlined in Executive

Order N-79-20[16]. While these projections use basic estimates for the actual EV share increases, they show two different paths the Bay Area EV market might take to 2050.

Figure 5. Bay Area EVs and Projected Increase to Meet 2050 Goal



Charging Infrastructure

The availability and accessibility of EV supply equipment (EVSE) is a critical factor influencing the number of people who switch to EVs.[17] Publicly accessible EV chargers are needed to support the growing number of EV drivers, especially for long-distance trips and for drivers that do not have access to private home chargers.

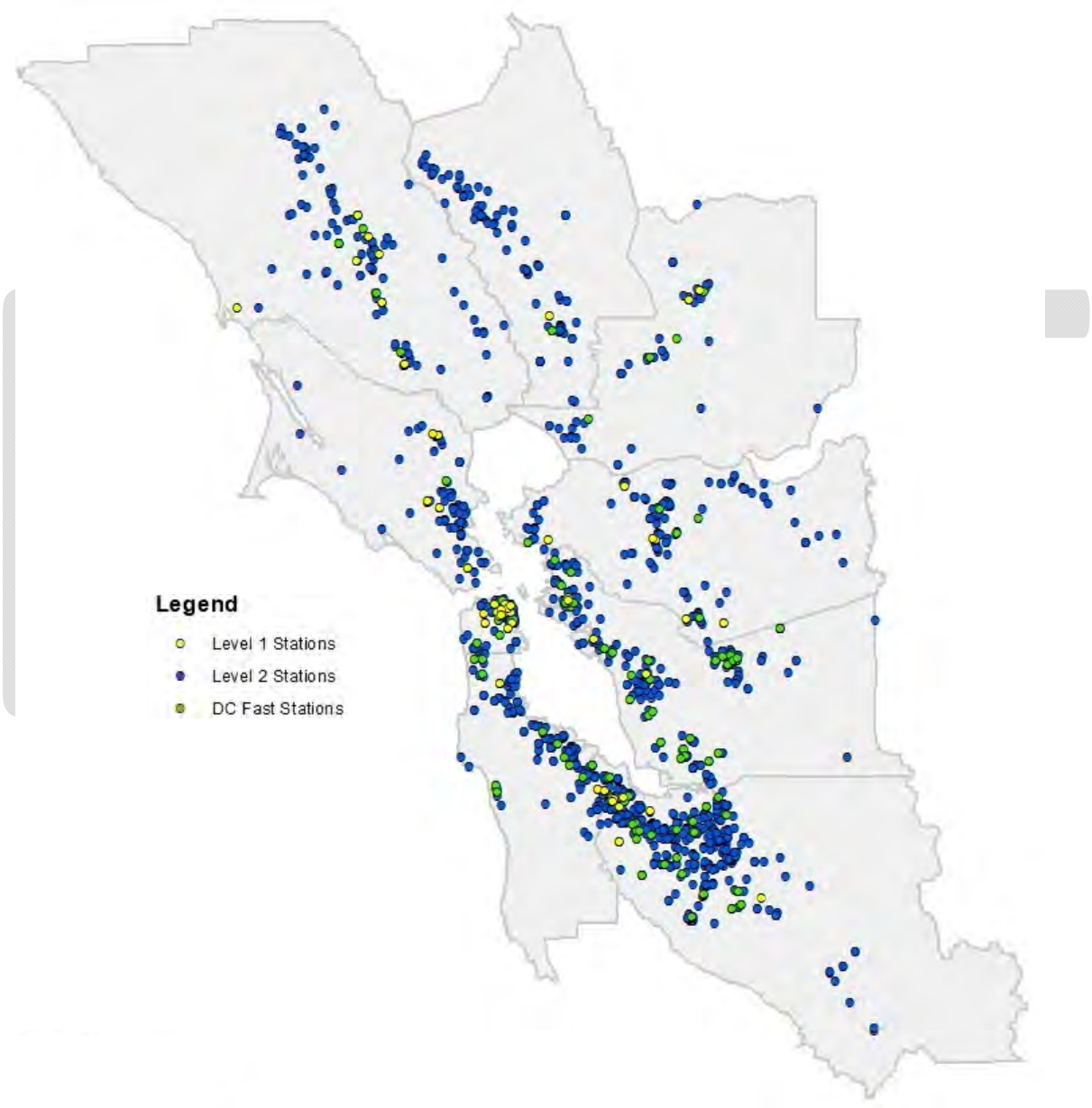
As of June 2020, the Bay Area was home to around 9,500 publicly available charging ports, including both Level 2 and DC Fast (Figure 6). The National Renewable Energy Laboratory (NREL) EV Infrastructure Projection Tool estimates that by the start of 2019, we needed 20,000

[16] CA Executive Order N-79-20, https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

[17] Hauke Engel, Russell Hensley, Stefan Knupfer, and Shivika Sahdev, McKinsey & Company, 2018, Charging Ahead: Electric Vehicle Infrastructure Demand, https://www.mckinsey.com/~/media/McKinsey/Industries/Automotive%20and%20Assembly/Our%20Insights/Charging%20ahead%20Electric-vehicle%20infrastructure%20demand/Charging-ahead-electric-vehicle-infrastructure-demand-final.pdf

publicly available charging ports (Public L2 and Public DC Fast) here in the Bay Area to support EV Drivers, following the 1.5 million California wide ZEV's by 2025 target set by Governor Brown.

Figure 6. Bay Area EVSE Station Locations[18]



Additional charging stations will be needed to accommodate future growth in the EV market, especially to achieve the ambitious Bay Area goals and to accommodate a wider range of Bay Area residents. There have also been anecdotal reports that current charging stations are often full, which indicates that additional charging station capacity is needed even for the current

[18] Department of Energy, Alternative Fuels Data Center, Station Locator, www.afdc.energy.gov/stations

number of EV drivers. NREL and California Energy Commission (CEC) developed a computer simulation tool, Electric Vehicle Infrastructure Projection (EVI-Pro), which uses the results of a state-wide transportation habits survey to quantify the charging infrastructure needed to ensure that future EV drivers can meet their transportation needs. This analysis accounts for shifts in vehicle and charger technologies, user demographics, market adoption conditions, the shared-use of chargers, and travel and charging preferences.[19] Over 20,000 public charging ports are estimated to be needed in 2019 (9,100 workplace L2, 8,400 public L2, and 3,300 DC Fast). However, according to the Alternative Fuels Data Center (AFDC), the Bay Area is home to just 9,500 EV charging ports, less than half of what is required according to EVI-Pro. To stay on track with our goals, by 2025, the Bay Area is estimated to need about 40,000 public charging ports (17,000 workplace L2, 17,000 public L2, and 6,000 DC Fast).

Widespread charging infrastructure will be key to overcoming current and future barriers to electric vehicle adoption. An individual or household's need for public charging infrastructure is related to home type, with drivers in single-family homes being much more likely to have home charging than those in apartments or multi-unit dwellings. Electric vehicle owners so far tend to live in single-family homes.[20] To extend the EV market beyond those living in single-family homes, we will have to expand charging available at multi-unit dwellings and public charging infrastructure. In the Bay Area, over one-third (36%) of housing units are in multi-unit dwellings.[21] Installing charging infrastructure has been more challenging for multi-family housing, requiring away-from-home charging options for a significant portion of the Bay Area population. The need for drivers to take longer-distance trips and with a wide range of transportation patterns also requires public charging.

While tools such as the AFDC EV charging map and EVIP-Pro are useful for assessing generalized information about charging, identification of specific geographic and technological gaps will require tools with greater accuracy and granularity. Currently, all data on AFDC's website are self-reported by station hosts, and therefore miss a large segment of the charging market (i.e. residential and workplace charging). Our projections for EVSE needs are only as good as the data we have on existing EVSE.

To support our desired EV adoption goals as quickly as possible, the Bay Area should be the most straightforward place in the country to install EVSE. There are three major EVSE policy accelerators that if achieved will help us achieve this goal:

1) Adoption of ambitious and equitable CALGreen building code updates,
2) The passage of local EVSE reach codes, and

[19] *California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025*, California Energy Commission, March 2018.
[20] *Quantifying the electric vehicle charging infrastructure gap across U.S. markets*, the International Council on Clean Transportation, January 2019.
[21] *American Fact Finder,* United States Census Bureau, January 2019.

3) Local EVSE permit process streamlining.

CALGreen Codes

CALGreen, the state green building code (California Code of Regulations, Title 24, Part 11), sets requirements for installing EV Capable infrastructure in new residential and nonresidential buildings. The current CALGreen code requires that new construction of multi-unit dwellings (MUD) include EV Capable infrastructure in at least 10% of parking spaces, rounded up, meaning that they have raceway and panel capacity installed. Additionally, CALGreen requires that about 6% of parking spaces in new nonresidential buildings must be EV capable. CALGreen only applies to new constructions, meaning that existing buildings post a significant gap in this policy approach.

Local Reach Codes

In addition to the mandatory codes, CALGreen has two tiers of reach codes that enable cities to adopt requirements more ambitious EV Capable codes of 15% and 20% of parking spaces. There are also two tiers of voluntary CALGreen reach codes for commercial buildings that increase the EV Capable levels to about 8% and 10% respectively.[22] These readiness requirements do not require placing a charger in the space immediately but avoid most of the costs that would have been required to retrofit electrical infrastructure, ease the process of installing a charger later, and ease nonfinancial barriers such as gaining landlord or HOA approval.[23]

In addition to the CALGreen reach codes, local jurisdictions that wish to increase their ambition can adopt codes that address existing buildings, similar to codes adopted by the City of Menlo Park[24], the City and County of San Francisco[25], and the City of Burlingame[26]. Local governments are critical to enacting these types of market accelerators. As part of local reach code enactment, local agencies should ensure that permitting and inspection staff are trained to implement these codes and are bought into the idea of an electrified future for their jurisdiction.

Permit Streamlining

California's EVSE permit streamlining law (AB 1236 Statutes of 2015, Chapter 598) was enacted to address mutual frustration: electric vehicle charging station providers wanted to speed the permitting process; and cities and counties often needed better information from applicants and/or a directive to create streamlined processes.[27] To help address these frustrations, AB

[22] The Governor's Office of Business and Economic Development (GO-Biz), Electric Vehicle Charging Station Permitting Guidebook, July 2019. https://static.business.ca.gov/wp-content/uploads/2019/12/GoBIZ-EVCharging-Guidebook.pdf

[23] *Ibid.*

[24] https://www.menlopark.org/DocumentCenter/View/18835/H5---CD---EV-chargers---18-193

[25] https://sfenvironment.org/green-building-ordinance-sf-building-code

[26] https://www.burlingame.org/departments/sustainability/green_building.php

[27] The Governor's Office of Business and Economic Development (GO-Biz), Electric Vehicle Charging Station Permitting Guidebook, July 2019. https://static.business.ca.gov/wp-content/uploads/2019/12/GoBIZ-EVCharging-Guidebook.pdf

1236 establishes permitting process and communication requirements for cities and counties. As shown in Figure 7, several Bay Area jurisdictions have fully streamlined their EVSE permitting process, however several regions have not yet started the process.

Figure 7. Bay Area Progress Towards EVSE Permit Streamlining (as of November 2020)[28]

While the three tools mentioned above are critical to the maturation of the Bay Area EV market, reaching our 2035 and 2050 goals in an equitable manner will be key.

Insights from Market Research and Surveys

In August 2019, the Air District contracted with the Center for Sustainable Energy (CSE) to study vehicle market stakeholders in the Bay Area to understand their barriers to EV adoption. Using

[28] https://business.ca.gov/industries/zero-emission-vehicles/plug-in-readiness/

a mixed-method approach, CSE analyzed these consumer and business perspectives on EV adoption and infrastructure across the Bay Area.

