Special Meeting of the COMMITTEE ON ENERGY AND THE ENVIRONMENT AGENDA

September 7, 2022 – 5:00 P.M.

On March 3, 2020, Governor Newsom proclaimed a State of Emergency due to COVID-19 and has issued Executive Order N-29-20, and approved AB 361 suspending provisions of the Brown Act allowing meetings via teleconferencing and members of the public to observe and offer comments telephonically or electronically.

If you wish to speak on an item listed on this agenda or under public comment, it is requested that you submit a speaker card in advance of the meeting at https://forms.cityofpleasantonca.gov/f/EandECommitteeSpeakerCardSep7

Once the meeting begins, you may participate in the Zoom meeting by using the "raise your hand" function when public comment is opened on the agenda item. You will be unmuted when your name is called and you will be re-muted after the allotted time. To raise your hand, click the "raise your hand" button or *9 on your telephone. To unmute your phone, press *6.

Join the meeting using this URL https://cityofpleasanton.zoom.us/j/88276881378

CALL TO ORDER

ROLL CALL

AGENDA AMENDMENTS

MINUTES

1. Approve the regular meeting minutes of July 27, 2022.

MEETING OPEN TO THE PUBLIC

2. Public comment from members of the audience regarding items not listed on the agenda.

OTHER MATTERS BEFORE THE COMMITTEE

3. Climate Action Plan 2.0 Status Report and Upcoming Committee Review Items

MATTERS INITIATED BY COMMITTEE MEMBERS: Brief reports on conferences, seminars, and meetings attended by Committee members.

ADJOURNMENT

The next meeting is a Regular Meeting of the Committee on Energy and the Environment on September 28, 2022, at 5:00 p.m.

Accessible Public Meetings

The City of Pleasanton can provide special assistance for persons with disabilities to participate in public meetings. To make a request for a disability-related modification or accommodation (e.g., an assistive listening device), please contact the City Clerk's Office at 123 Main Street, Pleasanton, CA 94566 or (925) 931-5027 at the earliest possible time. If you need sign language assistance, please provide at least two working days' notice prior to the meeting date.

MINUTES
CITY OF PLEASANTON
REGULAR MEETING OF THE COMMITTEE ON ENERGY AND THE ENVIRONMENT
July 27, 2022

CALL TO ORDER

Chair Liu called a teleconference meeting of the Committee on Energy and the Environment to order at the hour of 5:02 p.m.

ROLL CALL

Committee Members Present: Brown, Bloom, Jain, Kelly, Klein, and Chair Liu
Committee Members Absent: Lee

AGENDA AMENDMENTS

MINUTES

1. Approve the meeting minutes of the March 23, 2022, meeting.
   Motion by: Brown Seconded by: Klein
   Ayes: Brown, Bloom Jain, Kelly, Klein, and Liu
   Noes: none

Motion passed unanimously.

MEETING OPEN TO THE PUBLIC

2. Public Comment from members of the audience regarding items not listed on the agenda:

None.

OTHER MATTERS BEFORE THE COMMITTEE

3. Stop waste Informational Presentation

Councilmember Jack Balch introduced StopWaste staff Executive Director Timothy Burroughs and Rachel Balsley Senior Program Manager. Mr. Balch stated, let me just first start off by saying thank you very much for inviting us to be here and learn more. He stated that Timothy and the team will go through quite a lot of detail, and we also want to make sure that we're showing you the present tense partnership with StopWaste and the city.

Timothy Burroughs presented an overview of StopWaste as an organization and the partnership with Pleasanton and other cities in Alameda County to advance their waste reduction efforts. He stated that they do that at times by taking on work that local governments would otherwise have to do themselves.

Council member Balch asked Mr. Burroughs to share information on new California law SB54 from a prior meeting. Mr. Burroughs stated that SB 54, is being talked about as one of the most far-reaching waste prevention waste reduction laws in the country. It requires all packaging in the state to be recyclable or compostable by 2032, cutting plastic packaging by 25 percent in 10 years and requiring 65 percent of all single-use plastic packaging to be recycled in the same timeframe. The legislation shifts the plastic pollution burden from consumers to the plastics industry by raising $5 billion from industry members over 10 years to assist efforts to cut plastic pollution and support disadvantaged communities hurt most by the damaging effects of plastic waste.

During the presentation, Mr. Burroughs explained the StopWaste materials flow map for Alameda County. This interactive map shows the flow of waste materials processing within Alameda County. Over

30 facilities within the county serve over 15 municipalities. Many facilities provide initial processing and sorting for final disposition elsewhere. Landfilling and composting takes place within the county and other locations near the Bay Area. Final processing of recyclable materials happens to some extent domestically with most materials handled in international locations. https://www.stopwaste.org/about-stopwaste/member-agencies/materials-flow-map-for-alameda-county

Mr. Burroughs shared that StopWaste has Carbon farming projects where we're applying compost across a stretch of the property which has the benefits of sequestering carbon from the atmosphere, so it is a greenhouse gas emissions reduction strategy.

StopWaste began working with the Alameda County Resource Conservation District and later additional partners to add to the body of knowledge on how carbon farming can fight climate change through the application of compost on range lands. Carbon farming refers to practices—including the one-time application of compost—that increase the ability of the soil and plants to pull carbon from the atmosphere and sequester it deep in the soil. https://www.stopwaste.org/resource/carbon-farming-testing-shows-positive-results-january-2022?page=search

Rachel Beasley shared that StopWaste has a Free Indoor Food Scraps Bins Program. Free indoor bins are available to qualifying Alameda County businesses, institutions, and multi-family residential properties (5+ units) for the collection of food scraps, compostable paper and plant debris. A variety of containers and lids are available—up to a value of $500 per approved site including tax and delivery. www.StopWaste.org/free-green-bins

Public Comment: None.

MATTERS INITIATED BY COMMITTEE MEMBERS.

Next meeting CAP 2.0 update
Future meeting water rate adoption update

ADJOURNMENT
The meeting was adjourned at 6:33p.m.
Next regular meeting of the Committee is scheduled for September 28, 2022 at 5pm.

Respectfully Submitted,
ZeeLaura Page

The Committee on Energy and the Environment Agenda Report

September 7, 2022
Item 3

SUBJECT: CLIMATE ACTION PLAN 2.0 STATUS REPORT AND UPCOMING COMMITTEE REVIEW ITEMS

EXECUTIVE SUMMARY

In February 2022, the City Council adopted the City's Climate Action Plan 2.0 (CAP 2.0). The CAP 2.0 outlines the City's environmental framework over the next 10 years and creates a roadmap for Greenhouse Gas (GHG) emissions reductions that is both realistic and implementable. Staff has begun implementation of the CAP 2.0 and will bring specific implementation items to the Committee on Energy and the Environment for review and feedback over the coming months. This report outlines the status of CAP 2.0 actions and identifies specific actions the Committee will review. Additionally, while implementing the CAP 2.0, staff identified an error in the CAP 2.0's greenhouse gas (GHG) modeling quantification which is proposed to be reflected in an amended CAP 2.0 document. This is detailed in the report for the Committee's review.

RECOMMENDATION

Staff requests the Committee's review the CAP 2.0 implementation status, Committee workplan, and modeling adjustment. No action is requested at this time.

BACKGROUND AND DISCUSSION

Background

Throughout the nearly two-year CAP 2.0 update process, the Committee on Energy and the Environment provided guidance on several aspects of the plan as it was developed. Ultimately, following the recommendation of the Committee the City Council adopted the CAP 2.0 in February 2022.

The adopted CAP 2.0 sets ambitious GHG reduction targets that comply with, and exceed, targets established by the State of California. The CAP 2.0 identifies a set of Primary Actions to achieve the GHG emission reduction targets that are tailored to the Pleasanton community, considering city's unique local constraints and opportunities. The document further identifies ways to strive for GHG emissions reduction beyond the baseline target and includes a set of Secondary Actions that will deepen the City's commitment to taking local action and enhance community resilience to climate change. Ultimately, the adopted CAP 2.0 document includes four sections as follows:

1. **Introduction:** This section introduces the CAP 2.0, describes CAP 1.0 progress, the shaping of the document, public process, and details the local, regional, and state context (e.g., state regulations like SB 1383).
2. **Climate Vulnerability and GHG Emissions:** This section articulates Pleasanton's vulnerability and current GHG emissions. It covers best available science and outlines the City's GHG emission reduction targets.
3. **Climate Solutions:** This section is the main policy focus of the CAP 2.0. It outlines the strategies and actions across six sectors (Buildings and Energy, Transportation and Land Use, Materials and Consumption, Natural Systems, Water Resources, and Community Resilience and Wellbeing) the City will take to reduce GHGs locally, comply with state emission reduction targets, and enhance the City's resilience to climate change. The CAP 2.0 includes 16 new Primary Actions and 9 new Secondary Actions as well as the continuation of several existing actions the City is already taking. As outlined, the City is on track to meet the 2030 GHG emission reduction target and is considered a "qualified CAP" through 2030.
4. **Implementation:** This section provides the CAP 2.0 implementation and monitoring plan. It identifies partners, resources, and a monitoring protocol. It also outlines staffing, costs, equity consideration, and phasing of CAP 2.0 actions over the next 10 years.

The CAP 2.0 is included as an attachment for the Committee's reference (Attachment 1).

CAP 2.0 Implementation and Committee Workplan

The CAP 2.0 includes an implementation and monitoring plan (Section 4 of Attachment 1). Tables 7 and 8 in the CAP 2.0 identify costs, staff time, and responsible departments. Since the CAP 2.0's adoption in February 2022 staff has begun to implement several Primary actions. Work to implement other actions will proceed in 2023 and future years.

Anticipating that staff will be seeking input from the Committee on several actions, this agenda item highlights current work efforts and where touchpoints with the Committee will

occur and outlines future activities that may inform the work of the Committee in future years.

Table 1, on the following page, summarizes the CAP 2.0's Primary and Secondary actions, including their current status and where Committee review or input on particular actions will be sought.

Staff is actively working on the following activities:

- SB1383 Implementation (Existing Action P7)
- Fleet Electrification Plan (Primary Action P5)
- Reach Codes (Primary Action P1 and P5)
- Electric Vehicle DC Charging Hub (Primary Action P5)
- Expand community small engine electrification "leaf blower ban" (Primary Action P7)
- Urban Forest Master Plan (Primary Action P13)
- Solar and Storage Critical Municipal Facilities (Secondary Action S3)

Table 1: CAP 2.0 Status

Action	Responsible Department	Notes	Committee Review/Input
Phase 1 (2022-2024) Primary Actions			
P1 Reach Codes	Community Development (CDD)	Underway. Nov2022 completion	Yes
P3 PMC Covered Project Definition	CDD	Updates have been made to the existing GHG Checklist[1]. Pleasanton Municipal Code (PMC) update anticipated in 2023 as part of annual "omnibus" revision.	
P4 PMC Require solar/battery	CDD	Completed- 2022 Building Code covers new construction and GHG Checklist covers existing projects.	
P7 Expand community small engine electrification	CDD/City Manager's Office (CM)	Winter 2022- Spring 2023. City has had early conversations with neighboring jurisdictions to see if there is regional interest. If not, the City will still move forward in the next couple months.	
P8 PMC Require bicycle amenities	CDD	Updates have been made to existing GHG Checklist. Conforming amendments to PMC will be brought forward in 2023.	
P11 LEED Neighborhood Development	CDD	Updates have been made to existing GHG Checklist.	
P13 Urban Forest Master Plan	Operations/ Engineering	Budgeted and anticipated start date of Sept 2022. This is anticipated to be a two-year project.	Yes
P14 Soil Management Carbon Sequestration	Operations/CM	Initial compost procurement and application plan drafted and implementation to begin in Fall of 2022.	
P16 Comprehensive outreach, education, community programs	All Departments	Spring 2023 start-Ongoing. Items forthcoming in 2023: • Sustainability Awards • Neighborhood Program • Outreach Campaigns	Yes
Phase 2 (2025-2028)			
P2 Existing Building Electrification Plan	CDD	No progress yet. Anticipated 2025-2026	Yes
P5 Zero Emissions Infrastructure Plan	CDD/Operations	Elements of this underway: • Reach codes for EV charging (Nov 2022 completion) • Fleet electrification plan (Dec 2022 completion with rolling implementation) • EV DC charging hub(s) (2023 completion)	Yes

[1] The GHG Checklist is a required checklist for certain development applications wherein staff confirms all of the required CAP 2.0 actions are being met.