The mixed-method approach incorporated both central market actors and periphery market actors (residents, ride-hail drivers, multifamily property owners, fleet managers, and car dealerships). Responses for the resident survey were collected between January 14 and March 8, 2020. Responses for the ride-hail driver survey were collected between January 15 and January 27, 2020. Three focus groups were conducted in December of 2019 with multifamily) property managers. Two additional interviews were conducted with multifamily property managers who were unable to attend a focus group. Fleet managers participated in a focus group on December 18, 2019, and several interviews were conducted between January 31 and February 10, 2020. Nine dealership owners and/or managers were interviewed in early 2020.

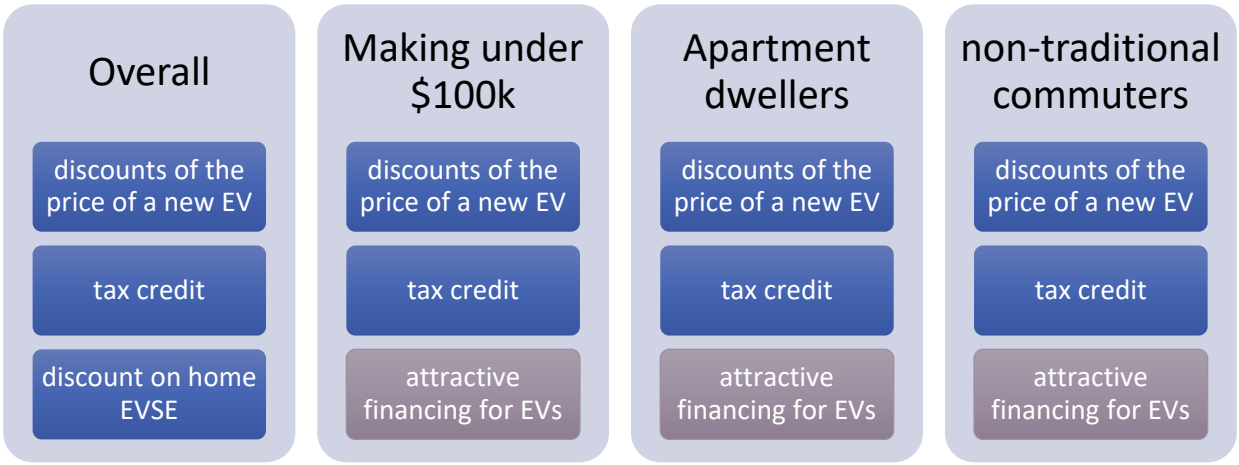
Over 1,100 survey responses were collected along with information from focus groups and interviews, adding 40+ stakeholders. Target response rates were put in place for apartment dwellers, residents making less than $100,000 a year, and residents with nontraditional commuting patterns given our interest in lowering barriers to EV adoption for those groups. Non-probability sampling was used to collect survey responses and should be considered when generalizing findings to the broader Bay Area population. However, these findings provide a useful roadmap to incentives, programs and outreach/education activities that can accelerate EV adoption and reduce emissions.

Bay Area Residents

Overall, 7% of respondents already owned an EV and 40% of non-EV owners have considered one. The most important factors that go into their decisions to purchase EVs are costs of purchase, fuel costs, safety, and dependability. The overall biggest concerns with EVs were related to range and charging availability. Interestingly, audiences who were more likely to have considered acquiring an EV also reported higher levels of concern about various aspects of the technology. Lastly, awareness of EV brands, available charging infrastructure, and available incentives were low.

To understand the appeal of various types of incentives, respondents were asked to rank possible incentives in order of how likely they were to influence their decision to get an EV. Overall, discounts off a new EV, tax credits, discounts on home charging equipment, and attractive financing offers were identified as most likely to influence their decision to buy an EV (see Figure 8). While commonly considered an effective incentive for EV buyers (and identified as important by dealerships), respondents ranked high-occupancy vehicle (HOV) lane access eighth out of ten options.

Figure 8. Top Three Incentives Types



Differences among the target populations were noticed in the findings. Apartment dwellers earned less income, were less likely to own a vehicle or be planning to purchase/lease one and tended to own older vehicles. Further, those planning to acquire a vehicle were more likely to indicate that they would purchase/lease a used vehicle. Apartment dwellers also had significantly less access to home charging (even standard 120-volt outlets) and were much more likely to park in shared lots or on the street.

Nontraditional commuters (i.e., those who do not primarily commute by themselves in their own car) had newer vehicles, owned a lower proportion of gasoline vehicles, and a higher proportion of clean vehicles (e.g., hybrids, BEVs, and PHEVs). They also tended to have fewer concerns about EVs than traditional commuters. Lastly, nontraditional commuters ranked the incentive of free or reduced charging vouchers as more influential in their decision to get an EV than the overall resident sample. This may be due to their limited driving and willingness to charge at various locations, but more research is needed to confirm.

The largest differences between target groups existed in respondents by income. Respondents making under $100K had older vehicles, were less likely to be planning a vehicle purchase, and were much less likely to be considering a new car. Respondents making over $100K were willing to pay 1.5 times the amount for a car on average and spent significantly less on transportation-related costs as a proportion of their income when compared to respondents making less than $100k. Respondents making over $100K had more interest in EVs but also more concerns about EVs, possibly indicating that they had spent more time thinking about the pros and cons of an EV.

Ride-Hail Drivers

The rationale behind survey ride-hail drivers (e.g. drivers on Uber or Lyft platforms) is that ride-hailing trips are higher polluting per passenger than average passenger car travel due to

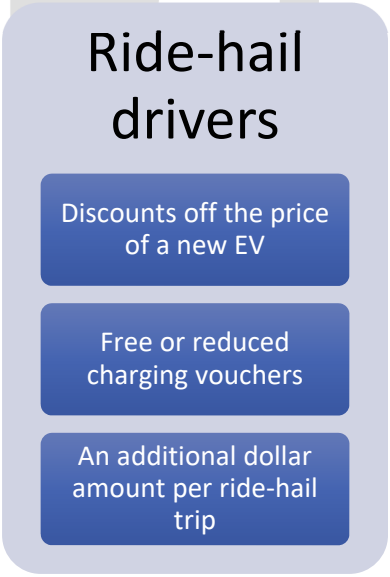
deadheading[29],[30]. Additionally, many ride-hailing trips replace near zero-emission trips on public transit or walking, and therefore generate additional emissions. As such, ride-hailing EVs contribute to reduced emissions more than traditionally owned/driven vehicles.

Overall, 185 ride-hail drivers were surveyed. These respondents do not constitute a random sample of ride-hail drivers and should not be used to generalize findings to the Bay Area ride-hail community. Most ride-hail drivers surveyed worked on a part-time basis of less than 20 hours per week and have other jobs in addition to driving ride-hail. They averaged 228 miles per week driving for ride-hail services, with 75% commuting less than 20 miles to where they start work. Ride-hail drivers reported owning newer vehicles that they have already paid off, most likely due to company requirements. Surprisingly, 16% drive an EV, and this group had a generally higher familiarity with EV incentives than the residents surveyed. For this audience, the most important factors for their purchasing decisions were cost, safety, and dependability; however, they ranked things like comfort and technology higher. More research is needed to confirm, but this may be due to the amount of time spent in their vehicles and the fact they use their vehicle to provide a customer service.

Three-quarters of respondents said their out-of-pocket expenses play an influential role in their car-buying decision. Compared to Bay Area residents in general, a higher percent of drivers said they would consider an EV (64%) but brand and charging infrastructure awareness was low in this group. Their concerns about EVs mirrored the residential survey population. However, over half (58%) of respondents indicated that long-range EVs would have enough range to meet their ride-hail driving needs during a shift.

When ranking the value of possible incentive structures (see Figure 9), ride-hail respondents ranked discounts off of a new EV the highest —as in the resident survey—however it was followed by incentives that would lower driving costs (charging vouchers) and increase driver revenue.

Figure 9. Top Three Incentive Types



Multi-Unit Dwelling Property Managers

Most multifamily property managers had done little to no research on installing EV charging at their buildings despite agreement that EV charging would attract high-quality tenants and would eventually become a necessity. These property managers face several barriers—a lack of time to research EV charging, uncertainty about cost and scope of project (e.g., need for

[29] Trips made by a ride-hailing vehicle when there are no passengers in the vehicle are called deadheading trips or empty trips.

[30] Bloomberg Law, California Moves to Regulate Climate Impact From Uber, Lyft, January 23, 2020, https://news.bloomberglaw.com/environment-and-energy/california-moves-to-regulate-climate-impact-from-uber-lyft

electrical upgrades) and a fear that chargers will become a future additional maintenance problem.

As some participants suggested, providing information and technical assistance would be valuable for many property managers. Interestingly, during the focus groups, one participant would occasionally offer a potential solution to another participant's concern. For example, one participant raised a concern that drivers will park all day in front of a charger, and another participant mentioned that her property had avoided this issue by implementing an hourly rate structure. Technical assistance that includes a site walk to assess electrical capacity and provide a cost estimate could also help alleviate fears and provide momentum for many property managers.

Finally, most participants agreed that despite any technical or logistical concerns, they would be willing to install EV charging with a high enough subsidy.

Public Fleet Managers

The fleet managers who participated in these interviews were very supportive of adding EVs to their fleet, and many expressed a desire to do their part for a cleaner environment. While discussing light-duty vehicles, there was almost no concern about driver apprehension around EVs nor any concern that EVs would be unable to meet fleet needs (except for emergency vehicles). For most interviewees, the biggest barrier to adding EVs to their fleet was EV infrastructure. EV charging stations represent a large upfront cost that fleets have not had to budget for in the past. Creating an EV infrastructure grant with clear rules and minimal participation restrictions could provide significant acceleration in EV adoption among fleets. In addition, some fleets currently own plug-in hybrid electric vehicles (PHEVs) but almost never charge them. Providing charging infrastructure could enable more electric vehicle miles traveled with these existing PHEVs.

For fleets with many trucks and vans, their biggest barrier is a lack of existing electric trucks. While electric retrofits for trucks and vans exist, they are extremely expensive and were not seen as a viable option by any of the interviewees. Some fleet managers expressed excitement about the upcoming electric Ford F-150. Providing significant rebates for electric trucks as they become available is likely to have a large impact for fleets.

Finally, for heavy-duty vehicles, such as buses or waste collection trucks, pilot programs may be very helpful because of the high risk associated with buying such expensive equipment.

Car Dealerships

Dealerships interviewed agreed that customers who come in looking for an EV largely have general knowledge about the technology and are committed to getting one. Dealers were asked whether they purposely steer customers towards a gas vehicle; the only time they report doing this is if the customer had budgetary considerations that made an EV unaffordable or they were interested in a body style not available as an EV. Conversely, they might encourage

consumers to consider an EV if they have a long commute and can take advantage of fuel savings and carpool lane access. The questions that prospective EV customers ask are most often related to range and charging.

Outside of marketing available incentives for EVs like rebates and carpool lane access, successful EV sales strategies were most often dealership-wide strategies that are particularly effective when engaging with prospective EV car shoppers. They included:

- Conducting Q&A with customers as they walk in the door to gauge their needs
- Providing two-week follow-up visits with customers
- Five-day return policy and free delivery
- Test drives/demonstrations

Both high- and low-volume dealerships cited EV inventory as the biggest challenge. Some brands were shifting production to newer models, limiting inventory of demonstration vehicles or creating competition among dealerships for EVs. High-volume dealerships also expressed incentive limitations as a challenge.

Both high- and low-volume dealerships indicated customers' lack of understanding about EVs, and subsequent hesitancy to switch as another challenge. Further, several dealerships indicated a perceived lack of public and multifamily charging by customers as challenges to selling EVs. Another commonly cited challenge was that customers are often concerned that newer/better versions of EVs will be coming out, leaving them hesitant to buy current models.

For used EVs, sales were driven primarily by the availability of lease returns/trade-ins. Often newer EV models have not yet been available long enough to be traded in or have their lease terms expired. While dealerships often reach out to customers at the end of their lease terms to gain repeat business, they are not always successful. If they get used EV inventory, those vehicles are usually priced attractively and sell quickly. Others indicated that it is challenging to move used EVs due to range restrictions of three-year-old models or issues with battery degradation in the used sales market.

When asked what could be done to help dealerships accelerate the sales of EVs, the key drivers indicated were more customer rebates, greater investment in infrastructure, extending HOV lane access and providing dealership EV sales support.

Accelerating EV Adoption

In mid-2019, the Air District conducted a series of meetings around the Bay Area with EV market stakeholders. These meetings included representatives from government organizations, Community Choice Aggregators, EVSE technology and software companies, automotive manufactures (or original equipment manufacturers, OEMs), colleges, school districts, ride-hailing companies, and elected officials. Staff collected input from these participants on the type of information and data that would be useful for their work to accelerate EV adoption in

the Bay Area. Additionally, the Air District asked participants what tools and resources are currently lacking that if developed, would help accelerate EV adoption.

The results of these meetings, combined with the results of the survey and market research discussed above, informed the following sections on Barriers to EV Adoption and Recommendations for Moving Forward. The following sections aim to articulate the barriers to EV adoption, identify solutions to those barriers, and prioritize and suggest responsibility for implementing those solutions.

Barriers to EV Adoption

Vehicle technology	• EV range • Battery degradation (esp. used market) • Lack of diversity in model styles (e.g. low or no supply of pick-up trucks, SUVs, minivans EVs)
Charging	• Not enough public charging locations • Low grid capacity in certain areas/properties • Uncertain availability of clean energy to get to zero emissions for EV charging • Restrictive facility configurations at multifamily buildings • Cost allocation to customers at multifamily buildings is complicated with EVSE and electricity meters • Varied permitting requirements for EVSE installations • Inaccurate public EVSE locations, not one centralized site, drivers must use multiple sources • We need more DC Fast chargers than we thought because fast chargers are needed to serve multifamily buildings residents, long-distance travelers, EVs with larger batteries that take longer to charge • Need to balance DC Fast with L2 charging needs for PHEV/used/multifamily drivers • Non-standard charging ports • Gas stations need to add EVSE, but no real support for them
Economics	• Purchase price of EVs compared to traditional gas vehicles • Complicated incentives (cars and EVSE) • Difficult to calculate longer term cost savings of EVs • Work-from-home electricity use make EV rates less financially attractive • Diminishing government budget revenue putting grant programs at risk • Public DC Fast charging is too expensive • COVID impact on economy and future commuting patterns
Perceptions and Behavior	• Dealership EV knowledge is low • Misinformation about EV technology

	• Perception that EVs are only for the wealthy • Outreach in the age of shelter in place • Lack of consistent equity data and metrics to track market trends • Low use of smart charging (i.e. off-peak)

Recommendations

Based on our market research, stakeholder outreach, and discussions with market experts, we have developed the following recommendations that aim to address the most pressing and persistent barriers to EV adoption in the Bay Area. For each recommendation we have identified an organization or group of organizations that have or should take on responsibility for implementing the recommendation. Realizing even a handful of the recommendations below will help the Bay Area reach our EV adoption goals and continue to lead the State and the Nation in advancing innovative and equitable transportation electrification programs and policies.

Policy and Legislation	
Recommendation	**Responsibility**
1. Seek more ambitious CALGreen EV ready parking spaces standards in the 2022 Title 24 Code Update (for both existing and new buildings)	1. California Department of General Services, Air District, Community Choice Aggregators (CCA), Non-profit Organizations
2. Support legislation that encourages additional grant funding and streamlining of grant programs to avoid duplication and unnecessary administrative costs	2. Air District
3. Streamline permit process and requirements for EVSE	3. Governments, CA Governor's Office of Business & Economic Development (GO-Biz)
4. Workforce training investments to retrain auto body workers	4. Governments, GO-Biz, California Community College Districts
5. Train and prepare the emergency response community to address and mitigate EV related hazards	5. CA Governor's Office of Policy and Research (OPR)
6. Develop a through web resource for EV related plans, materials, data, and grants for the Bay Area community.	6. Air District
7. Support CARB's challenge of the Trump Administration's actions that:	7. Air District

• revoked California's Clean Air Act waiver for its GHG and ZEV light-duty standards, • issued a regulation that those standards are preempted by the Energy Policy and Conservation Act (EPCA), and • significantly relaxed the federal light-duty vehicle GHG and fuel economy standards	
8. Support CARB and CPUC development of Clean Mile Standard regulation for transportation network companies (TNCs)	8. Air District
9. Support the development of CARB Advanced Clean Cars II regulation	9. Air District
10. Support State government implementation of Executive Order N-79-20	10. Air District
Financial Incentives and Rebates	
Recommendation	**Responsibility**
1. Seek additional funding sources for Bay Area EV programs from the State and Federal government.	1. Air District, MTC
2. Link EV and EVSE incentive programs for multifamily residents to ensure charging access	2. IOUs, CCAs, Air District, CARB, CEC
3. Explicitly allocate resources to provide technical assistance and time to develop authentic relationships with specific communities in all grant programs	3. Governments, IOUs, CCAs, Air District, CARB, CEC
4. Provide training for incentive program staff on how to bring a racial equity lens into their work	4. Governments, IOUs, CCAs, Air District, CARB, CEC
5. Develop a wealth-based system for determining eligibility, rather than an income-based system.	5. CARB, CEC, GO-Biz
6. Set minimum deployment commitments for EVSE programs in frontline communities	6. Governments, CCAs, IOUs

7. A monetary incentive to dealership sales personnel for every EV sold to income qualified customers	7. Governments
8. Support a universal incentive application to determine an individual's eligibility across several EV programs	8. CARB, Air District, CCAs
9. Home charging incentives for income qualified EV owners	9. IOUs, Air District, governments, CCAs
10. Incentivize multifamily EV charging infrastructure where multifamily owners pay a fee for EV chargers but do not have to maintain or manage them	10. EVSE OEMs, governments, CCAs
11. Incentivize upgrading of electric panels at multifamily buildings for buildings that do not have the electrical capacity to accommodate an EV charging station	11. IOUs, CCAs
12. Build in time to assess existing incentives and shift/update those programs as market matures	12. Governments, IOUs, CCAs, Air District
13. Encourage State incentive programs to support all charging levels to fit with the varied use cases of EV drivers	13. Air District
14. Encourage managed charging software at public and multi-family charging locations	14. Air District
15. Offer zero interest loans and/or loan guarantees for individuals with low/poor credit	15. Governments, NGOs, financial institutions
Recommendation	**Responsibility**
Outreach and Education	
1. Coordinate with other grant programs on applicant demographic data to identify underserved groups	1. Governments, IOUs, CCAs, Air District, CARB
2. Work more closely with communities to better understand their unique needs and barriers to EV adoption	2. Governments, IOUs, CCAs, Air District, community-based organizations (CBO)
3. Conduct outreach and education in various languages	3. Governments, IOUs, CCAs, Air District, CBOs

4. Use community specific cultural media channels to share information (e.g. Spanish language radio, etc.)	4. Governments, IOUs, CCAs, Air District, CBOs
5. Acknowledge that EVs have been associated with gentrification while sharing information about incentives for income qualified residents	5. Air District, Governments, IOUs, CCAs
6. Aim to hire from within the community when recruiting staff or consultants to conduct stakeholder engagement (e.g. case managers, call centers, etc.)	6. Governments, IOUs, CCAs, Air District, CBOs, MTC
7. Focus marketing resources on the benefits of EV ownership that address major concerns and important vehicle purchasing factors	7. Governments, IOUs, CCAs, Air District, CBOs, CARB
8. Market the existence of available rebates and the stackability of rebates	8. Governments, IOUs, CCAs, Air District, CBOs, CARB
9. Partner with CBOs when delivering messages and rolling out grants	9. Governments, IOUs, CCAs, Air District, CARB
10. Provide materials about EV benefits in ride-hail EVs	10. Governments, CCAs, Air District
11. Provide technical assistance to gas stations to install EVSE, particularly in frontline communities	11. Governments, IOUs, CCAs, Air District, CBOs, CARB, CEC
12. Utilize permitting databases to reach gas stations and share factsheets on EVSE installations	12. Air District, CARB
13. Empower influential members of frontline communities and support them with the latest information to share with their communities	13. Governments, IOUs, CCAs, Air District
14. Provide briefings to elected public officials aimed at educating them and their staff about the relevant EV issues, policies, and programs	14. Air District, CBOs
15. Build strategies to increase *word-of-mouth* lead generation into program outreach plans	15. Governments, IOUs, CCAs, Air District, CBOs
Recommendation	**Responsibility**
Charging	
1. Develop a more accurate count of public EVSE in CA	1. CEC, CARB, California Public Utilities Commission (CPUC)

2. Develop an estimate of home chargers in California to assess the share of EV drivers that charge at home versus on the go or at work.	2. CEC, CARB, IOUs, CCAs, EVSE OEMs
3. Collect and showcase the range of charging solutions available in California, with the aim to showing the varied use cases EVSE OEMs can support	3. CEC, CARB
4. Assess viability for alternative charging modes (e.g. battery swapping)	4. CEC
5. Increase EVSE signage along major highways	5. Caltrans
6. Utilities provide grid side asset details to streamline identification of multifamily properties that would be least expensive to install EVSE	6. IOUs, CCAs

Advancing Equity in the EV Market

Air pollution from mobile sources disproportionately impacts residents in frontline communities that live near major roadways and high traffic commercial hubs. For this reason, low-income residents stand to benefit the most from the cleaner air that comes along with transportation electrification, as well as the cost-saving benefits of driving an EV.[31] In California as a whole, African Americans are exposed to 43% more micro particulate pollution (PM2.5) from vehicles than white residents; and Latinos are exposed to 39% more; and Asians 21% more than white Americans. Households earning less than $20,000 per year are exposed to 10% more PM2.5 than the state average, and 25% more than the wealthiest Californian households.[32] Additionally, both low-income and communities of color have faced numerous challenges to participating in the nation's economic and technological transitions, from the homeownership push that produced redlining of African American and Latino neighborhoods to the digital revolution that opened a still-gaping divide.[33]

Below are several recommendations aimed at increasing equity and inclusion in the EV market, with greater attention to the actions governments and grant administrators can take to

[31] The Greenlining Institute, Electric Vehicles for All: Equity Toolkit. https://greenlining.org/resources/electric-vehicles-for-all/

[32] Union of Concerned Scientists, *Inequitable Exposure to Air Pollution from Vehicles in California (2019)*, https://www.ucsusa.org/resources/inequitable-exposure-air-pollution-vehicles-california-2019

[33] The Washington Post, *Redlining was banned 50 years ago. It's still hurting minorities today*, https://www.washingtonpost.com/news/wonk/wp/2018/03/28/redlining-was-banned-50-years-ago-its-still-hurting-minorities-today/

expedite this necessary shift. Many of these recommendations are based on the Air District's experience administering grants, developing and implementing outreach strategies, and working with CBOs to advance clean transportation, but this is by no means an exhaustive list.

Prioritize funding for low-income households. Incentives play a vital role in the acceleration of transportation electrification. Within the EV market, early tax incentives have traditionally benefitted innovators and early adopters. Low-income households are typically the last to adopt new technologies[34], which are usually cost prohibitive. This is still true today in the EV market, most low-income households were left behind as new, cleaner vehicles are inaccessible financially for reasons such as low/no access to credit, being unbanked, etc. Further, the longer commute times within this community mean that early EV models, which tend to have shorter ranges, were unattractive due to range anxiety.[35]

Recently, however, there has been a much-needed shift to equity focused incentives. Programs such as the Clean Vehicle Assistance Program, Drive Clean Assistance Program, MCEv, Drive Forward Electric, California Vehicle Rebate Project, and Clean Cars for All (CCFA)[36] provide EV incentives that focus on low-income consumers. Additionally, providing loans and/or loan guarantees to residents with low or poor credit is key to supporting greater access to the EV market. In order to shift from innovators and early adopters to the late majority and laggards of the technology adoption cycle, incentives must continue to be prioritized for low-income households.