Action	Responsible Department	Notes	Committee Review/Input
		Not started: • ZEV plan and other elements. Anticipated start in 2024.	
P6 Electrify Municipal Small Engine Equipment	Operations	Operations staff will start testing equipment in 2023.	
P9 Bicycle Rack Incentive Program	CDD and ED	No progress yet. Anticipated establishment 2025.	
P12 Single use plastic reduction	CM	Encouraged businesses to participate in re-think disposables. Countywide model ordinance being developed. Anticipated 2026.	Yes
P15 Water efficiency and retrofits	Operations	Parts of this completed: • Increased funding for Eco-Friendly Lawn Conversation Rebate • Submitted grant to Bureau of Reclamation to increase rebate	Yes
Phase 3 (2029-2031)			
P10 Increase Transit Ridership	CDD	Anticipated start date 2028	
Secondary Actions			
S1 Refrigerant management	CDD	TBD	
S2 Community energy efficiency upgrades	CDD	TBD	
S3 Energy Benchmarking and City Facility retrofits	CDD/CM	Some retrofits underway including critical municipal facilities solar and storage system project	
S4 VMT reduction for K-12 activities	CDD/CM	TBD	
S5 Environmentally Preferable Purchasing	CM	Policy completed in 2022	
S6 Embodied Carbon Reduction Plan	CDD	TBD	Yes
S7 Carbon Sequestration research and tracking	CM	TBD	
S8 Green Stormwater Infrastructure Plan	Operations	TBD	Yes
S9 Wildfire preparation, prevention, and education	Fire	TBD	

At the Committee's regular meeting in September, staff will bring forth Reach Codes (Action P1 and P5) for electric vehicle charging stations and building electrification consistent with the CAP 2.0. Staff will be looking for a recommendation from the Committee at that time to take forward to the City Council.

Going forward, staff will check in with both the Committee and Council with the CAP 2.0 implementation status, expected as an annual update to both bodies.

Modeling Quantification

For the Committee's information, while reviewing some details of the CAP 2.0 as part of its implementation, staff identified a unit conversion error for calculating GHG impacts associated with carbon sequestration in the CAP 2.0 GHG impact model. Specifically, the conversion from pounds (lbs) to metric tons (MT) of CO2 was incorrectly noted as 0.139 rather than 0.000453592. This issue resulted in an overestimation of the GHG sequestration potential of the CAP Primary Action P13, the Urban Forest Master Plan.

Since this error alters the projection of GHG reductions over time and affects the overall quantification of reductions reflected in the plan, it is necessary to amend/correct the CAP 2.0 accordingly. To offset the overestimation of reductions found with respect to the Urban Forest Master Plan, staff recommends strengthening three additional actions, to provide greater levels of associated GHG emissions reductions. These changes will allow the CAP 2.0 to continue to meet the GHG emissions targets and be consistent with the Plan's original goals:

The suggested changes include:

- **Action P2: Existing Building Electrification.** The CAP 2.0 included a very conservative goal of a 5% switch from natural gas to electric energy use by 2030. The revised modeling would use a somewhat more aggressive, but nonetheless realistic assumption that there will be a 15% switch from natural gas use to electric by 2030, and that 30% of space and water heating equipment will be replaced with electric equipment by 2030. These assumptions are similar (and still slightly more conservative) than those used in neighboring cities' CAPs (e.g., Dublin), and reflective of evolving State and federal programs and policies, such as the California Building Code, that strongly support electrification.

- **Action P5: ZEV Infrastructure Plan.** The CAP 2.0 modeling assumes that passenger vehicle VMT will shift to 20% from Electric Vehicles by 2030; and 17% of commercial VMT from EVs by 2030. This is proposed to be adjusted to 30% and 25% respectively by 2030, reflecting a somewhat more aggressive assumption. To support this shift, the language of Action P5 is proposed to be strengthened to add two additional implementation strategies: 1) To adopt and implement an EV Charger and Parking Ordinance for commercial properties; and 2) to develop partnerships with businesses and employers, particularly those with large fleets, to accelerate ZEV adoption. The proposed assumptions are consistent with those used by neighboring jurisdictions in their CAPs. Further, state and federal regulation, such as the Clean Fleets regulations that are accelerating markets for clean trucks and

buses; and the CARB's recent vote to affirm car sales of only ZEVs in the state by 2035, are expected to accelerate uptake of ZEV's, thereby supporting this as a reasonable assumption.

- **Action P7 Community small-engine electrification.** The CAP 2.0 modeling assumed a 50% reduction in lawn & garden (L&G) equipment emissions by 2030; this is proposed to be increased to a 95% reduction by 2030, and a 25% reduction from other off-road equipment (e.g., construction equipment). To support this action, an additional implementation strategy is proposed, to conduct a feasibility study to identify and implement a pathway to reduce citywide offroad construction equipment GHG emissions by 50% (e.g., adding conditions of approval.). The more aggressive assumption is supported the fact that the City is moving ahead with drafting of an ordinance to limit the use of gas-powered leaf blowers (and potentially similar small equipment); as well as external factors such as the expected effects of the State's ban on sale of gas-powered small equipment in coming years, as well as technology improvements in electric and battery-powered equipment; as well as the added implementation measure noted.

The above changes in modeling assumptions will necessitate minor adjustments to the stated GHG emission reduction estimations in various places in the CAP 2.0. This is because the model accounts for interrelationships between actions, so as to avoid any potential double counting of GHG reductions. The tracked changes are noted below and reflected in Attachment 2. The clean version of the CAP 2.0 document (Attachment 1) reflects the modifications.

			MTCO2e Reductions (mass)			MTCO2e Reductions (per capita)		
Sector	Strategy	Type	Cumulative to 2030	2030	2045	Cumulative to 2030	2030	2045
BE	Decarbonization of buildings	Existing	271,838	29,649	(0)	3.27	0.36	(0.00)
BE	Decarbonization of buildings	Primary	59,668	15,698	41,059	0.72	0.19	0.42
BE	Decarbonization of buildings	Secondary	-	-	-	-	-	-
BE	Energy efficiency & consumption	Existing	-	-	-	-	-	-
BE	Energy efficiency & consumption	Primary	1,290	279	65	0.02	0.00	0.00
BE	Energy efficiency & consumption	Secondary	8,611	1,335	0	0.10	0.02	0.00
BE	Renewable energy generation & storage	Existing	-	-	-	-	-	-
BE	Renewable energy generation & storage	Primary	2,341	726	(0)	0.03	0.01	(0.00)
BE	Renewable energy generation & storage	Secondary	-	-	-	-	-	-
TLU	Active, shared transport	Existing	11,722	1,839	427	0.14	0.02	0.00
TLU	Active, shared transport	Primary	19,666	4,220	1,452	0.24	0.05	0.01
TLU	Active, shared transport	Secondary	-	-	-	-	-	-
TLU	Sustainable land use	Existing	17,257	3,251	865	0.21	0.04	0.01
TLU	Sustainable land use	Primary	15,331	1,577	372	0.18	0.02	0.00
TLU	Sustainable land use	Secondary	-	-	-	-	-	-
TLU	Vehicle decarbonization	Existing	-	-	-	-	-	-
TLU	Vehicle decarbonization	Primary	391,530	85,195	209,826	4.72	1.03	2.14
TLU	Vehicle decarbonization	Secondary	-	-	-	-	-	-

MC	Waste diversion	Existing	135,118	22,585	26,499	1.63	0.27	0.27
MC	Waste diversion	Primary	-	-	-	-	-	-
MC	Waste diversion	Secondary	-	-	-	-	-	-
MC	Sustainable consumption	Existing	-	-	-	-	-	-
MC	Sustainable consumption	Primary	-	-	-	-	-	-
MC	Sustainable consumption	Secondary	-	-	-	-	-	-
NS	Carbon sequestration & ecosystem resilience	Existing	-	-	-	-	-	-
NS	Carbon sequestration & ecosystem resilience	Primary	5,085	860	1,259	0.06	0.01	0.01
NS	Carbon sequestration & ecosystem resilience	Secondary	-	-	-	-	-	-
WR	Supply & conservation	Existing	-	-	-	-	-	-
WR	Supply & conservation	Primary	-	-	-	-	-	-
WR	Supply & conservation	Secondary	-	-	-	-	-	-
WR	Stormwater resilience	Existing	-	-	-	-	-	-
WR	Stormwater resilience	Primary	-	-	-	-	-	-
WR	Stormwater resilience	Secondary	-	-	-	-	-	-
CRW	Community resilience & vulnerability	Existing	-	-	-	-	-	-
CRW	Community resilience & vulnerability	Primary	26,254	5,133	1,829	0.32	0.06	0.02
CRW	Community resilience & vulnerability	Secondary	-	-	-	-	-	-

COMMITTEE REVIEW

Staff requests Committee review the proposed modeling adjustments and CAP 2.0 implementation status and Committee workplan. No formal action is requested from the Committee at this time. As noted, staff will be returning over the coming months to seek Committee input on several items associated with CAP 2.0 actions, as well as with future periodic status updates on CAP implementation.

Submitted by:

Megan Campbell
Associate Planner

Approved by:

Becky Hopkins
Assistant to the City Manager

Attachments

1. CAP 2.0
2. CAP 2.0 Appendix A (Tracked Changes)


THE CITY OF
PLEASANTON
CLIMATE ACTION PLAN
2.0
March 2022
Updated September 2022

Acknowledgments

This Climate Action Plan (CAP) 2.0 builds on the success of the previous plan to develop a new suite of greenhouse gas emissions reduction targets and actions to mitigate the acceleration of climate change and improve community resilience. The City of Pleasanton (City) expresses great appreciation to the following staff, community members, and organizations for their contributions in developing the CAP 2.0.

City Council

Karla Brown, Mayor
Julie Testa, Vice Mayor
Valerie Arkin, Councilmember
Jack Balch, Councilmember
Kathy Narum, Councilmember
Jerry Thorne, Previous Mayor
Jerry Pentin, Previous Councilmember

City Staff

Brian Dolan, Assistant City Manager and Interim City Manager
Pamela Ott, Deputy City Manager
Megan Campbell, Associate Planner
Zachary Reda, Management Analyst
Ellen Clark, Community Development Director
Becky Hopkins, Assistant to the City Manager
Nelson Fialho, Previous City Manager

Committee on Energy and the Environment (EEC)

Andrea Bloom, Regular Member
Catherine Brown, Regular Member
Aryan Jain, Youth Member
Linda Kelly, Regular Member
Greg Klein, Regular Member
Joel Liu, Regular Member
Chiman Lee, Regular Member
Eric Cartwright, Previous Regular Member
Terry Chang, Previous Regular Member
Bruce Daggy, Previous Regular Member
Robert Gan, Previous Youth Member

Professional Services Team

Andrea Martin, Cascadia Consulting Group
P.J. Tillmann, Cascadia Consulting Group
Mike Chang, Cascadia Consulting Group
Addie Bash, Cascadia Consulting Group
Megan Lee, Cascadia Consulting Group
Julie Stein, Cascadia Consulting Group
Kelsey Bennett, Rincon Consultants, Inc.
Ryan Gardner, Rincon Consultants, Inc.
Andrew Hatt, Rincon Consultants, Inc.