Incentive programs must coordinate and align program requirements. As more federal, state, and local incentives become available, it becomes increasingly difficult for consumers to understand and navigate these programs. This is particularly important as we strive to serve non-native English-speaking communities. Program eligibility requirements should be aligned to avoid confusion and can help lessen the administrative burden of income verification. Program administrators should work to build off one another. For example, if one program verifies applicant income, other programs can accept proof of enrollment in that program as income verification. They key is to avoid duplication and find efficiencies wherever possible. This reduces both the workload for program administrators and barriers to participation for consumers. Coordinating also helps with outreach and marketing, making it easier for consumers to combine or stack funding.

Provide multilingual and multicultural education, marketing, and outreach. The lack of consumer awareness and knowledge around EVs and charging technology continues to be a primary barrier to widespread adoption. Education, marketing, and outreach must not only be

[34] Pew Research Foundation, Digital divide persists even as lower-income Americans make gains in tech adoption, https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/

[35] *Ibid.*

[36] Funded by the Transportation Fund for Clean Air, California Climate Investments, and the VW Settlement Agreement. More information can be found at www.baaqmd.gov/cleancarsforall

available in multiple languages but must also be done in a way that conforms to the cultural norms and experiences of the communities being targeted. Language and cultural barriers limit accessibility of incentives to underserved communities of color and must be prioritized in order to limit the challenges and barriers of EV adoption.

For example, Clean Cars for All launched using several ride-and-drive events in DACs given the success of such events in the early years of EV outreach work. However, despite using several communication channels, offering free food and entertainment, the events attracted very low numbers of attendees. We used an approach that worked for educating early adopters, which are inherently a different type of consumer. Our challenge was discovering what types of events and outreach our frontline communities would respond well to and what messages were most effective. Once we came to this understanding, we shifted our focus and communicated with potential grantees through social media and encourage all of our early grantees to share the program information with their friends and family. As of November 2020, roughly 60% of our grantees hear about the program from friends or family members.

Invest in developing relationships with communities to increase participation. There are often sentiments of government distrust among frontline communities, particularly undocumented workers[37]. Working with trusted non-government agencies (NGOs) and CBOs can help bridge the gap between government and underserved communities to build trust and drive participation in incentive programs. Additionally, working with CBOs allows for better targeting of incentives to residents that are truly in need of assistance. As trust is built and participation grows, our experience has shown that word of mouth will become a major driver for outreach and participation.

Prioritize point-of-sale incentives. How an incentive is applied plays an important role in the accessibility of those funds, especially for low-income consumers. Incentives that are upfront can be accessed immediately, while an after-purchase incentive requires the customer to pay the money upfront and wait for reimbursement. In the case of EVs, many low-income residents are not able afford the higher upfront costs of EVs or qualify for a large enough loan to access these incentives. For residents that intend to cover the entire cost of their EV with the grant, an after the purchase rebate can force some grantees into even greater financial difficulty, negating some if not all of the benefits of participation.

Equity metrics must be clearly defined and (the right) data should be collected early and often. When demographic and socioeconomic metrics, baselines, and goals are clearly defined, progress can be measured and analyzed to identify areas of success and areas that need improvement. Collecting data early and often allows data collection to be segmented so

[37] California Energy Commission, Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities, https://assets.ctfassets.net/ntcn17ss1ow9/3SqKkJoNIvts2nYVPAOmGH/fe590149c3e39e51593231dc60eeeeff/TN214830_20161215T184655_SB_350_LowIncome_Barriers_Study_Part_A__Commission_Final_Report.pdf

applications aren't lengthy and overwhelming. The data can be used to identify underserved or underrepresented communities where more support and targeted outreach may be needed and can also help inform policy changes.

Air District Investments in Advancing Equity in the EV Market

The Air District has endeavored to integrate the recommendations above into existing grant programs. Below is a summary of what we have accomplished to date.

The Air District's Clean Cars for All Program (CCFA) [38] provides qualifying low-income residents up to $9,500 for scrapping an older vehicle and switching to a clean transportation option. Participants have the option to purchase or lease new and used PHEVs, BEVs, FCEVs, or receive a "mobility options" prepaid card for public transit, e-bikes, and car-sharing. There is an additional rebate of $2,000 to purchase and install a home EV charger. The incentive funding is based on participants' income levels and which clean transportation or vehicle option they select. CCFA conducts stakeholder engagement and outreach to frontline communities, contracts with case managers to support participants through the application process, and developed partnerships with dealerships, vehicle scrappers, and community-based organizations across the Bay Area.

In 2021, CCFA added an additional $500 incentive for grantees that purchase or lease an EV that are enrolled in one of the following low-income programs:

- Bureau of Indian Affairs (BIA) General Assistance
- CalFresh/Supplemental Nutrition Assistance Program (SNAP)
- CalWORKS (TANF) or Tribal TANF
- Cash Assistance Program for Immigrants (CAPI)
- Free or Reduced National School Lunch Program
- Head Start Income Eligible (Tribal Only)
- Low Income Home Energy Assistance Program (LIHEAP)
- Supplemental Security Income (SSI)

WIC - Women, Infants, and Children Supplemental Nutrition Program This funding was added to help grantees with the greatest need lower their financial burden to purchase a car, particularly used EVs that average $19,000.

Since CCFA launched in March 2019, we have received over 2,000 applications and as of November 2020, 1,337 residents have been awarded grants totaling over $10 million. Of the residents awarded CCFA grants, 60% make less than $30,000 a year and 67% do not own their home. The average new EV price is $37,000, the average used EV price is $19,000, and several

[38] Funded by the Transportation Fund for Clean Air, California Climate Investments, and the VW Settlement Agreement. More information can be found at www.baaqmd.gov/cleancarsforall

grantees have purchased used EVs under $10,000 (resulting in no or very little out of pocket costs).

In addition to vehicle incentives, the Air District has offered the Charge! Program since 2016, which provides funding to offset the cost of purchasing and installing public EV charging infrastructure. Charge! has supported the deployment of over 2,900 publicly accessible Level 2 and 121 publicly accessible DC Fast charging ports at over 363 locations in the region.

For many EV owners, private charging located in their place of residence offers the convenience to reduce range anxiety (the fear of running out of fuel). However, for the approximately 36% of Bay Area housing units are multifamily buildings, home charging is not an option.[39] The Air District is committed to making EVs accessible to everyone, and adequate EV charging is a key component of that effort. For this reason, additional funds are allocated to projects at multifamily buildings, which encounter significant challenges to EV charger installation and operation.

The Air District's Community Health Protection Program (AB617) is an important companion effort for achieving the overall goals and specific equity measures in this Plan, and we will work through our communities' AB617 Steering Committees to collect ongoing input on implementation efforts.

The Air District will continue to seek funding for these grant programs and will encourage other public agencies to transition incentives to serve residents and businesses in frontline communities that are disproportionately impacted by air pollution.

[39] American Fact Finder, United States Census Bureau. January 2019. Available online: https://data.census.gov/cedsci/table?q=Housing&g=0500000US06001,06013,06041,06055,06075,06081,06085,06095,06097&tid=ACSDP1Y2016.DP04&hidePreview=true

Conclusion

The transportation sector continues to be the largest source of our greenhouse gas emissions and contributes to depressed health outcomes in frontline communities that are disproportionately impact by such pollution. The Air District will seek to review and update this Plan's equity outcomes and recommended adjustments as warranted, including strategies to further expand infrastructure for hydrogen fuel cell vehicles. The Air District is committed to securing cleaner air and access to clean vehicles and clean transportation options for all residents in our jurisdiction. Programs that provide support to residents that are low-income, and people of color are critical to meeting our ambitious transportation electrification goals. The Air District will utilize our position as a regional agency to motivate state and national leadership and support local action to encourage EV adoption in our communities.

Acknowledgements

The Air District wishes to thank the following people and organizations that assisted us in this project by providing contacts and recommendations for market test interviews and site assessments.

- MTC
- The Center for Sustainable Energy
- Ecology Action
- PCE
- East Bay Clean Cities
- CPUC
- Grid Alternatives
- Greenlight Labs
- Kearns & West

Finally, our deep appreciation to the Bay Area EV Coordinating Council for providing thought leadership support and subject matter expertise.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Cindy Chavez and Members
of the Technology Implementation Office Steering Committee

From: Jack P. Broadbent
Executive Officer/APCO

Date: May 21, 2021

Re: Climate Tech Finance Impact Report

RECOMMENDED ACTION

None; receive and file.

BACKGROUND

Climate Tech Finance is the Air District's first loan program, with the aim of reducing greenhouse gases by accelerating the adoption of climate technologies. The program offers two financing vehicles: loan guarantees to improve access to credit for climate technology developers, and direct loans to improve local government access to capital when buying greenhouse gas-lowering technologies. These financial products are offered through a partnership with the California Infrastructure and Economic Development Bank (IBank).

The Air District launched the Climate Tech Finance program in 2019 and executed outreach and engagement with over 1,000 Bay Area organizations to identify potential loan projects. From that outreach, the program has funded two loan guarantee projects, approved eight more projects for funding, and developed a pipeline of several dozen near-term climate projects.

The loan guarantee projects that Climate Tech Finance has funded are:

- SW/TCH Maritime, a hydrogen fuel cell ferry that will service passengers between San Francisco and Oakland. The Air District has encumbered $250,000 to support this loan worth $5,000,000 over a five-year term; and

- Gridscape Solutions, a provider of renewable microgrids for public and private sector buildings. The Air District has encumbered $100,000 to support this $1,000,000, one-year line of credit.

Together, the Air District committed $350,000 to support these loans totaling $6,000,000, a leverage ratio of over 17 to 1.

The Climate Tech Finance program has also approved eight additional projects for funding, all loan guarantees. The companies supported by these loan guarantees are currently in discussions with banks to execute their respective loans.

- A company scaling up production of integrated residential battery systems;
- A demand-response software to provide low-carbon grid stability;
- A company scaling up deployment of battery-boosted electric vehicle chargers;
- An in-road energy recovery system at toll gates;
- An energy-efficient cooling technology for data centers;
- A project to produce concrete from low-carbon aggregate;
- An ultracapacitor technology to improve energy storage performance; and
- A company deploying solar-powered electric vehicle chargers.

If the banks approve the above projects, the total Air District commitment to guarantee these loans would be approximately $1.7 million. By leveraging additional assets through its partnership with IBank, the Air District's $1.7 million commitment would be supporting an additional $20 million in total loan value.

Staff have also had discussions on 43 more specific climate projects in the Bay Area actively seeking financing. In total, the program has identified over $500 million in demand for climate loans in the Bay Area.

DISCUSSION

In late 2020, staff began developing a Climate Tech Finance Impact Report to summarize progress to date and capture lessons learned from two years of outreach and implementation. After drafting the report and incorporating feedback from internal and external stakeholders, staff distributed the report to targeted audiences in early 2021. Staff are continuing to update the report with additional feedback from these audiences, and to reflect the changing climate investment landscape in 2021.

The Impact Report (Attachment 1) provides an overview of the Climate Tech Finance program, a description of actions and outcomes (both qualitative and quantitative), and summarizes lessons learned from the program to date. The key lessons described in the report include:

On loan guarantees:

- Loan guarantees increase small businesses' working capital flexibility and reinvestment potential;
- Enhancing capital access works by building bank comfort with unfamiliar technologies; and
- Going through the process of developing a loan guarantee may itself reduce risk.

On public sector direct loans:

- Current Climate Tech loans do not offer superior enough lending to spur the market; and
- Loans satisfy a capital need but are not a subsidy.

On sustainable financing platforms:

- Partnerships accelerate program growth;
- Accelerating climate projects requires engaging with multiple clients; and
- Lending can leverage and revolve public funds for amplified impact.

Staff are seeking input from the Steering Committee on the results of the Impact Report, particularly lessons learned and appropriate actions to take in response.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Derrick Tang
Reviewed by: Damian Breen and Jeff McKay

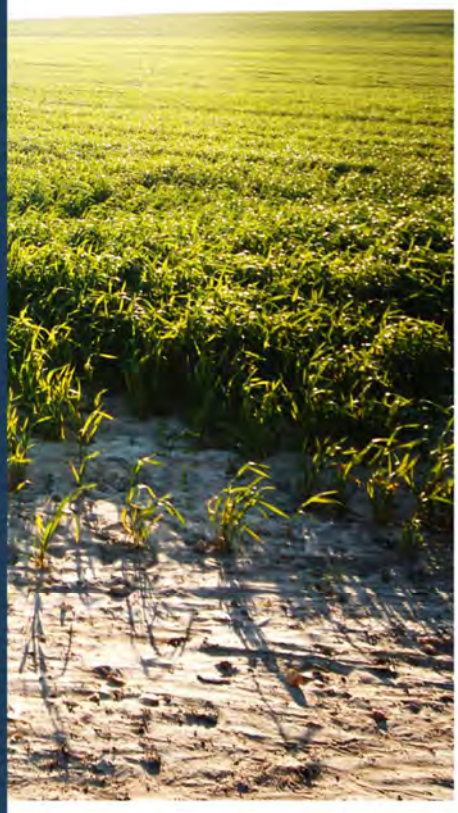
Attachment 4A: Climate Tech Finance Impact Report

Bay Area Air Quality Management District

CLIMATE TECH FINANCE

Impact Report

How Increasing Access to Capital Is Reducing Greenhouse Gases



March 2021

Climate Tech Finance: Executive Summary

What is Climate Tech Finance? It is an environmental finance partnership with a unique model to accelerate climate technology commercialization. Its mission is to reduce greenhouse gases by offsetting risk for lenders and increasing access to capital for entrepreneurs.

What does Climate Tech Finance do? It bridges a financial gap for entrepreneurs by securing working capital to commercialize technology faster. It also offers direct lending for customers to adopt climate technologies sooner.

How does Climate Tech Finance work? The initiative was designed in 2018 and fully launched in 2019. During its development and operation since then, the program has done the following:

- Built a partnership between the Bay Area Air Quality Management District (BAAQMD) and the California Infrastructure and Economic Development (IBank). This first-of-its-kind partnership combines **BAAQMD's technical expertise** on sources of pollution with **IBank's financial expertise** in lending and economic development.
- Launched a capital access program for emerging technology commercialization in the private sector. Entrepreneurs get earlier access to debt through commercial lending through a **loan guarantee that insures up to 90%** of a bank loan. These loan guarantees and the lending support provided through this partnership help banks find comfort supporting new technology ventures.
- Launched a direct financing program to spur technology adoption in the public sector. Public agencies can **borrow up to $30M** on a term of up to 30 years. BAAQMD subsidizes the loan by contributing capital at 0% interest as an incentive for climate tech adoption projects.
- Published a *Climate Technology Review* that assesses nearly 200 climate technologies. This review highlights the **accessibility of climate technology** and reduces the information search costs for potential technology adopters. This report recommends technologies with demonstrated technical merit, high potential to reduce greenhouse gases, and strong economic credentials.
- Conducted outreach to over a thousand organizations, hosted technology showcase and networking events, and built bridges to technology R&D programs and incubators to help climate entrepreneurs make a successful **transition from demonstration projects into market growth**. Our continuing goal is to build these connections in the public and private sectors.

Climate Tech Finance at a glance

- Financing partnership that combines emission reduction expertise with community banking expertise
- Use of revolving funds to speed low-GHG tech to market and into use
- Loan guarantees of up to $2.5M to support emerging climate tech
- Loans of up to $30M to support climate tech adoption
- A growing network of participating lenders, with four new banks in the last year
- Identification of $500M in fundable projects in the Bay Area

Outcomes of Climate Tech Finance So Far

- **Climate Tech loan guarantees have already accelerated two zero-emission technologies**. A $5 million guaranteed loan is supporting commercialization of a first-of-its-kind hydrogen fuel cell ferry. A $1 million guaranteed loan is accelerating installation of software-enabled, solar-battery microgrids at municipal facilities around the Bay Area.
- **Climate Tech Finance projects produce multiple co-benefits**. Funding for the zero-emission ferry is expected to reduce 30,000 metric tons CO_2e over five years, create 63 jobs, and reduce diesel emissions in disadvantaged communities around the Port of Oakland and eastern San Francisco. Microgrid deployments are expected to reduce 10,000 metric tons CO_2e over five years, support 12 jobs, increase electrical grid resiliency, and prevent use of diesel generators.

75 jobs created by the first two Climate Tech Finance projects.

- **We have qualified ten companies from diverse sectors for lending support**. Dozens more are in the pipeline, and we are building partnerships to connect with hundreds of others. We have focused efforts on advanced energy systems, including microgrids, distributed energy resources, and zero-emission backup/mobile power.
- **We bring commercial lenders to the climate investment space**. Over a dozen banks have been engaged in conversations about emerging technology, and four new banks have joined as certified lenders for climate projects, two of which have funded Climate Tech Finance projects.
- **We have identified ample demand for climate financing**. In total, we have engaged with dozens of climate projects in the Bay Area that are actively seeking financing totaling half a billion dollars.

$500 million, amount of loan funds dozens of climate projects are pursuing in the Bay Area.

Key Insights of Climate Tech Finance So Far

- **Organizations need working capital to accelerate climate tech.** Our team has already identified nearly $500 million in shovel-ready climate tech adoption opportunities in the Bay Area. A dedicated lending program would close the gap between the need for affordable capital that greatly exceeds available funds – and could transform the lending market for climate tech adoption.
- **Lending partnerships can accelerate climate technology innovation.** We have supported $6 million in loans for our first two projects and have qualified eight additional projects for support on $20 million in loans. Our pipeline of promising leads involves a dozen more projects and $50 million in loans. Based on this deal flow, a dedicated $50-100 million fund could accelerate climate tech development and adoption and drive the lending market for low-carbon technologies.
- **Lending leverages and revolves public funds for maximal impact.** The Climate Tech Finance program leverages up to $10 in private capital for every $1 of public capital encumbered. These funds generally revolve in 5 years or less.
- **Innovation financing accelerates reductions and aggregate impacts.** The first half dozen projects in our program will reduce nearly 30,000 metric tons CO_2e in the first year of their loans. After five years these ventures will be able to reduce almost 500,000 metric tons CO_2e or more annually.
- **Climate Tech Finance positions its partners at the center of climate tech innovation and investment.** In addition to attracting a tech development and deployment labor pool, climate tech innovation financing builds closer relationships between banks and new tech sectors that aid job and business growth.

Overview of Climate Tech Finance

Climate Tech Finance is a financial services platform developed to shorten time to market for emerging climate technologies and to increase their uptake in the Bay Area and beyond. The financial services developed and tested on this platform are meant to improve access to capital and, in so doing, close funding gaps in technology innovation. The end goal is to speed up maturation of emerging technologies and to increase the probability that a wider range of climate tech will succeed in the market and be widely adopted.

Over the last two years Climate Tech Finance has put a direct and an indirect capital access product into the marketplace. In doing so, it has sought to evaluate whether a low-interest loan can help public agencies install climate tech more easily or readily. It has similarly tested whether a tailored small business loan guarantee can help climate tech entrepreneurs introduce and expand product offerings more quickly and successfully.

Partnership Structure. Climate Tech Finance is a novel public-public environmental finance partnership. It was conceived at the Bay Area Air Quality Management District (Air District) and developed in partnership with the California Infrastructure and Economic Development Bank (IBank)[1] and with Northern California Financial Development Corporation (NorCal FDC).[2] It is the first partnership between IBank and one of California's thirty-five air districts and the first partnership between an air district and a regional financial development corporation like NorCal FDC. It is the first lending program at the Bay Area Air Quality Management District and its first acceleration program for emerging technology. In all, Climate Tech Finance creates a new set of relationships and brings together skills in an entrepreneurial way to develop new State capacity to address climate change.

Figure 1. Climate Tech Finance Partnership

Although the partnership does not follow in the footsteps of previous efforts, it has the benefit of drawing upon an existing set of financial instruments. Climate Tech lending products are variants of IBank's Infrastructure State Revolving Fund (ISRF) loans[3] and of the loan guarantee offered through the State Loan Guarantee program.[4] Building on top of these successful financial instruments has allowed partners to focus on applying them to spur emerging technologies and targeting them on low-carbon technologies and projects.

The partnership structure synergizes the talents of the Air District, IBank, and NorCal FDC (Figure 1). Our *Project Development* efforts leverage the local relationships of NorCal and the Air District to identify lending needs and technology acceleration opportunities. *Financing Know-how* draws on IBank and NorCal FDC's well-developed lending instruments as well as their accrued reputations in community banking and public finance. The *Financial Capital* for loans and loan guarantees is available through IBank, with the Air District providing capital to lower the interest rate for loans and to raise the percentage of a guarantee. In addition to these core functions, the partners provide various support

[1] https://ibank.ca.gov/ or see IBank's comprehensive annual report
[2] https://nor-calfdc.org/ or see NorCal FDC's annual report
[3] https://ibank.ca.gov/loans/infrastructure-loans/
[4] https://ibank.ca.gov/small-business/loan-guarantees/

services that help target climate tech and improve the viability of the lending projects. These services include climate technology review, climate impact assessment, technology development coaching, and financial network introductions.

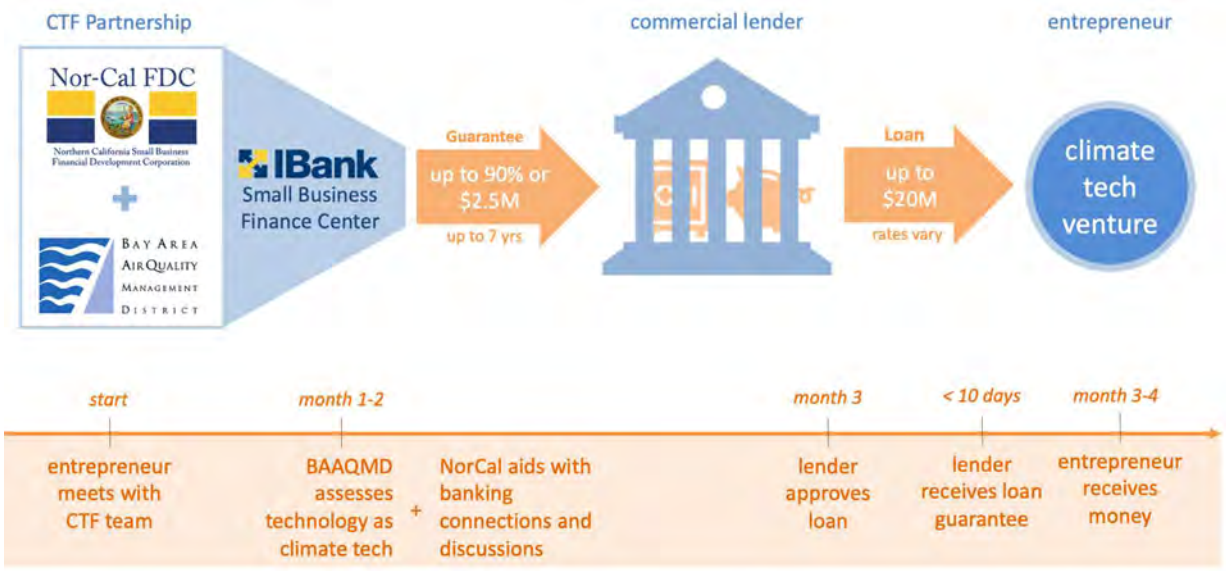
In short, the partnership combines the expertise and services of three organizations to develop fundable projects, and the products are used to fund technology projects that are both emerging and lower-carbon solutions. It also enhances the ability of regional government to guide and drive economic development.

Financial Products. Over the last two years the Climate Tech Finance partnership has introduced two lending products into the marketplace. These products have been designed to expand access to commercial lending markets and to aid cash flow management.

One product is a **Climate Tech loan guarantee**. This product supports commercialization of climate technology and is available to private-sector organizations. It insures up to 90% of the value of a commercial loan to an entrepreneur of low-carbon technology. This financial insurance is effectively a higher-tier version of the standard loan guarantee backed by the trust fund of the fifty-year-old State Loan Guarantee program. Financial development corporations like NorCal FDC identify and develop loan guarantee recommendations, and the Small Business Finance Center within IBank administers the trust fund and issues a loan guarantee upon origination of a commercial loan. Along with IBank, the Air District is a capital contributor to the loan guarantee.