The City extends a special recognition to the following implementation partners, community organizations, and businesses:

Implementation Partners

Altamont Corridor Express (ACE)
Bay Area Rapid Transit (BART)
Bay Area Air Quality Management District (BAAQMD)
Dublin San Ramon Services District (DSRSD)
East Bay Community Energy (EBCE)
Livermore Amador Valley Transit Authority (LAVTA)
Metropolitan Transportation Commission (MTC)
Pacific Gas & Electric (PG&E)
Pleasanton Garbage Service (PGS)
San Joaquin Regional Rail Commission
StopWaste
Visit Tri-Valley
Wheels
Zone 7 Water Agency

Community

Bay East Association of REALTORS
Chinese American Cooperative Council
Council on American Islamic Relations
Hacienda
GoGreen Initiative
Hindu Swayamsevak Sangh (HSS)
Hines
Muslim Community Center
Pleasanton Chamber of Commerce
Pleasanton Downtown Association
Tri-Valley Citizens' Climate Education
Workday

City Council's Welcome

Pleasanton is an incredible place with a unique character that is reflected in its location, setting, history, and people. Our community is vibrant and rich with small-town character and a scenic backdrop that gives our city a direct connection to the natural environment. In recent years, like much of California, our community has experienced dangerous heat waves, public safety power shutoffs, and unhealthy air quality from devastating wildfires. We know the climate is changing. We have heard stories from community members about the changes they see in their own lives and the future they want to experience and pass down to generations to come.

To meet these challenges and usher in a sustainable future, Pleasanton will continue to preserve and protect the environment to meet the needs of the current generation without compromising the ability to meet the needs of future generations. The CAP 2.0 is a critical part of realizing this vision. It recognizes the value of our people, our community, our neighborhoods, our thriving economy, and our natural resources: the CAP 2.0 is for, and by, the community. The goals and actions outlined in these pages are responsive to your concerns, priorities, and ambitious vision. Many of you contributed through workshops, online surveys, public hearings, and individual expertise to make the CAP 2.0 possible. Thank you for helping to make sure that the CAP 2.0 reflects Pleasanton and protects what we love, while responding to the changing climate. We are honored to work with our residents, businesses, and organizations to be a leader locally, regionally, and nationally.

Climate change is one of the greatest challenges we face and Pleasanton should be proud for taking initiative to continue our preparation and adaptation. Reducing emissions and responding to the impacts of climate change will not be easy, but we have shown that by working together, we can create a sustainable, prosperous, and healthy city.

The CAP 2.0 is our community roadmap to a climate-friendly future. Implementation will deliver a more inclusive future powered by clean energy, a sustainable and secure water supply, clean transportation options, less waste in our landfills, and a thriving local economy. Although our work has just begun, we have the opportunity to celebrate the many collaborations and innovative ways our community will come together. We hope you will join us in creating a prosperous, sustainable, and healthy future.

Your City Council

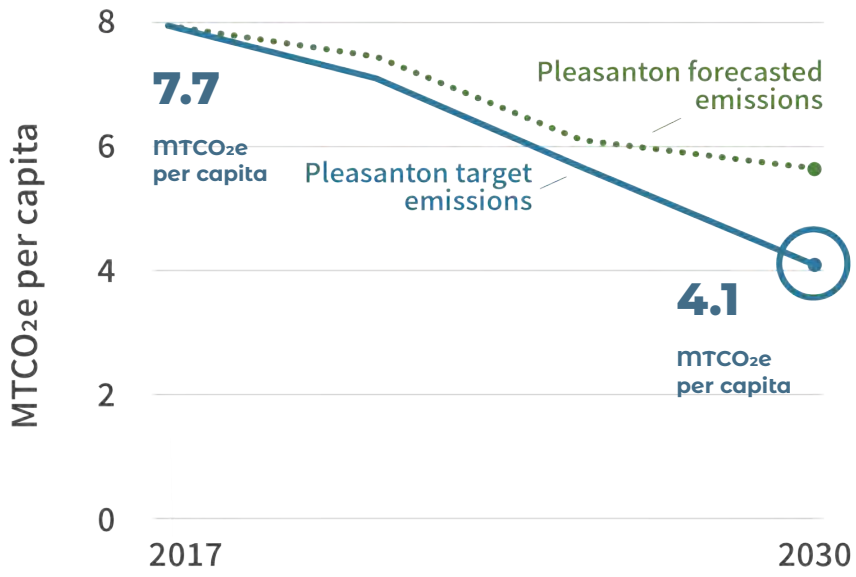
Executive Summary

Vision

This CAP 2.0 looks to not only reduce Pleasanton's greenhouse gas emissions, but also improve quality of life and public health, cultivate community resilience and adaptability, and promote thriving ecosystems and a vibrant economy now and for future generations. Through an inclusive and equitable process, the CAP 2.0 will position Pleasanton as a regional leader addressing climate change.

Targets

CAP 2.0 sets a target to reduce GHG emissions to **4.1 $MTCO_2e$ per capita by 2030** and work towards **per-capita carbon neutrality by 2045**.



Actions and Strategies

Pleasanton's CAP 2.0 re-envisions what a climate-smart future looks like in the near- and long-term, and how to get there in an efficient, equitable, and sustainable way. It calls for continuation of existing and ongoing environmental efforts, and details 16 new primary actions to be implemented and 9 secondary actions to be implemented as time and resources allow. The actions are designed to address Pleasanton's most significant GHG emissions sources—transportation (64%), natural gas use (20%), and electricity use (10%)—with ample community benefits beyond emissions reduction. As detailed in Tables 1 to 3, CAP 2.0 actions will:

- Decarbonize and modernize Pleasanton's buildings and transportation.
- Make it easier, safer, and more enjoyable to travel without a privately-owned vehicle.
- Increase water and energy security.
- Make the local economy more circular and sustainable.
- Beautify Pleasanton while capitalizing on the carbon storage capacity of trees, plants, and soil.
- Equip current and future generations with the knowledge needed to act on climate change.
- Demonstrate continued City leadership in sustainability.

Table 1. Existing ongoing CAP 2.0 actions

Existing Ongoing Actions	Emissions Reduced ($MTCO_2e$)[1]	Net City Cost	Net Community Cost
Buildings & Energy: This sector includes strategies to advance the decarbonization of buildings (BE-1), improve energy consumption and efficiency (BE-2), and expand use of renewable energy (BE-3).			
E1. Maintain zero-emissions energy as the default EBCE choice for municipal operations	2,200	N/A	N/A
E2. Maintain zero-emissions energy as the default EBCE choice for the community	269,600	N/A	N/A
Transportation & Land Use: This sector includes strategies to advance vehicle decarbonization (TLU-1), advance active, shared, and public transportation (TLU-2), and Advance sustainable land use (TLU-3).			
E3. Bicycle & Pedestrian Master Plan and Trails Master Plan	5,900	N/A	N/A
E4. Regional transit support	4,800	N/A	N/A
E5. Complete Streets implementation	1,000	N/A	N/A
E6. Housing Element implementation	17,200	N/A	N/A
Materials & Consumption: This sector includes strategies to increase waste diversion and optimize collection and disposal systems (MC-1), and enhance sustainable production and reduce consumption (MC-2).			
E7. SB 1383 implementation	135,100	N/A	N/A
E8. Outreach and education	[2]	N/A	N/A
E9. Local purchasing		N/A	N/A
E10. Textile recovery		N/A	N/A
Natural Systems: This sector includes a strategy to increase and optimize carbon sequestration and improve ecosystem resilience (NS-1).			
E11. Pesticide Posting Program		N/A	N/A
E12. Municipal landscape management practice		N/A	N/A
E13. Sustainable land management education		N/A	N/A
Water Resources: This sector includes strategies to improve water supply & increase conservation (WR-1), and improve stormwater resilience (WR-2).			
E14. Controller assistant program		N/A	N/A
E15. Smart water meter installation		N/A	N/A
E16. Water Conservation Program		N/A	N/A
E17. On-site stormwater management		N/A	N/A
Community Resilience & Wellbeing: This sector includes a strategy to improve community resilience and reduce vulnerability to climate change (CRW-1).			
E18. School climate action planning		N/A	N/A
E19. Access to green spaces		N/A	N/A
E20. Community cooling centers	N/A	N/A	N/A
E21. Community gardens		N/A	N/A

[1] Cumulative reductions across all years through 2030. Estimates are rounded to the nearest hundred $MTCO_2e$.
[2] The symbol indicates an action that indirectly supports emissions reduction.

Table 2. Primary CAP 2.0 actions

Primary Actions	Emissions Reduced ($MTCO_2e$)[1]	Net City Cost[2]	Net Community Cost[2]
Buildings & Energy: This sector includes strategies to advance the decarbonization of buildings (BE-1), improve energy consumption and efficiency (BE-2), and expand use of renewable energy (BE-3).			
P1. All-electric reach code for new construction	10,100	$49k	($2.7M)
P2. Existing Building Electrification Plan	49,500	$138k	$137k
P3. Modify Municipal Code definition of “covered projects”	1,300	($0)	$287k
P4. Solar and storage on "covered projects"	2,300	($0)	($0)
Transportation & Land Use: This sector includes strategies to advance vehicle decarbonization (TLU-1), advance active, shared, and public transportation (TLU-2), and advance sustainable land use (TLU-3).			
P5. ZEV Infrastructure Plan	315,300	$218k	($31k)
P6. Electrify municipal small engine equipment and reduce emissions of off-road equipment upon replacement	[3]	($0)	($0)
P7. Electrify community small engine equipment	76,200	($0)	($2.4M)
P8. Bicycle amenities	1,800	($0)	$2.4M
P9. Bicycle rack incentive program	1,600	$8k	($777k)
P10. Increase transit ridership	4,600	$75k	($585k)
P11. Promote LEED Neighborhood Development	15,300	$1k	($850k)
Materials & Consumption: This sector includes strategies to increase waste diversion and optimize collection and disposal systems (MC-1), and enhance sustainable production and reduce consumption (MC-2).			
P12. Single use plastic reduction	[3]	($0)	($0)
Natural Systems: This sector includes a strategy to increase and optimize carbon sequestration and improve ecosystem resilience (NS-1).			
P13. Urban Forest Master Plan	1,200[4]	$486k	$470k
P14. Soil management carbon sequestration projects	3,900[4]	$35k	$2.8M
Water Resources: This sector includes strategies to improve water supply & increase conservation (WR-1), and improve stormwater resilience (WR-2).			
P15. Water efficiency and retrofits	[3]	$1.6M	($4.6M)
Community Resilience & Wellbeing: This sector includes a strategy to improve community resilience and reduce vulnerability to climate change (CRW-1).			
P16. Comprehensive climate awareness, education, and outreach	26,200	$119k	($0)

[1] Cumulative reductions across all years through 2030. Estimates are rounded to the nearest hundred $MTCO_2e$.
[2] Numbers shown within parentheses represent net savings to the City or community.
[3] The symbol indicates an action that indirectly supports emissions reduction.
[4] Represents carbon sequestration.