Climate Tech loan guarantees draw together staff from the Air District and from NorCal FDC into cross-organizational teams. These teams blend the scientific and engineering expertise of the Air District with the community banking and economic development expertise of NorCal FDC, and they collaborate on the identification of potentially fundable products and on the development of loan guarantees for them. The Air District takes the lead in work with an entrepreneur to estimate the climate impacts of each unique emerging technology. NorCal FDC works with the potential borrower to develop successful relationships with commercial lenders. This team works together to attract and recruit commercial banks, credit unions, and community development financial institutions to participate in the loan guarantee program. Their participation is key, given that effect of a Climate Tech loan guarantee is to de-risk working capital loans to climate tech entrepreneurs for commercial lenders (Figure 2).

Figure 2. Support for Tech Development: Small Business Loan Guarantee for Entrepreneurs



The other product is a **Climate Tech loan**. This product can be used to finance public projects that adopt new climate tech. Loans can be up to $30 million and can amortize funds for up to 30 years. Climate Tech loan interest rates are based on the market, but the interest rate is subsidized by a 0% interest capital contribution from the Air District of up to 25% of the loan value or a maximum of $1 million. Like the loan guarantee, both IBank and the Air District are capital contributors on a Climate Tech loan.

Climate Tech loans blend the technology and project development expertise of the Air District with the lending expertise of IBank. The Air District takes the lead identifying potential projects and attracting client interest in the lending opportunity. The Air District also works with an organization to estimate the climate impacts of the project and assure that it includes relevant climate tech. IBank reviews a project's creditworthiness and provides all administrative services over the life of the loan (Figure 3).

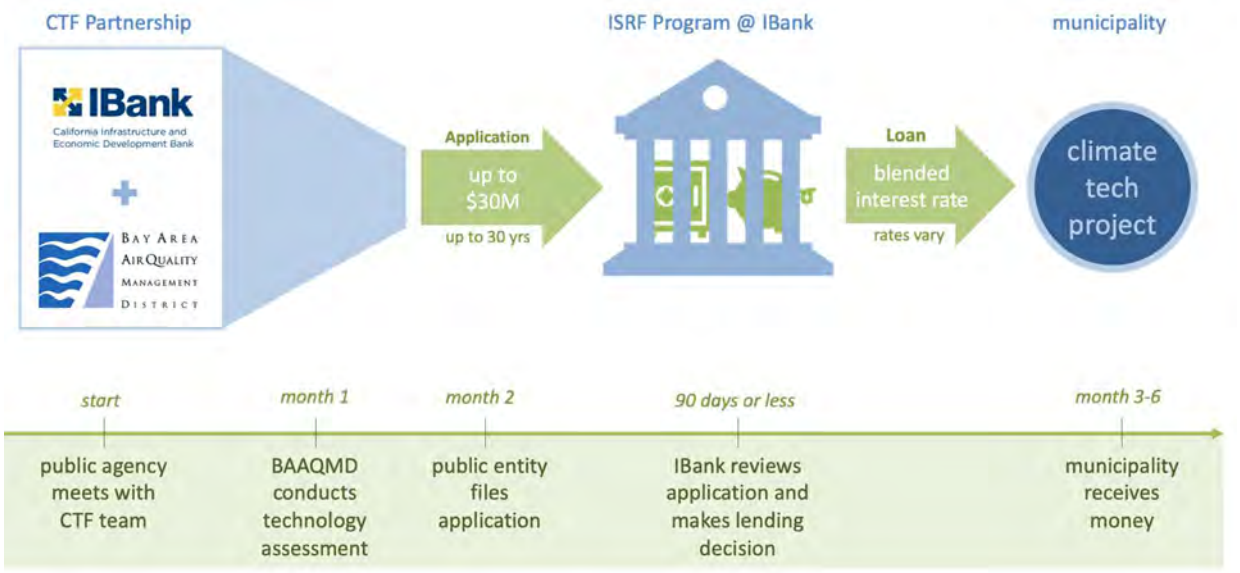
Climate Tech loan guarantee

- Tech qualification required
- Issued to commercial lender
- Up to 90% of a loan value
- Maximum payout of $2.5M
- Last up to seven years
- Sunsets upon repayment

Climate Tech loan

- Project qualification required
- Lent to public entity
- From $0.5M to $30M
- Up to 30 years
- Subsidized interest rate

Figure 3. Support for Tech Adoption: Low-interest Loans for Public Projects



Actions & Outcomes

Over the last two years the Climate Tech Finance partnership introduced Climate Tech loans and loan guarantees into the marketplace. This section summarizes actions taken and describes outputs and outcomes.

Actions Taken. Climate Tech lending products were new to the marketplace when we began this effort. To raise awareness and attract consideration of them, the partnership relied on a combination of outbound and inbound marketing techniques. Our outbound marketing relied on virtual and in-person events. These included webinars, on-site presentations, mini-conferences, and technology open houses. We used marketing emails and outreach phone calls to identify potential funding prospects. Our inbound techniques relied on word-of-mouth communication and on the engagement networks of the underlying entities engaged in the Climate Tech Finance partnership.

In our marketing efforts, we looked for market channels[5] that could be a source of leads for our efforts.

- We looked to establish funding pipelines with technology innovation funding or incubation programs upstream of our efforts. Our objective has been for technology ventures exiting demonstration phase and beginning commercialization phases of venture development to know about Climate Tech Finance. We worked toward channels with four initiatives: two technology incubators, one technology accelerator, and one State government R&D program. We found two of our qualified projects this way.

- We worked to introduce and socialize Climate Tech lending products by connecting with business and industry sector associations. In doing so, we looked for feedback about the ability of our products to support financing needs and to encourage word-of-mouth communication that could help identify project leads. We worked to establish channels with four technology networks: two statewide trade groups, one regional trade group, and one technology alliance.

In addition to market channels, we look to complementary programs that we thought could be sources of potential financing leads. Such programs are those that would help us identify infrastructure development or upgrade projects that were or could be deploying climate tech. The goal was to see whether these projects might accelerate through the availability of our funding and/or might be able to make modest changes to their

[5] We use the term "market channels" in reference to technology innovation pipelines that can "graduate" entrepreneurs from R&D programs, incubators, and successful pilot projects into early commercialization and readiness for Climate Tech Finance products. We also use it in reference to technology innovation networks and trade associations that can connect us with organizations who are developing projects whose design might be shaped or supported by Climate Tech Finance products.

technology deployment and funding plans to take advantage of our lending products. We drew data from four such programs: an air district permitting database, the State database of projects going through review under the California Environmental Quality Act (CEQA), and the EPA WIFIA Program and California's Clean Water State Revolving loan Fund (CWSRF) that fund upgrades to water and wastewater treatment facilities.

We combined direct client marketing and market channel identification with network-based matchmaking events. These events provided opportunities to promote Climate Tech lending products, but they were primarily designed to facilitate connections between climate tech vendors and potential customers. In this sense, the objective of these events was to create peer-learning circumstances for current and future adopters of climate tech. In short, the Air District explored the possibility of accelerating technology not only by placing lending products in the market, but also by creating learning spaces for climate tech deployment. Our matchmaking engagements included our mini-conference *Climate Tech Network* meetings and our technology showcase *Climate Tech Marketplace* events.

Outputs and Outcomes. Climate Tech Finance marketing focused on growing market awareness of Climate Tech lending products, on identifying fundable low-carbon technology projects, and on facilitating connections among vendors and potential customers that support tech deployment. In the process of doing this work, we documented our contacts with entrepreneurs and public agencies in a customer relationship management (CRM) database. This CRM helped us track our marketing efforts. It also helped us log projects details about potential climate tech projects and gauge the size of the potential climate tech marketplace.

Based on data in our CRM about near-term project finance opportunities, we estimated the current market size for our loan guarantees at $50 million. This number aggregated the potential market size for only those entrepreneurs engaged with us in detailed enough conversation for us to be able to quantify their working capital needs. Because our marketing was limited, we found it reasonable to estimate that the size of the climate tech marketplace for loan guarantees may be even larger.

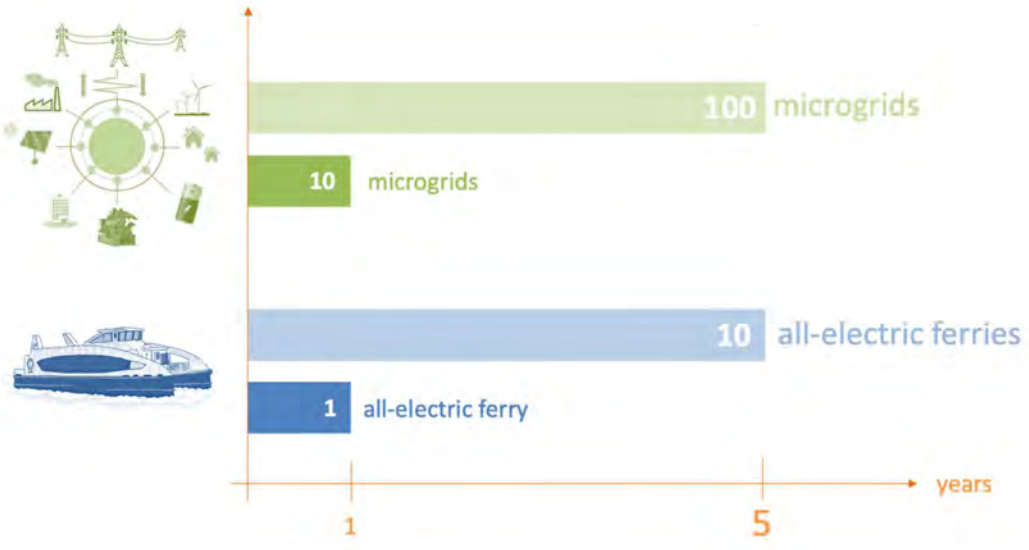
Similarly based on our CRM, we estimated market size for Climate Tech adoption at $500 million. This number was based on projects with funding gaps and likely eligibility for a Climate Tech loan. These projects were identified through direct engagement with organizations. Like our estimate of the marketplace for loan guarantees, our estimate of market size was limited by the number of direct contacts made. As a result, we estimated that actual size of the market may be well over $1 billion.

Project Examples. As of this report, Climate Tech lending tool has been used to fund two projects. Our first project uses a $5 million term loan to accelerate the commercialization of a hydrogen fuel cell ferry into service on San Francisco Bay. This ferry will begin operating on a route between Oakland and San Francisco in the first half of 2021. In addition to reducing climate pollution, this project will reduce diesel emission impacts for disadvantaged communities around the Port of Oakland and San Francisco. It will also serve as the flagship for a planned fleet of similar zero-emission harborcraft.

Our second project uses a $1 million line of credit to accelerate the installation of turn-key microgrids at municipal facilities. This technology integrates custom energy management software with solar photovoltaic systems, lithium-based battery systems, and delivery systems, such as building electrification and electric vehicle charging. These systems help to provide load balancing on the grid and to increase resilience of critical municipal facilities and will help prevent the spread of diesel-based back-up generators.

Climate Tech loan guarantees are intended to support development and expansion of an entrepreneur's customer base. Their loans are based on their project flow in the next year, and their total technology impacts are based on anticipated deployments over the next five years (Figure 6).

Figure 6. Projected One-year and Five-year Technology Impacts



Similar to technology impacts, Climate Tech Finance evaluates the climate impacts of projects over a five-year timeframe. For these first two projects, climate tech deployments are anticipated to prevent 40,000 metric tons of carbon dioxide equivalent emissions over the next five years.