Table 3. Secondary CAP 2.0 actions

Secondary Actions	Emissions Reduced ($MTCO_2e$)[1]	Net City Cost[2]	Net Community Cost[2]
Buildings & Energy: This sector includes strategies to advance the decarbonization of buildings (BE-1), improve energy consumption and efficiency (BE-2), and expand use of renewable energy (BE-3).			
S1. Refrigerant management in new construction	[3]	$43k	($262k)
S2. Community energy efficiency upgrades	8,300	$958k	($1.9M)
S3. Energy benchmarking and City facility retrofits	400	($3.1M)	($0)
Transportation & Land Use: This sector includes strategies to advance vehicle decarbonization (TLU-1), advance active, shared, and public transportation (TLU-2), and advance sustainable land use (TLU-3).			
S4. VMT reduction for K-12 activities	11,700	$571k	($6.3M)
Materials & Consumption: This sector includes strategies to increase waste diversion and optimize collection and disposal systems (MC-1), and enhance sustainable production and reduce consumption (MC-2).			
S5. Environmentally preferable purchasing policy		($0)	($0)
S6. Embodied Carbon Reduction Plan		($0)	($89k)
Natural Systems: This sector includes a strategy to increase and optimize carbon sequestration and improve ecosystem resilience (NS-1).			
S7. Carbon sequestration research and tracking		($0)	($0)
Water Resources: This sector includes strategies to improve water supply and increase conservation (WR-1), and improve stormwater resilience (WR-2).			
S8. Green Stormwater Infrastructure Plan		($0)	($0)
Community Resilience & Wellbeing: This sector includes a strategy to improve community resilience & reduce vulnerability to climate change (CRW-1).			
S9. Wildfire preparation, prevention, and education		($0)	($0)

[1] Cumulative reductions across all years through 2030. Estimates are rounded to the nearest hundred $MTCO_2e$.
[2] Numbers shown within parentheses represent net savings to the City or community
[3] The symbol indicates an action that indirectly supports emissions reduction

Key Definitions

AB	**Assembly Bill** in the State of California.
ABAU	**Adjusted business as usual** is a scenario that adjusts the BAU to account for GHG emissions reductions expected from federal, state, and regional policy such as vehicle emissions standards and renewable energy requirements.
AMI	**Advanced Metering Infrastructure** is a system that enables two-way communication between utilities and customers. It provides utility companies with real-time data about power consumption and allows customers to make informed choices about energy usage.
BAU	**Business as usual** is a scenario that assumes that current activities do not significantly change relative to current, normal conditions and circumstances.
CAFE	**Federal Corporate Average Fuel Economy** standards are the required average fuel economy of cars and light trucks produced in the U.S.
CAP 2.0	Pleasanton's **Climate Action Plan 2.0** is the City's plan to reach per capita carbon neutrality by 2045, consistent with state requirements.
CARB	**California Air Resources Board** is California's lead agency for climate change programs and oversees all air pollution control efforts.
CEQA	The **California Environmental Quality Act** requires state and local government agencies to inform decisionmakers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible.
City	The **City of Pleasanton, CA** developed and will implement CAP 2.0, in consultation with community members, stakeholders, and other implementation partners.
EVs	**Electric vehicles** are vehicles that derive all or part of their power from electricity.
GHG	**Greenhouse gas** is a gas that traps heat in the air and causes climate change. Examples include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFCs).
GWP	**Global warming potential** is a measure that allows comparison of global warming impacts among different types of GHGs. Different GHGs can have different impacts on the Earth's warming. For example, compared to CO_2, methane has 84 times the GWP of CO_2 but stays in the atmosphere for a shorter timeframe.
KPI	**Key performance indicators** are values used to monitor and measure the trends and effectiveness of overall sustainability performance.
LEED ND	**Leadership in Energy and Environmental Design for Neighborhood Development** is a rating system that recognizes new neighborhood-scale developments that achieve sustainability and energy efficiency. It assesses neighborhood pattern and design, connection to services and amenities, habitat and species conservation, green infrastructure and buildings, and innovation and the design process.
LEV	The most recent **Low Emission Vehicles** regulations impose stringent emission standards for criteria pollutants and greenhouse gases for new passenger vehicles through the 2025 model year.
MMBTU	**Million metric British thermal units** is a common unit to measure heat content, particularly of energy sources like natural gas.
MTCO2e	**Metric tons of carbon dioxide equivalent** is a standard unit of measurement for GHGs that includes consideration of the major GHGs, including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). It expresses the "global warming potential" of GHGs in a standardized unit, the equivalent amount of carbon dioxide.
NPDES	**National Pollution Discharge Elimination System** is a permit program that regulates point sources that discharge pollutants into waters across the country.
PMC	**Pleasanton Municipal Code** refers to ordinances (i.e., laws) that are currently in effect within Pleasanton city limits.
TDM	**Transportation demand management** is the application of policies, strategies, and incentives to maximize the efficiency of the transportation system through enhanced mobility, reduced congestion, and low-carbon transportation.
VMT	**Vehicle miles traveled** is a metric used in transportation planning to measure the cumulative miles traveled by all vehicles in a geographic region over a given time period.
EO	**Executive Order** for the State of California.
SB	**Senate Bill** in the State of California.
ZEV	**Zero emission vehicles** are vehicles that emit no carbon pollution during operations. Electric vehicles and hydrogen-fuel cell vehicles are two examples.

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Section 1. Introduction

Pleasanton rests in the scenic and economically important Tri-Valley area of Alameda County in California, north of San Jose and east of San Francisco. The nearly 80,000 residents of this diverse community enjoy warm summers and mild winters.[1] Pleasanton is a prosperous city full of opportunity and innovation and serves as the home headquarters of many businesses, including Safeway, Workday, and 10x Genomics. The city has an active art scene, with several galleries and theaters that host events throughout the year. Pleasanton values open space, with more than 40 community parks, nearly 150 miles of bike paths, bike lanes, and trails, and 700 acres of undeveloped open space for hikers, cyclists, and equestrians to play.[2] Thanks to these integrated economic, cultural, and community development successes, Pleasanton has been ranked one of the wealthiest middle-sized cities in the United States by the Census Bureau, and it was ranked 4th in USA Today's list of "America's 50 best cities to live" in 2014.[3]

The City of Pleasanton has already begun its climate action work, having completed its first greenhouse gas (GHG) emissions inventory in 2007 and its first climate action plan (CAP 1.0) in 2012. Pleasanton surpassed the CAP 1.0 target of reducing emissions 15% below 2005 levels by 2020, ahead of schedule. Since then, extreme heat, water uncertainty, wildfire smoke, and flooding have become more frequent and intense, putting vital systems at risk.

Pleasanton surpassed the CAP 1.0 target of reducing emissions 15% below 2005 levels by 2020 ahead of schedule.

In recognition of escalating climate threats and the latest Intergovernmental Panel on Climate Change (IPCC) report, this climate action plan update (CAP 2.0) reaffirms Pleasanton's commitment to help slow climate change.[4] As Pleasanton continues to grow and thrive, the City needs new strategies to balance economic growth and technological innovation—and maintain the community's culture—without depleting natural resources and compromising the quality of life of current and future generations. Collectively, the City and community must reduce greenhouse gas emissions while building resilience to climate change within our community to maintain a vibrant, healthy, and sustainable home, now and for decades to come. Local climate action planning is a vital and effective tool for reducing greenhouse gas emissions, and the City is committed to achieving its climate goals through evidence-based, equitable, and accountable leadership.

[1] See the 2020 Decennial US Census.
[2] See the City of Pleasanton's Parks & Trails webpage and Trails Master Plan for more information on the City's park and trail system.
[3] See https://www.usatoday.com/story/money/business/2014/09/17/24-7-wall-st-50-best-cities-to-live/15736533/ (accessed 01/05/2022).
[4] IPCC. (2021). Climate Change 2021: The Physical Science Basis. Available at www.ipcc.ch/report/sixth-assessment-report-working-group-i/ (accessed 8/31/2021).

1.1 CAP 2.0 Overview

Why update the Climate Action Plan?

- CAP 1.0 has a horizon year of 2020. Updating the CAP was a City Council priority to continue building on CAP 1.0.
- Climate science has evolved, as have state, regional, and local policies and initiatives. Pleasanton must continue to take an evidence-based approach to climate action that aligns with the latest science and current and anticipated policies.
- The City needs a clear path forward that continues to respond to climate change.

Objectives

- Create a plan with evidence-based, actionable, and achievable local policies.
- Reduce Pleasanton's greenhouse gas emissions.
- Enhance local environmental sustainability and improve resilience and vulnerability to climate change.
- Create a qualified CAP under the California Environmental Quality Act (CEQA) that complies with current regulations.

Document Organization

The CAP 2.0 is organized into the following sections:

- **Section 1. Introduction:** This section introduces the CAP 2.0 and describes CAP 1.0 progress, shaping of the CAP 2.0 through analysis and a public process, the CAP 2.0's local, regional context, and state context.
- **Section 2. Climate Vulnerability and GHG Emissions:** This section articulates Pleasanton's GHG emissions and vulnerability to climate change. This section also covers best available science and outlines GHG emissions reduction targets.
- **Section 3. Pleasanton's Climate Solutions:** This section is the main policy focus of the document. It outlines the strategies and actions Pleasanton will take to reduce GHG emissions locally, comply with state emissions targets, and enhance the city's resilience to climate change.
- **Section 4. Implementation:** This section provides the CAP 2.0 implementation and monitoring plan. It identifies partners, resources, and a monitoring protocol. It also outlines staffing, costs, equity considerations, and phasing of CAP 2.0 actions.

WHAT IS A "QUALIFIED CAP"?

A "qualified CAP" allows projects to streamline future analyses under the California Environmental Quality Act (CEQA). To be a qualified GHG Reduction Plan (i.e., CAP) through 2030, the CAP shall:

- Quantify GHG emissions within a defined area.
- Establish a GHG emissions level below which planned activities would not be "cumulatively considerable."
- Identify and analyze emissions from planned activities.
- Specify measures and performance standards to achieve the specified level of emissions.
- Establish a mechanism to monitor progress toward achieving the specific emissions level and amend if necessary.
- Be adopted through a public process following environmental review.

CAP 2.0 envisions Pleasanton in 2030...

Electricity is almost 100% renewable and natural gas consumption has declined by almost 10%

Homes and buildings are better able to withstand power supply fluctuations because they are more efficient, emit 30% fewer GHG emissions, and generate more renewable energy

Youth continue to drive innovation and ambition in climate action and sustainability, and have a sense of optimism about the environment of the future

People walk and bike more; when they drive, it's most likely in a zero-emissions vehicle

Green space is accessible to all, healthy, and abundant, storing over 70,000 $MTCO_2e$ in trees, plants, and soil

Per capita emissions are 70% lower than in 1990 and on track to reach carbon neutrality by 2045

It's second-nature to consider climate change in everything the City and community does, and the community is more resilient to both climate and non-climate risks as a result

Water is used and reused wisely, so there is enough to go around even as the city grows

About 90,000 more tons of waste are recycled, composted, or never generated in the first place

1.2 CAP 1.0 Progress

The City's first Climate Action Plan, CAP 1.0, included a GHG emission reduction target of 15% below its 2005 baseline by 2020. Since adopting the CAP 1.0, the City has developed plans, created committees, enacted policies, and taken other notable action to address climate change. The City and its partners expanded and improved the pedestrian and bicycle network; conserved community and municipal water; and increased recycling, organics diversion, and waste reduction. The City also increased the proportion of clean, renewable resources in the electricity mix and improved green building adoption, energy efficiency, and energy conservation. Several key accomplishments and events have led Pleasanton to where it is today.

Collectively, these actions along with state and regional regulations and policies have reduced Pleasanton's emissions 28% between 2005 and 2017, and the City met the CAP 1.0 target ahead of schedule. Along the way to meeting the CAP 1.0 target, the City learned key lessons in both planning and implementing climate actions. Specifically of note, the CAP 1.0 included actions that went far above and beyond the available resources to implement.

CAP 2.0 accounts for these lessons, building upon and improving the work that the City, residents, and businesses have done over the last decade and focusing on a short list of highly implementable actions.

1.3 CAP 2.0 Public Process and Engagement

How We Got Here

Pleasanton's CAP 2.0 took two years to complete. The Committee on Energy and the Environment (EEC) was the primary City committee providing input and guidance to staff and the City's professional services team. The City relied on EEC direction and community input to inform every stage of the plan's development, from its overarching goals, vision and targets, to sectors of focus, specific strategies and actions, and their implementation. The City Council, commissions, committees, residents, businesses, implementation partners, City staff, and the professional services team worked together to:

- Conduct a **baseline assessment** of existing plans, policies, state legislation, and progress since the 2012 CAP to understand the existing context and build on lessons learned.
- Assess **vulnerabilities** to climate change impacts, especially increased heat, extreme weather, wildfire, and water uncertainty.
- Prepare a **comprehensive community engagement plan** to guide public outreach, engagement, and communications. The plan was adjusted to focus on virtual engagement in light of COVID-19.
- Articulate a **vision** and **guiding principles** to guide strategy and action development, co-benefits, and action selection criteria.
- Evaluate existing emissions and forecast future emissions, explore **emission reduction pathways**, and set 2030 and 2045 GHG emission reduction targets.
- Develop and refine **strategies and actions** through focus groups, workshops, and surveys; qualitative analysis of impact, cost, feasibility, level of support, equity, and co-benefits; and quantitative analysis of emissions reductions, costs, cost savings, and staff time to implement CAP 2.0 actions.
- Prepare this **CAP 2.0 document** and corresponding CEQA materials for environmental and public review.

How We Engaged

The City engaged community members and organizations, businesses, other community stakeholders, City committees and commissions, and City staff throughout the planning process using a range of in-person and digital platforms. Due to the COVID-19 pandemic, the City paused in-person engagement in March 2020 and transitioned all engagement to the virtual environment, including the addition of virtual surveys, trivia, and workshops to diversify engagement methods and reach more residents.

By the Numbers

685	responses from two community surveys
13	Committee on Energy and the Environment public hearings
5	public hearings across City commissions and committees
4	City Council public hearings
2	meetings with the Chamber of Commerce
6	focus groups with representation from approximately 25 different implementation partners and community organizations and businesses
2	community meetings
22,700	utility customers reached with mailer to raise awareness about the CAP 2.0 planning process
600+	views of youth- and City-created videos on climate action
Dozens	of social media posts, community newsletters, and newspaper and TV ads to engage the community

Engagement Themes

During engagement, several themes emerged as priorities for the community. These themes guided each stage of the planning process, ensuring that the City developed policies that align with the community's priorities.

Reliable Renewable Energy

Residents support transitioning away from fossil fuels to renewable energy sources, including electrification and expanding local renewable energy generation, particularly solar panels. Simultaneously, the community is concerned about future blackouts and energy shortages, underscoring the importance of technologies like battery storage to ensure that renewables are both a clean and reliable energy source.

What we heard

- "Vacant or large open land like parking lots and shopping centers are ideal for adding solar."
- "Reliability of the grid; quality and cost (are critical)."

Water Conservation

Community members recognize the threat that severe droughts and water scarcity poses to Pleasanton. They identified safe and clean water as a priority early in the engagement process and reiterated support throughout for water conservation actions, such as expanding recycled water systems.

What we heard

- "We need to ensure that our water supply is safe to drink and bathe in."
- "Please put money into our water supply."

Sustainable Transportation

Community members and City leaders alike highlighted the need for adopting more policies and programs to reduce GHG emissions from transportation, noting support for electrifying transportation, expanding telecommuting, incentivizing carpooling, making the city more bike- and walk-friendly, making public transportation more convenient, and using sustainable land use policy to reduce VMT.

What we heard

- "More specific targets focused on reducing VMT."
- "Electrification across transportation and buildings highest lever (for reducing emissions)."

Waste Reduction and Diversion

Early on, community members elevated reducing community waste as a top priority for CAP 2.0 and reiterated this support throughout the engagement. They noted the importance of both community reuse programs to reduce waste overall and improving waste diversion to divert unavoidable waste from landfills.

What we heard

- "REDUCE waste, then divert what is left."
- "Stop the waste at source; businesses using disposable everything!"
- "City events and programs need to focus on food recycling/composting."

Green Space and Carbon Storage

Community members emphasized the importance of expanding green spaces and ensuring proper soil management, both to support healthy habitat and to increase local carbon sequestration. This feedback resulted in focusing the Natural Systems strategy on local carbon sequestration and ecosystem resilience.

What we heard

- "How could Pleasanton offset emissions with low-cost investments in carbon sequestration projects?"
- "Community gardens would be great!"
- "More trees in parks & on streets will clean the air and provide more shade from the heat."

Accessibility and Cost

The community voiced concern over the cost and equity implications of climate action, noting cost as a barrier to climate action and highlighting the need to provide support for low-income residents to ensure that implementing CAP 2.0 does not inadvertently increase existing economic disparities. Additionally, City staff reiterated throughout the planning process that CAP 2.0 should focus on a short list of highly impactful strategies and actions that are cost effective and feasible to implement.

What we heard

- "I am concerned about the rising cost of living in Pleasanton as a result of the plan."
- "Need to consider cost associated (with energy efficiency retrofits); need to incentivize."
- "What are the equity/cost implications of EBCE's Renewable 100?"

1.4 CAP 2.0 Local and Regional Context

The CAP 2.0 does not exist within a vacuum. To understand the strategies, gaps, and opportunities that exist, the City and professional services team reviewed relevant existing plans, policies, and programs that inform or relate to current and future climate activities in the City. Development of CAP 2.0 also intentionally aligned with and built upon several sustainability-related plans and efforts.

Table 4 (right) links to the various documents reviewed for the City of Pleasanton Baseline Assessment. Figure 1 (next page) highlights the City's key sustainability actions to date.

Beyond Pleasanton's immediate context, regional efforts include but are not limited to:

- **Bay Area Air Quality Management District (BAAQMD) programs** such as Climate Protection Planning Program, Healthy Homes Initiative, and Wildfire Air Quality Response Program.
- **Alameda County programs** such as Green Business Certification, Climate Protection Project, and Cool Counties Climate Stabilization Declaration.
- StopWaste programs **that help the community waste less and** use resources more efficiently.
- **Plan Bay Area 2040** details how the nine-county Bay Area can make progress toward the region's long-range transportation and land use goals.
- **Climate action plans in neighboring jurisdictions**; for example, Dublin and Livermore recently established GHG reduction targets for carbon neutrality by 2045.

Table 4. Documents reviewed for the City of Pleasanton Baseline Assessment

Cross-cutting
Tri-Valley Local Hazard Mitigation Plan (2018)
StopWaste's Climate Change Adaptation Measures: Building and maintaining soil health to assist in climate change mitigation (2018)
Emergency Operations Plan (2018)
Pleasanton General Plan – Air Quality and Climate Change Element (2005)
Pleasanton General Plan – Economic and Fiscal Element (2005)
Pleasanton General Plan – Housing Element (2005)
Pleasanton General Plan – Community Character Element (2005)
Transportation and Land Use
Downtown Pleasanton Parking Strategy & Implementation Plan (2017)
Downtown Specific Plan (2019)
Pleasanton Pedestrian and Bicycle Master Plan (2010)
Trails Master Plan (2019)
Pleasanton General Plan – Land Use Element (2005)
Buildings and Energy
City greenhouse gas inventories for 2012 and 2017
Pleasanton General Plan – Energy Element (2005)
Materials and Consumption
The Alameda County Integrated Waste Management Plan (amended 2017)
SB 1383 Draft Text
Natural Systems and Water Resources
Zone 7 Water Agency Stream Management Master Plan (2005)
StopWaste's Climate Change Adaptation Measures: Building and maintaining soil health to assist in climate change mitigation (2018)
Urban Water Management Plan – Pleasanton Municipal Code (amended in 2016)
City of Pleasanton Recycled Water Use Guidelines (2015)
Pleasanton General Plan – Water Element (2005)
Pleasanton General Plan – Conservation and Open Space Element (2005)
Pleasanton General Plan – Land Use Element (2005)
Pleasanton 2018 Annual Water Quality Report and Pleasanton's Water Quality webpage

Figure 1. Key sustainability actions to date[1]

[1] For more information on City plans, the 2012 CAP 1.0, and EEC, visit the City of Pleasanton website.

1.5 CAP 2.0 State Context

Pleasanton must take an evidence-based approach to climate action planning that aligns with the latest science, current and anticipated policies, and neighboring communities.

Since adoption of the CAP 1.0, several strategies to monitor and address climate change have emerged and California has continued to be a leader in developing climate action goals. Key California legislation and executive orders (EO) that set statewide emissions targets include:

EO S-3-05 (2005) established statewide targets for reducing GHG emissions to 2000 levels by 2010, 1990 levels by 2020, and 80% below 1990 levels by 2050.

CEQA Guidelines Sections 15183.5 (2010) required, as part of Senate Bill (SB) 97, that public agencies review the environmental impacts of proposed projects and planning documents, including CAPs and specific kinds of development projects, to address GHG emissions and provide guidance about the analysis, mitigation, and effects of GHG emissions. Completion of this environmental review is one of six factors that support a GHG Reduction Plan (i.e., CAP) to be considered qualified.

SB 32 (2016) established an update statewide goal of reducing GHG emissions to 40 percent below 1990 levels by 2030.

California Climate Change Scoping Plan Update (2017) lays out California's strategy for meeting its GHG emissions reduction goals, including targets and standards for clean energy, clean transportation, energy efficiency, land use and agriculture, industry, and other sectors. The state adopted the Assembly Bill (AB) 32 and SB 32 Scoping Plans in 2014 and 2017, respectively.

EO B-55-18 (2018) created a statewide goal of reaching carbon neutrality by 2045 (in addition to meeting SB 32 targets for 2030).

In addition to GHG emission reduction target setting legislation, the state has passed legislation that will help reduce Pleasanton's emissions including:

AB 1493 (2002) required that the California Air Resources Board (CARB) adopt regulations to achieve the maximum feasible and cost-effective reduction in GHG emissions from California vehicles. These are known as the Pavley Regulations and Fuel Efficiency Standards.

SB 375 (2008) directs CARB to set regional targets for GHG emissions reduction, offers CEQA streamlining incentives for GHG emissions reduction, and establishes a collaborative process to develop a regional Sustainable Communities Strategy that coordinates land use and transportation planning.

California's Advanced Clean Cars Program (2012) establishes regulations and incentives that support the transition to Low Emission Vehicles and Zero Emission Vehicles. This program exceeds federal Corporate Average Fuel Economy (CAFE) fuel efficiency standards and sets some of the most aggressive standards in the country.

SB 1383 (2016) requires that California reduce organic waste to landfill by 75% by 2025 and rescue 20% of surplus edible food in phases beginning in 2022. The bill requires jurisdictions to expand organic waste collection, procure organic waste products such as compost, mulch, and biogas; and conduct education and outreach on organics recycling to residents and businesses.