Figure 7. Projected One-year and Five-year Climate Mitigation Impacts ($MTCO_2e$)

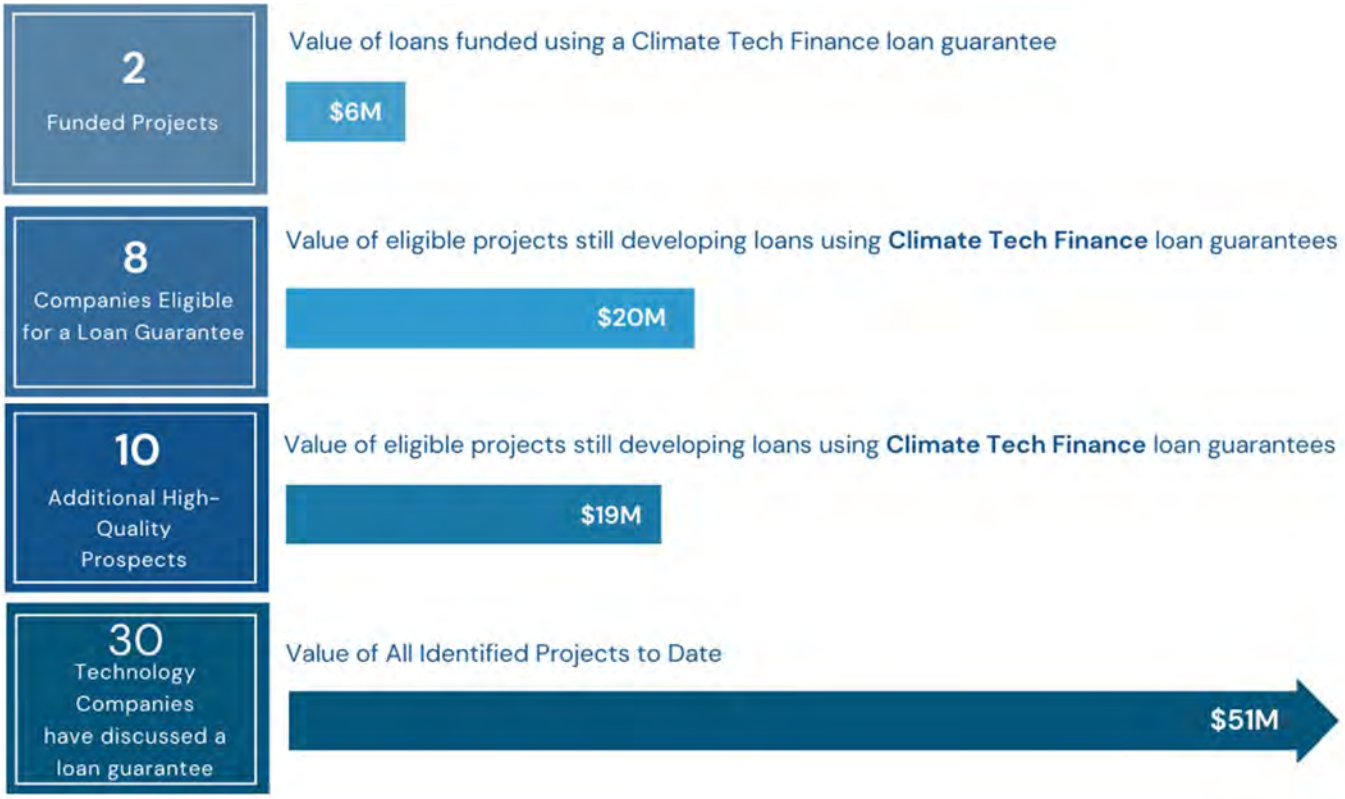
Funded projects tell only part of the story. Eight additional technology development projects in our pipeline have undergone a technology review and greenhouse gas reduction impact analysis to qualify for a Climate Tech loan guarantee. These projects are now in loan development conversations with commercial lenders. Figure 8 highlights details about these projects.

Figure 8. Projects Currently Seeking Funding Using Climate Tech Lending Products

Based on our technology review and greenhouse gas assessment for these projects, we predict that these projects will deploy technology at rates similar to our first two and will prevent half a million metric tons of carbon dioxide over five years.

In total, we have supported $6 million in loans for two projects and have qualified eight additional projects for support on $20 million in loans. If we look at the promising leads and prospects in our pipeline, we see potential to support a dozen more projects exceeding $50 million in loans.

Figure 9. Project Pipeline for Climate Tech Lending Products



Beyond project funding, Climate Tech Finance outcomes might also be evaluated in terms of yield from our matchmaking efforts. While more qualitative in nature, our networking efforts have resulted in such outcomes as initiating talks for a wastewater treatment plant to buy an emerging biosolids treatment technology and facilitating a plant inviting a startup to build a pilot-scale production facility on site.

Lessons Learned

Our ultimate goal is to spur technology development and adoption. Our more proximate goal is to place our products into the marketplace and assess to what extent they are understandable and competitive enough to attract customers. To this end, we compiled data about the market response to our products as well as about financing gaps for climate tech adoption projects. We used these to make inferences about the demand for this kind of lending. Here we break these insights down for our lending products.

On Loan Guarantees to Expand Entrepreneurs' Access to Capital. As a form of financial insurance, a loan guarantee is an indirect lending product. It facilitates a "deal" between a commercial lender and an entrepreneur. For the lender it does so by absorbing some of risk of loan default that derives from economic and logistical contingencies that a lender and borrower may find difficult to assess for emerging technologies. In doing so, it enables a lender to reach new clients, lend in new sectors, and certainly find comfort making a deal that involves new technologies. For the entrepreneur, a loan guarantee increases access to working capital needed to grow a business. In addition to increasing capital access, it can adapt to an entrepreneur's needs. This could include building inventory, servicing clients, investing in infrastructure, etc. It also be used to de-risk different types of loans, like term loans, delayed draft term loans, and lines of credit.

- **Entrepreneurs have shown strong interest in the loan guarantee**. As owners of small businesses producing early mature products, they need capital to fuel their growth, and they quickly learn that commercial lending is an attractive and lower-cost source of money. However, building bank confidence in their venture and creditworthiness is a challenge, and the Climate Tech loan guarantee helps grow a lender's financial and business comfort with their product. In some cases it opens the door in a lending relationship. In others it helps keep it open.

- **Loan guarantees increase small businesses' working capital flexibility and reinvestment potential**. This program spurs climate tech innovation by expanding access to capital. While equity providers offer a variety of resources for business startups (e.g., business advising, market connections, additional wealth networks), commercial lending offers less expensive and more flexible working capital. We assume that this flexibility in use of working capital makes it easier for entrepreneurs to grow and for a business owner to use profits for business reinvestment or expansion of their business portfolio. As an example, our first funded project looked to a commercial loan to accelerate its reinvestment of capital and to expand production a year earlier than its capital flows would have otherwise enabled.

- **Lenders have demonstrated interest in the loan guarantee** by registering for the State Loan Guarantee Program, which enables them to receive a Climate Tech loan guarantee. The first two funded Climate Tech Finance projects were with banks who filed new or renewed their certifications as participating lenders. We anticipate the next few funded projects may also bring new participating lenders into the State loan guarantee program. The ongoing marketing effort for Climate Tech Finance is building lender confidence in being lenders to emerging technology and in the trust fund for the State loan guarantee program.

- **There is a significant, untapped market for loan guarantees**. We have identified dozens of small business ventures advancing individual climate technologies and the market for climate technologies who reach the capital gap that we have identified. (Mature enough but not perceived to be low risk enough to access capital via a bank.) On average over the last year we have identified 1-2 such ventures every month and qualified roughly 1 per month.

- **Enhancing capital access works by building bank comfort with unfamiliar technologies**. Lending for a new business means that a bank must assure that the venture has the resources and skills likely to succeed in loan repayment. Lending to a new business with emerging technology involves additional contingencies associated with getting a new technology to work and its market going. A loan guarantee serves the purpose primarily of helping a bank manage this second set of contingencies. It de-risks this outer layer of concern that may lie beyond a banker's experience and that it cannot analyze confidently. This is the primary service of an emerging tech loan guarantee. A loan guarantee does not change a banker's risk management requirements or the banking regulations. It also does not appear to change the terms of a loan. The financial insurance primarily grows the comfort of banks. It helps them hedge against contingencies that they cannot anticipate.

- **Going through the process of developing a loan guarantee may itself reduce risk**. The third-party technology and financial reviews that are part of the Climate Tech loan guarantee eligibility evaluation may do more than qualify a project. They also create environmental, technological, and financial observation that can increase the viability of a project and its probability of success.

On Loans to Accelerate Public Sector Adoption of Climate Tech. Our early marketing of direct loans targeted the Bay Area wastewater sector. We took this approach for two reasons: the Air District regulates emissions from industrial facilities, and the capital deployed through Climate Tech Finance direct loans must remain under public ownership. Wastewater treatment plants match these characteristics. Additionally, there are several types of climate tech that wastewater treatment plants can adopt to lower their greenhouse gas emissions.

Over the last two years roughly five dozen wastewater treatment facilities in the Bay Area have been introduced to new low-carbon technologies and the availability of financing support through the efforts of Climate Tech Finance. Because wastewater treatment plants have periodic capital planning projects that often take between five and ten years to execute, we anticipate only a half dozen significant improvement projects in any given year. Over the last year six wastewater treatment plants considered this financial tool, two of which took it to their board. We have not seen rapid uptake of Climate Tech loans, but we have found evidence of substantial interest in project financing. We see ways that the Climate Tech loans could meet this interest under different market conditions or with a different structure. We summarize these insights here.

- **Funding gaps are potentially widespread**. During our marketing of Climate Tech loans to facilities around the Bay Area, we identified over $500 million in funding needs associated with projects adopting climate tech. Because our observations are drawn from focused marketing in one industry sector (wastewater treatment) and more casual for one technology (advanced energy systems) and an emerging resource management sector (biomass recovery), we speculate that financing interests are more widespread and bigger than what we have seen.

- **Current Climate Tech loans do not offer superior enough lending to spur the market**. Climate Tech loans have been able to offer capital at a lending rate between 2.4 and 3.4 percent, depending on project size, location, and loan term. Initially this lending rate was competitive, but not more than marginally superior. Over the last year interest rates have fallen to below 2 percent, both in the bond market and from commercial lenders. Niche government programs, such as US EPA's Water Infrastructure Finance and Innovation Act (WIFIA) program, may also offer larger loans or half-market rates. To be superior as a technology accelerator, Climate Tech loans need a deeper subsidy that enable them to outcompete alternative, cheaper, but sluggish loan or bond options.

- **Loans satisfy a capital need but are not a subsidy**. Loans do not reduce the cost or "buy down" the cost of a new technology. Instead, they enable that cost to spread out over time provide access to capital for a technology that is affordable but whose purchase is limited by cash flow. Without a compelling reason or existing plan to adopt a new technology, it is difficult to attract their interest with a loan. Thus, loans work best when they align with an existing plan or compelling need. Alternatively, even a small subsidy may psychologically assist lending as a technology driver. Even if it does not have a substantive impact on the overall costs, some organizations may be motivated by the existence of a subsidy, even if of only modest or symbolic size. Some sectors (e.g., schools) see rebates as an important part of their project currency. (This may be based on people's relative thinking about expenditures, per recent social science. It may be a psychological/social hurdle for them to take finance without a rebate.) It is unclear if our current offering to cover fees (which would be in the $10k range) is attractive.

On Creating a Sustainable Financing Platform. Climate Tech Finance has used a novel public-public financial partnership to leverage the assets of three organizations. We turn here to lessons learned about starting a lending program, reflecting on this structure and on our marketing strategy.

- **Partnerships that combine assets accelerate program growth**. The novelty of this partnership is its combination of the Air District's technical expertise and knowledge about emission sources with IBank and NorCal FDC's financial expertise and trust among capital lenders. The partnership was able to leverage IBank's ISRF program and the State small business loan guarantee program to accelerate climate tech, NorCal FDC's network of banking relationships and community reputation, and the Air District's technical knowledge. The blending of this expertise helped the partnership generate momentum. This was particularly true for lead generation and loan development, given that lending benefits greatly from locale familiarity and local relationships.