California Air Resources Board Climate Change Scoping Plan Update (2017) lays out California's strategy for meeting its GHG emissions reduction goals, including targets and standards for clean energy, clean transportation, energy efficiency, land use and agriculture, industry, and other sectors.

AB 1346 (2021-2022) would require the California State Air Resources board to adopt cost-effective and technologically feasible regulations to prohibit engine exhaust and evaporative emissions from new small off-road engines, such as leaf blowers.

SB 100 (2018) created the state's renewable portfolio standards, requiring 100% renewable energy with zero-carbon energy sources by 2045.

California Code of Regulations Title 24 (2019) was updated with new California Green Building Standards (part 11) and Building Energy Efficiency Standards (part 6). These energy efficiency and other sustainable building and construction standards apply to all newly constructed and renovated California buildings.

SAFE (Safer Affordable Fuel-Efficient) Vehicles Rule (2019) is a federal policy that revoked California's authority to set its own GHG emissions standards and ZEV mandates. The Final SAFE Rule relaxed federal GHG emissions and Corporate Average Fuel Economy (CAFÉ) standards to increase in stringency at only about 1.5% per year from model 2020 levels over model years 2021-2026.

EO N-79-20 (2020) requires sales of all new passenger vehicles to be zero-emission by 2035.

While state and regional efforts will help Pleasanton reduce GHG emissions, they alone will be insufficient to meet the state's 2030 and 2045 targets. This CAP 2.0 provides a roadmap of proactive City actions and coordination with regional partners to reduce GHG emissions, so that the City can do its part to mitigate climate change and adapt to climate impacts.

Section 2. Climate Vulnerability and GHG Emissions

2.1 Pleasanton's Climate Vulnerability

Pleasanton, like many communities, faces vulnerabilities to climate change. To better understand the extent to which climate change will affect the community, the City completed a Pleasanton-specific climate vulnerability assessment.[1] This assessment evaluated anticipated climate threats to the community—including impacts to social, environmental, and infrastructure systems—and the City's level of readiness to respond to them. The assessment revealed that the community is already experiencing and will continue to experience impacts from climate change. These impacts will build upon one another, with one impact intensifying another, and threaten the safety, health, and wellbeing of residents, particularly vulnerable populations such as outdoor workers, the very young, and the elderly. Some of the specific threats that Pleasanton faces are shown in Table 5 on the following page, with relative risk levels indicated for different public and natural systems. The relative risk scores (1 being "lowest risk level" and 5 being "highest risk level") can help the City better determine how to prioritize protecting different sectors from climate impacts.

[1] To view the full Climate Vulnerability Assessment, visit the City of Pleasanton CAP 2.0 webpage (accessed August 16, 2021).

Table 5. Vital systems vulnerability to climate change impacts

This table shows the extent to which Pleasanton's greatest climate change impacts (increased heat, extreme weather, wildfire, water uncertainty) are likely to affect the city's most vital public and natural systems.

Increased heat

Summers are expected to warm in Alameda County, with the number of extreme heat days and heat waves at least doubling by mid-century.1 Rising temperatures will exacerbate drought, wildfire, and water uncertainty.

Rising temperatures impact nearly every vital system in Pleasanton. For example, a severe summer heat wave threatens public health from heat-related illness. Higher demand for air conditioning could strain the energy supply.

Extreme weather

Climate change will cause rain events to be less frequent but more intense.2 In the Bay Area, these heavy rain events are likely to increase flooding, landslides, and mudslides.

Flooding, landslides, and mudslides can put people in harm's way and increase risk of injury or death. Extreme weather can also cause property damage.

Wildfire

Climate change is causing more frequent, intense wildfires in the Bay Area, straining what the fire-prone landscape can handle. Rising temperatures, drought, and expanding wildland development increases wildfire risk for parts of the inland Bay Area.[3]

Wildfires are very likely to make air quality unhealthy: those with asthma and other health complications are at higher risk.

Water uncertainty

Pleasanton is particularly vulnerable to future water shortages. Warmer temperatures, an 80% decline in snowpack by 2100, and changing seasonal precipitation patterns will worsen summer water shortages and lead to more frequent, severe droughts.

Pleasanton recently declared a Local Drought Emergency. These water shortage challenges will become more severe and frequent in the coming years, with impacts to everyday water use, natural landscapes, habitats, and even hydropower energy sources.

PUBLIC INFRASTRUCTURE	Most Relevant Impacts	Risk Level (1-5)
Land Use		1
Energy Infrastructure		2
Energy Supply & Demand		3
Buildings		4
Dams		1
Transportation Systems		4
WATER MANAGEMENT	**Most Relevant Impacts**	**Risk Level (1-5)**
Wastewater Infrastructure		1
Water Supply & Availability		5
Stormwater Infrastructure		3
NATURAL SYSTEMS & BIODIVERSITY	**Most Relevant Impacts**	**Risk Level (1-5)**
Terrestrial Habitats		3
Aquatic Habitats		4
Habitats & Biodiversity		3
Agriculture		2
PUBLIC HEALTH	**Most Relevant Impacts**	**Risk Level (1-5)**
Mental Health		1
Heat-related Illnesses		4
Respiratory Illnesses		3
Acute Injuries & Displacement		4
Health Access & Emergency Services		2

[1] An extreme heat day is defined as a maximum air temperature of at least 95°F, a heat wave is defined as three to nine days with maximum air temperature of at least 95°F, and an extreme heat wave is defined as ten or more days with maximum air temperature of at least 95°F. Warm months are defined as June through October. Source: Vahmani, P., Jones, A.D., and Patricola, C.M. (2019). Interacting implications of climate change, population dynamics, and urban heat mitigation for future exposure to heat extremes. Environ. Res. Lett. 14(0840851). DOI: doi.org/10.1088/1748-9326/ab28b0

[2] Cannon, S.H. and J.E. Gartner. (2005). Ch. 15 Wildfire-related debris flow from a hazards perspective. In: Debris-flow Hazards and Related Phenomena [eds. M. Jakob and O. Hungr]. Springer Praxis Books. Springer, Berlin, Heidelberg.

[3] Ackerly, David, Andrew Jones, Mark Stacey, Bruce Riordan. (University of California, Berkeley). (2018). San Francisco Bay Area Summary Report. California's Fourth Climate Change Assessment. Publication number: CCCA4-SUM-2018-005.

Building a Resilient Community for Future Generations

The CAP 2.0 focuses on not only reducing emissions but also building a resilient community. The COVID-19 pandemic revealed the importance of understanding climate vulnerability through the lens of public health, emergency responses, quality of life, and those who are disproportionately impacted. The investments the City makes today will allow Pleasanton to shape what the community will look like, not just for current residents and visitors, but for children, grandchildren, and all future generations.

- **Some community members are more vulnerable to climate change impacts**, including children, older populations, people with chronic health conditions, low-income households, and communities of color.
- **Addressing climate vulnerability can build resilience to a broad range of crises and hazards, including natural disasters, water shortages, and public health crises**—all of which are expected to increase as a result of climate change.
- **Some of the most cost-effective strategies for increasing resilience and preparing for pandemics involve investing in essential public health infrastructure**, including water and sanitation systems, increasing community awareness and education, and increasing emergency response systems. Shoring up the local economy, especially small, local businesses, is another important opportunity to cost effectively prepare for public health and climate emergencies.
- By coordinating planning efforts, **multiple economic challenges generated by crises from climate change and other impacts can be addressed simultaneously.**

Did you know? Individual action is just as important as City action to ensure community resilience. Read on to learn what you can do!

What you can do today

Act locally

- Join and support local non-profits such as the **GoGreen Initiative** and/or **Tri-Valley Citizens Climate Education** to support local climate and sustainability action.
- Calculate your **household carbon footprint** and build an action plan for reducing your household's carbon pollution (e.g., how you get to work, what you buy and throw away, what you eat). The calculator will also offer funding and cost-saving resources!
- Increase your civic engagement to ensure your concerns, priorities, and values are heard and reflected, such as participating in the Pleasanton Committee on Energy and the Environment.
- Stay informed about recent climate science. For example, read parts of the most recent **IPCC report**.
- Shop locally, supporting local businesses and clean manufacturing, and keeping transportation emissions down" or similar - it's really a great way to support the local economy while reducing your footprint!

Travel more sustainably and improve air quality

- Reduce your travel by minimizing flights and cutting down on driving.
- Enjoy alternative transportation modes, including walking, biking, and public transit—replacing just one car trip per week can really add up!
- If you purchase a car, go electric!
- Replace gas-powered landscaping equipment with electric plug-in or battery equipment.

Embrace zero waste

- Reduce consumption of high-emissions foods such as meat and dairy—replacing just one portion of meat per week with a plant-based alternative can really add up! Seasonal fruits and vegetables, grains, and unprocessed foods generally have a lower impact than out-of-season alternatives.
- Avoid unnecessary food waste by planning meals, right-sizing your grocery and restaurant purchases, and bring reusable containers when you shop or eat out.
- Avoid single-use plastic food wraps, utensils, or bags and instead use reusable storage containers, jars, beeswax, and shower caps.
- When purchasing clothing, electronics or household goods, look for items that are high quality, repairable, and long lasting.

Be water-wise, energy-smart, and nature-friendly

- Switch off and unplug appliances when not in use (computers, phone chargers, TVs, etc.).
- Install water- and energy-efficient appliances, such as WaterSense toilets and showerheads and Energy Star washing machines.
- Plant summer-dry native trees and vegetation in your backyard or garden.
- **Sheet mulch your yard** and practice xeriscaping, a process that reduces or eliminates the need for additional water in landscaping and gardening.
- Use mulch and compost to retain soil moisture, control weeds and build resilient soil.
- Organize a community group to help restore a local stream or park.
- Sign up for **automatic leak detection.**
- Avoid pesticides, herbicides, and insecticide use and instead practice **Integrated Pest Management**.

2.2 Pleasanton's Greenhouse Gas Emissions

Every mile we travel, device we plug in, and ounce of food and waste we produce adds to Pleasanton's carbon footprint. As Pleasanton continues to grow and develop, more buildings, more vehicles, and more demand for goods and services come at a cost that we will eventually repay in impacts from climate change. Limiting the amount of climate pollution and other heat-trapping GHGs in the atmosphere is the most important action the City and community can take to slow climate change.

The City has completed several GHG emissions inventories with the most recent in 2017. These inventories help the City set community-wide targets, measure progress over time, and inform which actions will have the greatest GHG emissions reduction benefits.

Consumption-based Emissions

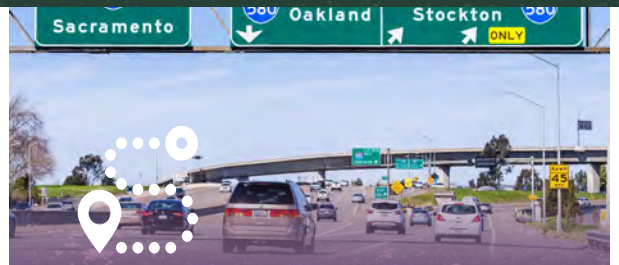
Traditionally, cities measure GHG emissions through geographic-based inventories. These inventories estimate emissions directly tied to actions taken with the physical Pleasanton boundary, such as from the burning of fossil fuels to power vehicles and buildings.

These traditional inventories do not tell the entire emissions story, however. Services and goods purchased within Pleasanton also carry an upstream GHG emissions impact, such as emissions produced through the production and transport of fuels, food, and construction materials. Efforts to reduce overall consumption or transition to less carbon-intensive goods and services are crucial components of an overall climate mitigation strategy.

The City measured the following sources of carbon pollution in the 2017 GHG emissions inventory:

BUILDINGS & ENERGY

Buildings and energy, including residential, commercial, industrial, and municipal electricity and natural gas use.



TRANSPORTATION & LAND USE

Transportation and land use, including fuels for community and municipal vehicle travel (e.g., passenger vehicle, commercial vehicles, off-road vehicles).

WASTE AND WASTEWATER

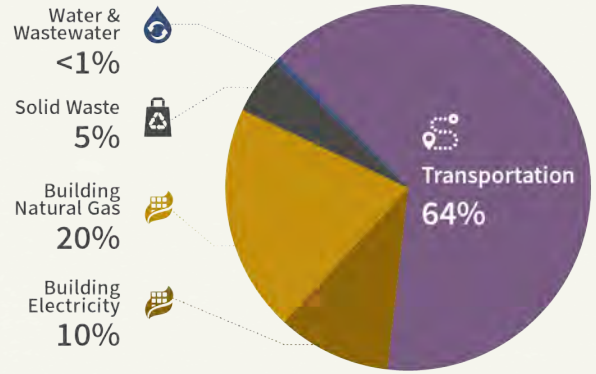
Waste and wastewater, including community solid waste generation and decomposition, and wastewater generation and treatment.

Like many cities, Pleasanton's major emissions sources are on-road transportation, especially from commercial and passenger vehicles, and building energy, especially natural gas consumption. In 2017, most of Pleasanton's GHG emissions came from three sources (Figure 2):

- **Transportation** (on-road and off-road transportation)
- **Building natural gas use** (residential and non-residential buildings)
- **Building electricity use** (residential and non-residential buildings)

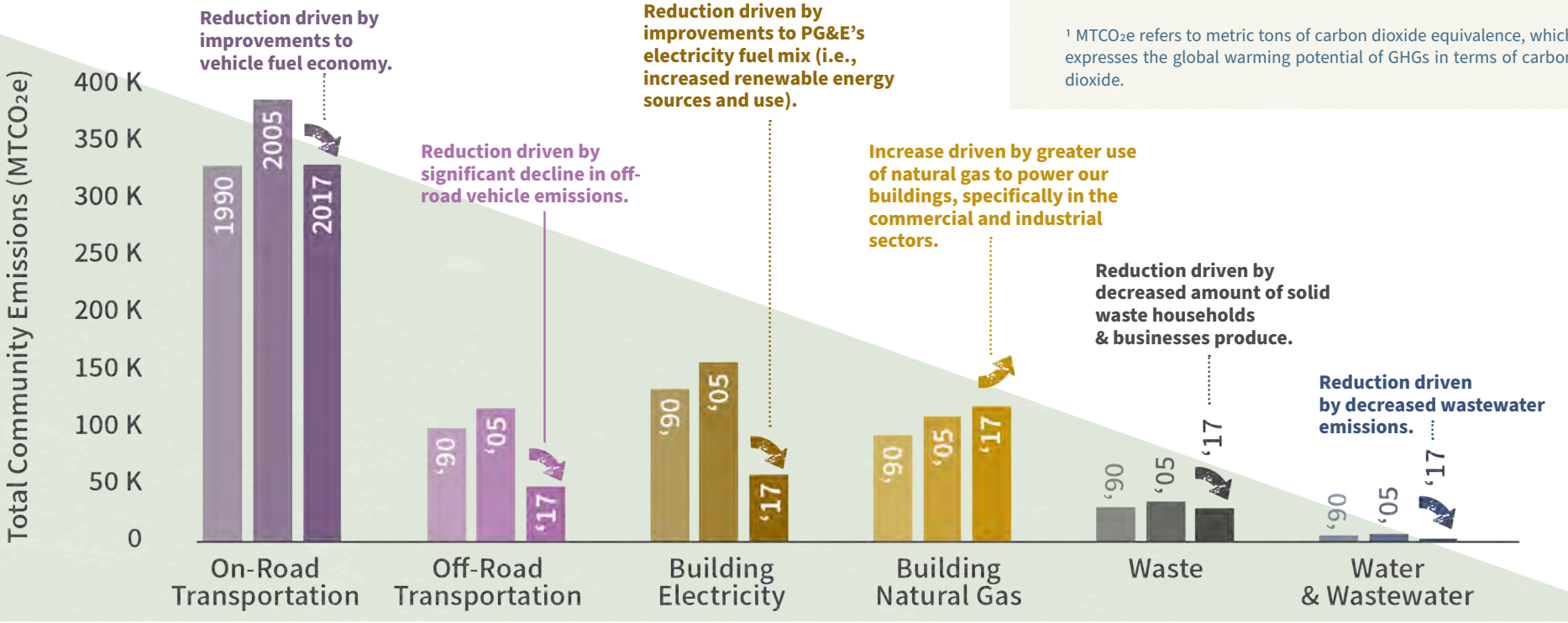
As measured in the inventories, between 2005 and 2017, GHG emissions have declined 28%, exceeding the GHG emissions reduction target established in the CAP 1.0 (Figure 3). Even as Pleasanton has continued to experience a growing population and economy, the community achieved a per capita emissions reduction of 37%.

Figure 2. Pleasanton community GHG emissions by sector
(2017 Total: 588,553 $MTCO_2e$ | Per Capita: 7.67 $MTCO_2e$[1])



[1] $MTCO_2e$ refers to metric tons of carbon dioxide equivalence, which expresses the global warming potential of GHGs in terms of carbon dioxide.

Figure 3. Communitywide emissions changes from 1990 to 2017, by sector



Projected Emissions

Building off the 2017 GHG emissions inventory, emissions were forecasted into the future, in five-year intervals beginning in 2020 and ending in 2050 (see Appendix B and Figure 4 on page 29 for more information).

- A **Business as Usual (BAU) forecast** estimates how emissions would change over time without the influence of external or internal policies or programs. Population and economic growth are the key drivers of the BAU projection, specifically the growth projected in the City's 2005-2025 General Plan and Association of Bay Government's future demographic forecasts.

- An **Adjusted BAU (ABAU) forecast** considers the influence of policies external to Pleasanton—namely SB 100, Title 24 building efficiency standards, and vehicle emission standards—on projected communitywide emissions. These existing and anticipated policies will decrease Pleasanton's local emissions even if the City takes no climate action.

In addition to state and federal regulations that affect local emissions, the City is already taking several actions that are anticipated to continue through the life of this plan. These actions are considered existing and ongoing. Some of these actions are GHG mitigating actions and contribute to additional GHG emissions reductions. Existing ongoing actions that were quantified for emission reduction potential are listed in Table 6 to the right. The gap between the 2030 reduction target set by the City (See Section 2.3) and the city's projected emissions (accounting for the adjustments made for the ABAU forecast and considering existing ongoing actions) is the policy focus of the new actions in the CAP 2.0.

Table 6. GHG emission reduction estimates for local existing ongoing actions

Existing Ongoing Actions	Cumulative 2030 Emissions Reduced ($MTCO_2e$)
E1. Maintain zero-emissions energy as the default EBCE choice for municipal operations	2,200
E2. Maintain zero-emissions energy as the default EBCE choice for the community	269,600
E3. Bicycle & Pedestrian Master Plan and Trails Master Plan	5,900
E4. Regional transit support	4,800
E5. Complete Streets implementation	1,000
E6. Housing Element	17,200
E7. SB 1383 implementation	135,100

2.3 GHG Emissions Reduction Targets

Recognizing that state and federal policies will reduce emissions, the City aims to deepen GHG emissions reductions through local targets, strategies, and actions.

The CAP 2.0 includes a linear emissions reduction target pathway that complies with the latest state-level policies and supports a qualified CAP through 2030. This pathway includes GHG emission reduction targets to **reduce emissions to 4.1 $MTCO_2e$ per capita by 2030** and work towards **per capita carbon neutrality by 2045**. The targets set in the CAP 2.0 align Pleasanton with the long-term path set by the state (i.e., SB 32, EO B-55-18, EO S-3-05), with a more aggressive interim 2030 target. The City chose a pathway that exceeds state GHG emissions reduction requirements in 2030 to underscore the importance of early and consistent action. Actions that are taken today set the foundation for achieving carbon neutrality, help ensure a smooth transition for system-changing actions, and enable emissions reductions to occur sooner, making them more impactful.

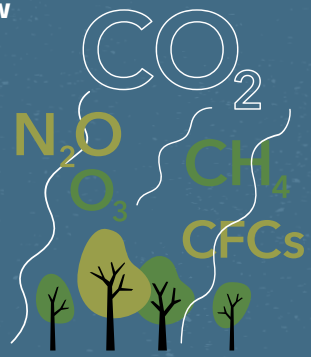
The CAP includes actions over the next 10 years and is intended to be qualified through 2030, at which point it will be updated to lay out the next decade of actions.

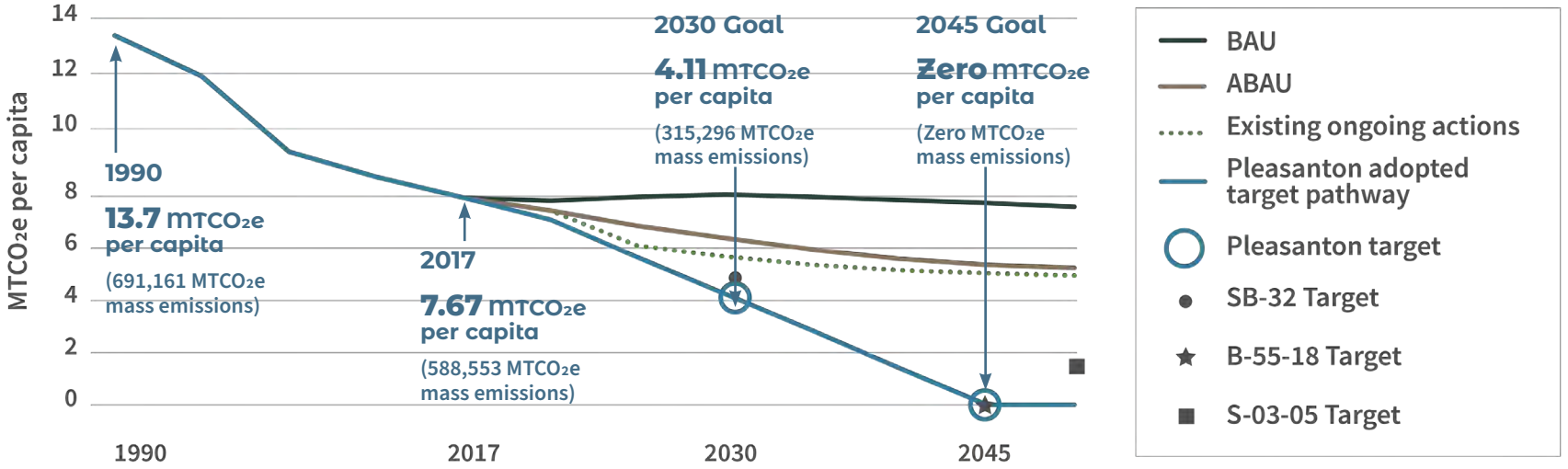
By 2030

Pleasanton's per-capita GHG emissions will be ~**65% below 2005 levels** and ~**70% below 1990 levels** (4.1 $MTCO_2e$ per capita)

By 2045

Pleasanton will achieve carbon neutrality (0 net $MTCO_2e$ per capita)