- **Accelerating climate projects requires engaging with multiple clients**. For Climate Tech loans, there are two clients, and they are internal to the same organization. One is the facility designer, who selects climate tech as part of a facility design. The other is the public finance managers, who chooses how to finance debt for a project that includes climate tech. For Climate Tech loan guarantees, there are two clients, and they are different market actors. One is the entrepreneur who is looking to borrow capital. The other is the bank who lends capital. For Climate Tech loan guarantees we need to bring people together to make a

deal. For a Climate Tech loan we needed to bridge decision making within an organization to support a project.

- **A larger, lower-interest loan fund would accelerate project development**. We interpret progress to date as validation of the viability of the Climate Tech loan guarantee as an instrument for accelerating the commercialization of climate technologies. We have supported $6 million in loans for two projects, qualified eight more worth $20 million, and see potential to support a dozen more projects exceeding $50 million in loans. Based on our outreach, we anticipate that the aggregate lending demand to accelerate climate tech adoption in the Bay Area is $500 million or more. Establishing a dedicated, revolving fund of $50-100 million to support these types of projects at superior rates could be a significant accelerator for climate tech entrepreneurship.

- **Lending leverages and revolves public funds for maximal impact**. The Climate Tech Finance program leverages up to $10 in private capital for every $1 of public capital encumbered. The historic loan default rate suggests that 98% or more of these funds will become available for subsequent lending, resulting in the public capital revolving every seven years or less.

- **Climate Tech Finance positions its partners at the center of climate tech innovation**. In addition to attracting entrepreneurs, it has the potential to add jobs and build a technology development and deployment labor pool. It also aids job and business growth by building closer relationships between banks and new tech sectors and greater economic development rapport between the State and the low-carbon economy.

Climate Tech Finance Case Study: **SWITCH Maritime and Zero-Emission Harborcraft**

The creation of zero-emission harborcraft on San Francisco Bay was a dream when Governor Newsom was Mayor. Today, with some help from Climate Tech Finance, that dream is about to come true.

What is SWITCH Maritime? SWITCH Maritime (SWITCH) is a company building the first fleet of zero-emissions vessels in North America. SWITCH's flagship vessel is an 84-passenger, fuel cell electric ferry (e-ferry) commencing operation in the Bay Area later this year. This project got started after a 2016 study at Sandia National Labs concluded that using fuel cell to power an electric ferry was now both technologically and economically feasible. In 2018 a startup named Golden Gate Zero Emission Marine (GGZEM) moved to translate theory into practice and secured a $3M grant from the California Air Resources Board (CARB) to demonstrate the viability of a hydrogen fuel cell powertrain in a marine environment. With the proceeds from the grant, GGZEM developed plans and contracted with a shipyard in the Bay Area to start vessel construction. Later that same year, SWITCH solidified its investment case for funding completion of vessel construction and took the lead role by purchasing the vessel. Shortly thereafter, SWITCH met Climate Tech Finance.

How Did Climate Tech Finance Help SWITCH Accelerate? Key to completing this project was securing additional funding for an emerging technology. SWITCH's initial equity contribution and the $3M grant from CARB were enough to fund research and development and the start of construction, but another $5M was needed to complete the build and ready the vessel for commercial service. SWITCH looked to a bank loan as part of its financing strategy but found that the newness of the technology made commercial lenders wary of involvement, despite a robust 5-year bareboat charter contract with a best-in-class ferry operator. Climate Tech Finance worked with SWITCH and a commercial bank to come up with a strategy to de-risk the technology venture that included providing a $2.5M loan guarantee through California's Small Business Loan Guarantee program. With this support, SWITCH and a commercial bank were able to agree on terms for a $5M loan that fully funds e-ferry through commercialization. The experience has been positive enough that SWITCH and the bank are in discussion about development deals for additional zero-emission harborcraft.

How Does Climate Tech Finance Create Value? Climate Tech Finance offers loan guarantees to commercial lenders when they fund emerging tech ventures that reduce greenhouse gases. The goal of this de-risking insurance is to expand access to capital for climate tech entrepreneurs and to speed commercialization of their product. Climate Tech Finance is able to provide this risk mitigation because of an innovative public-public environmental finance partnership. The partnership brings together environmental entrepreneurs from the Bay Area Air Quality Management District (BAAQMD) and bankers from Nor-Cal Financial Development Corporation (NorCal FDC) and the California Infrastructure and Economic Development Bank (IBank). The partnership blends their expertise and local relationships to attract entrepreneurs, evaluate technology impacts, and successfully match ventures and lenders. It is this blending of know-how and trust networks that creates the partnership's "secret sauce" and successful technology acceleration.

Annually this electric ferry will avoid roughly 2,000 tons of carbon dioxide emissions and support eight standing jobs. Its construction period provided work for fifty-five people and created the template for a fleet of commercial vessels that, over the next five years, can increase the impact 10x. Because it is part of plans to develop renewable hydrogen production and fueling infrastructure at seaports, the SWITCH e-ferry is also positioned to be a catalyst for development of a hydrogen economy for maritime transportation.

Snapshot of the Deal

- Hydrogen fuel cell ferry in passenger commuter service
- Guarantee of $2.5M for commercial loan of $5M
- Creates work for 63 people in construction and operation
- Avoids 2,000 tpy of GHG and reduces diesel particulates for seaport communities
- Creates flagship for fleet with 10x impact potential

Water-Go-Round Characteristics

- Length: 70 feet
- Max Passengers: 84
- Electric Motor: twin 300-kW
- Top speed: 22 knots

- Fuel Cell Size: 360 kW
- Battery: 100 kWh
- Fuel Tank: 264 kg, 250 bar
- Time to Refuel: 4 – 8 hours

- Hull Build: Bay Ship & Yacht
- Full Build: All-American Marine

- First Operation: early 2021

Climate Tech Finance Case Study: **Gridscape Solutions and Municipal Microgrids**

With the need for a more resilient, distributed grid, microgrids have been emphasized as a key solution. Traditional microgrid developments require customized designs specific to a site. Gridscape Solutions applies value engineering principles to develop a modular approach, offering "microgrids as a service" that can lead to lower cost and scalability.

What is Gridscape? Gridscape is the largest developer of small to mid-sized renewable energy microgrid products and technology in California. They are focused on deploying state-of-the-art microgrids aimed at reducing overall energy costs for a site and providing clean emergency backup power during Public Safety Power Shutoffs (PSPS) or other power disruption events. The Gridscape microgrid system is a software-driven, product centric system, integrated with solar PV, battery storage and EV charging stations and has been proven in over 15 recent microgrid installations in California municipal and commercial facilities. Gridscape offers a "Microgrid-in-a-box"—all the necessary hardware and software come pre-assembled in an outdoor-rated enclosure, making it possible to install a larger number of microgrids in California in the near term.

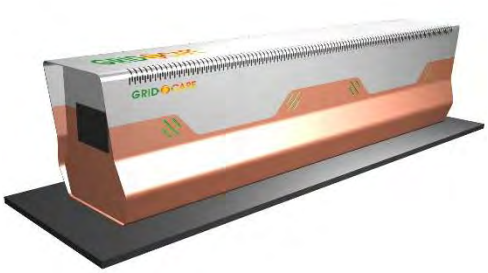
How did Climate Tech Finance help Gridscape accelerate? Gridscape is designing and deploying small microgrids at municipal and commercial facilities in cities in California. Because these microgrids are ultimately transferred for customer ownership or third-party financing, Gridscape sought working capital to purchase equipment and services during construction and commissioning of these microgrids. Gridscape looked to a bank loan as part of its project financing strategy but found that the newness of the technology and deal structures made commercial lenders wary of involvement, despite a track record of successful projects. Climate Tech Finance worked with Gridscape and River City Bank to come up with a strategy to de-risk the technology venture that included providing a 90 percent loan guarantee in partnership with California's Small Business Loan Guarantee program. With this support, Gridscape and River City Bank were able to agree on terms for a line of credit that supports commercialization of urban microgrids for energy savings, grid resilience and disaster readiness.

How does Climate Tech Finance create value? The core value of Climate Tech Finance is to support innovative climate projects by offering loan guarantees to commercial lenders when they fund emerging tech ventures that reduce short- and long-term greenhouse gases. The goal of this de-risking insurance is to expand access to capital for climate tech entrepreneurs and to speed commercialization of their product. Climate Tech Finance is able to provide this risk mitigation because of an innovative partnership of environmental entrepreneurs from the Bay Area Air Quality Management District (BAAQMD) and bankers from Nor-Cal Financial Development Corporation (NorCal FDC) and the California Infrastructure and Economic Development Bank (IBank). The partnership blends their expertise and local relationships to attract entrepreneurs, evaluate technology impacts, and successfully match ventures and lenders.

What is the impact of this project? Annually these microgrid projects will avoid roughly 2,200 tons of carbon dioxide emissions. Depending on the size of the microgrid project, installations can save between $7K to $30K a year in energy cost to their customers. Gridscape is projecting growth of over one hundred installations by 2023, providing wider grid resiliency using energy storage systems and working to eliminate the need for fossil-based back-up power systems such as diesel generators.

Snapshot of the Deal

- Solar+battery-enabled microgrids with integrated energy management software
- Guarantee of 90% of loan value
- Supports work for 25+ people in construction and operation
- Avoids 2,200 tpy of GHG and reduces diesel particulates
- Creates grid resilience with dispatchable on-site clean energy production and backup power



Microgrid Characteristics

On- and Off-Grid Modes
EnergyScope Software Controller

DC and AC EV Chargers
Cashless ePay Kiosk

Modular & Scalable System from 120kWh to 3MWh battery system

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Cindy Chavez and Members
of the Technology Implementation Office Steering Committee

From: Jack P. Broadbent
Executive Officer/APCO

Date: May 21, 2021

Re: Climate Tech Finance Strategic Plan

RECOMMENDED ACTION

None; receive and file.

BACKGROUND

Climate Tech Finance, the Air District's first loan program, funded its first two projects in 2020 and approved eight additional projects for loan guarantees. Having validated the loan guarantee product and entered a more mature stage of program development, staff engaged with a strategy and marketing consultant to build on the program's successes by developing focused branding and marketing to drive program growth.

DISCUSSION

Staffed worked with the strategy consultant to develop a strategic plan by conducting stakeholder interviews, performing an analysis of strengths, weaknesses, opportunities, and threats, drafting key messages, and establishing two-year program objectives.

Stakeholder interviews highlighted that the Climate Tech Finance program has potential for growth and needs to develop a strong brand and marketing strategy to properly communicate its value proposition. Outreach processes should be streamlined and focus on well-qualified potential customers to build on the program's current successes.

The strategic plan defines a mission statement for Climate Tech Finance: to reduce greenhouse gases by increasing access to capital to accelerate climate technology development and adoption. The mission is geared toward entrepreneurs, banks, and referral networks and focuses on bridging the financial gap in climate technology commercialization by offering access to debt financing.

The Climate Tech Finance program is poised for significant growth with the passage of federal stimulus bill. Specifically, the federal government has allocated $10 billion to the State Small Business Credit Initiative (SSBCI), which will likely result in an infusion of as much as $900 million for eligible California programs. The infusion would increase the amount of funds that Climate Tech Finance can leverage by seven times. The program's banking partner, the California

Infrastructure and Economic Development Bank (IBank), will likely enhance the loan guarantee product by increasing the maximum beyond the current $2.5 million per loan.

As these changes occur, there will likely be increased loan activity as IBank will need to facilitate a large volume of loans within a fixed timeline. At the same time, the Air District's contribution to loan guarantees may have less relative impact, due IBank's much larger fund size. As a result, staff see an opportunity to shift resources and develop additional program offerings to complement IBank's loan guarantees.

Staff are considering the following potential program offerings:

- Direct lending for climate projects in partnership with community banks or credit unions;
- Local project finance to support energy and building upgrades, especially for multi-unit dwellings (MUDs); and
- Climate bond development by working with the California Green Bond Market Development Committee.

Staff are seeking input from the Steering Committee on the Climate Tech Finance strategic plan and potential program offerings that would complement existing products.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Derrick Tang
Reviewed by: Damian Breen and Jeff McKay