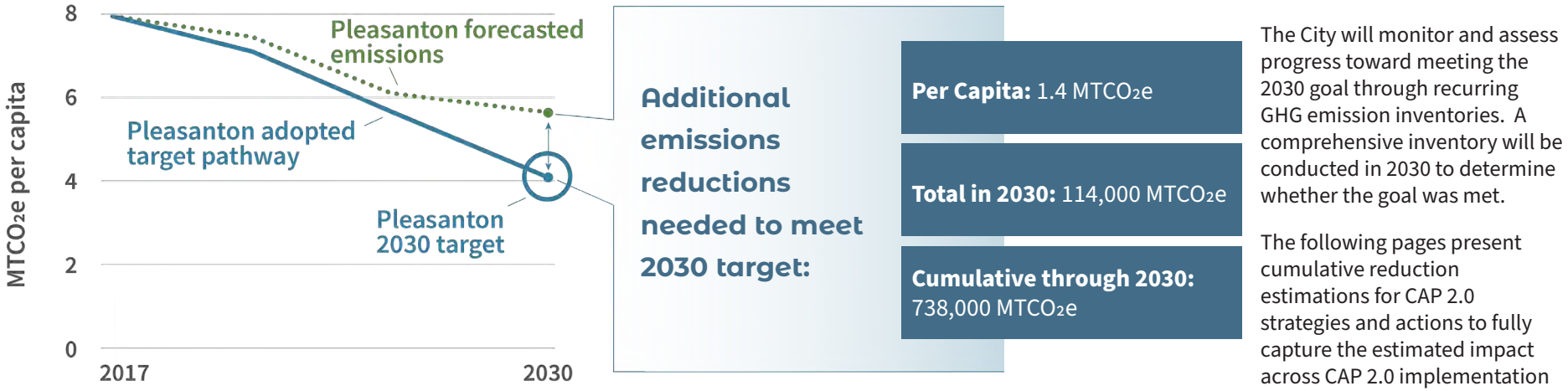




2.4 CAP 2.0 Policy Focus

As described in the previous section, existing state legislation (i.e., the ABAU forecast scenario) will help drive reductions in emissions. Further driving reductions are local existing and ongoing actions. However, that is not enough to reach the CAP 2.0 2030 target. As shown in Figure 4, further local action is needed to close the gap between the projected emissions and the CAP 2.0 target pathway. This gap is the policy focus of the CAP 2.0. The CAP 2.0 outlines new strategies and actions the City will implement over the next 10 years that will achieve the interim 2030 CAP 2.0 target and set the City up for success to meet the City's long-term 2045 target of per-capita carbon neutrality (see Section 3: Pleasanton's Climate Solutions).

Figure 4. CAP 2.0 Policy Focus



The City will monitor and assess progress toward meeting the 2030 goal through recurring GHG emission inventories. A comprehensive inventory will be conducted in 2030 to determine whether the goal was met.

The following pages present cumulative reduction estimations for CAP 2.0 strategies and actions to fully capture the estimated impact across CAP 2.0 implementation years.

Section 3. Pleasanton's Climate Solutions

3.1 Introduction and Orientation

Climate Solutions Introduction

Pleasanton's climate solutions since 2012 have led to meaningful benefits for residents and businesses. The policy focus for the CAP 2.0 builds off the solutions since 2012 and focuses on the gap between the forecasted emissions and the CAP 2.0 targets. CAP 2.0's climate solutions outline new strategies and actions combined with existing ongoing actions that slow the process of climate change by reducing GHG emissions from multiple sectors and storing carbon in natural systems. CAP 2.0 climate solutions also build resilience to extreme heat and weather, flooding, wildfire, fluctuations in the power supply, and water shortages. In addition to reducing emissions, the CAP 2.0's climate solutions have many social, economic, and environmental co-benefits for the community (see "Orientation to Climate Solutions Sectors, Strategies, and Actions" section on page 32 for details).

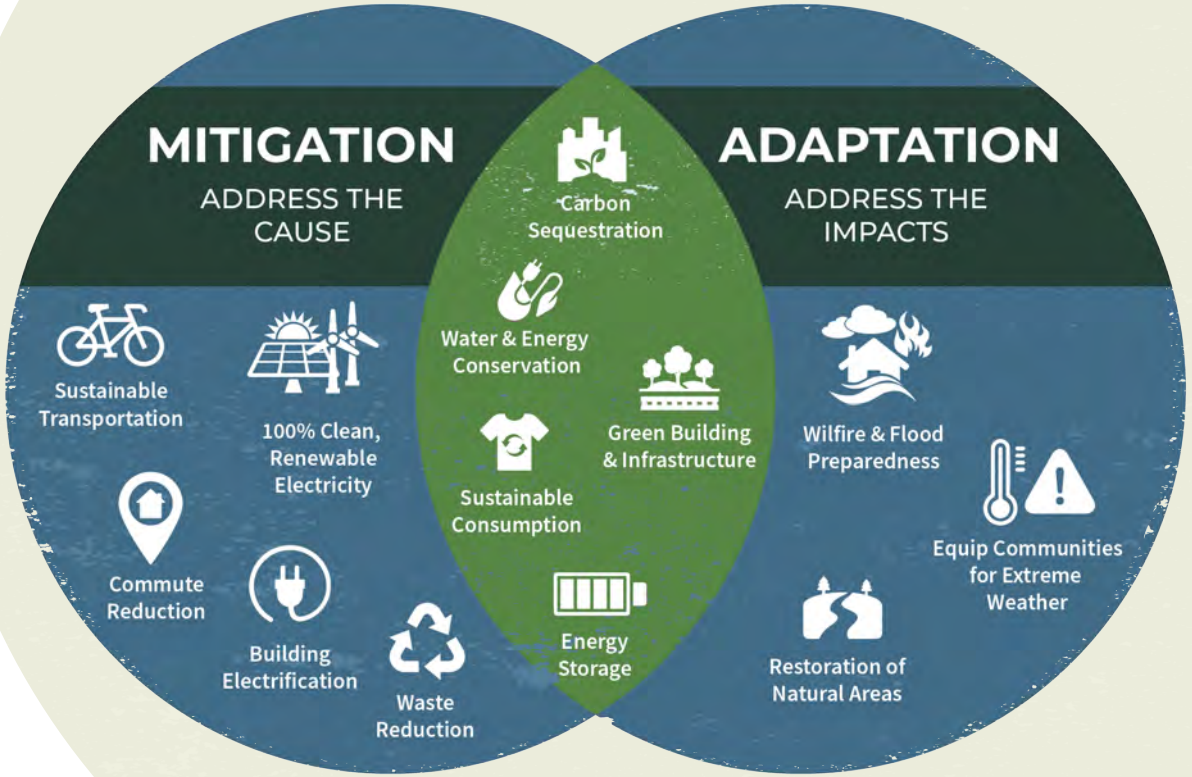


Figure 5. Climate solutions incorporate mitigation of and adaptation to impacts.

The strategies and actions included in the CAP 2.0 aim to meet the needs and reflect the values and concerns of the Pleasanton community. The primary pathway to reduce transportation emissions is to take advantage of zero-emissions electricity to **electrify vehicles and buildings**. The City will also **build out and connect its bicycle, pedestrian, and transit network** to further reduce emissions from remaining gas-powered vehicles, provide viable travel alternatives, and support healthy lifestyles. Natural gas emissions is also a key component on the primary pathway to reduce emissions. In July 2021, the Pleasanton City Council made the decision to opt into EBCE's 100% renewable energy portfolio which will help to make significant progress in this area. Since electrified buildings still use energy, electrification will be complemented by **expanding green building and energy conservation and efficiency efforts**, which also build resilience to extreme heat and fluctuations in the power supply. Together, the transportation and buildings/energy approaches will account for ~40% of Pleasanton's needed emission reductions. The remaining reductions will come largely from **implementing existing state law on food waste reduction and recovery** and **storing carbon on the landscape** through an Urban Forest Master Plan.

To further address the impacts of climate change and support a healthy environment for Pleasanton residents to live, work, and play, the City will continue a number of ongoing efforts. They will continue to **implement water conservation, water quality, stormwater, and pollutant reduction programs** to preserve and protect the water supply. The City will also **support urban agriculture**, and **provide cooling centers** during extreme heat. Finally, the City will **support and in some cases expand community outreach and education programs**.

BUILDINGS & ENERGY

TRANSPORTATION & LAND USE

MATERIALS & CONSUMPTION

NATURAL SYSTEMS

WATER & WASTEWATER

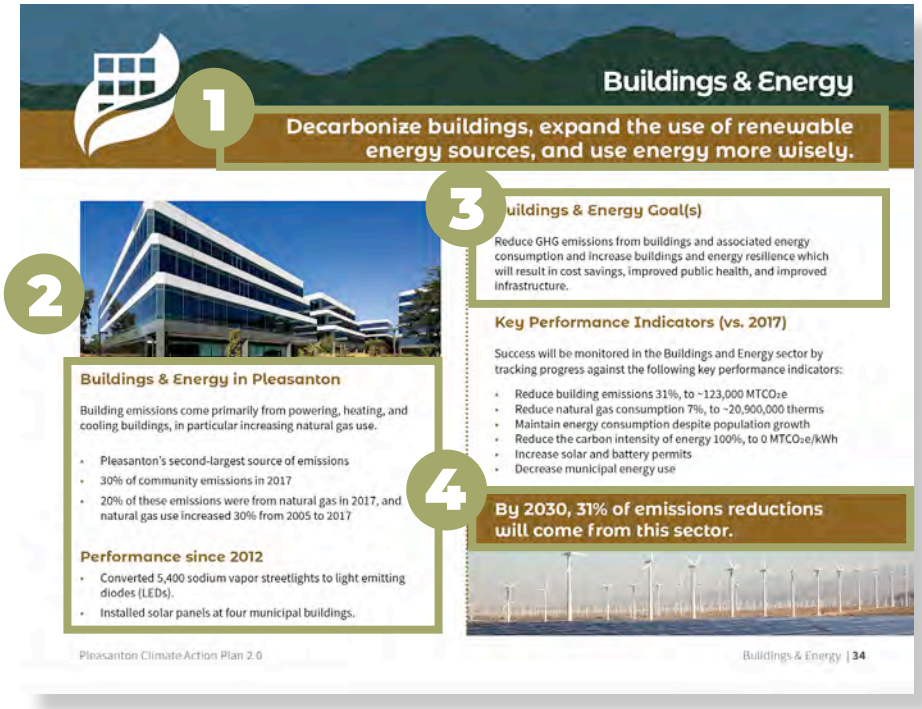
COMMUNITY RESILIENCE

Orientation to Climate Solutions Sectors, Strategies and Actions

Orientation to Sectors and Strategies

Each sector (Buildings & Energy, Transportation & Land Use, Materials & Consumption, Natural Systems, Water Resources, and Community Resilience & Wellbeing) begins with a **two-page overview** of how the sector contributes to Pleasanton's carbon pollution and climate solutions.

1. **Subheader:** The plan for the sector, in a nutshell
2. **Introduction:** How the sector contributes to Pleasanton's climate pollution and what the City has done since 2012 to address it
3. **Goal(s):** The outcome that Pleasanton intends to achieve and how progress will be tracked
4. **Reductions:** The emissions reductions needed from the sector to achieve the 2030 target
5. **Strategies:** Pleasanton's plan to accomplish goals in the sector, and the cumulative emissions reductions and other benefits expected from the sector through 2030
6. **Actions:** The specific activities the City will implement; includes the cumulative costs or cost savings over a 10-year timeframe and cumulative emissions reductions expected through 2030. The symbol indicates an action that indirectly supports emissions reduction



Buildings & Energy

1 Decarbonize buildings, expand the use of renewable energy sources, and use energy more wisely.

2

Buildings & Energy in Pleasanton

Building emissions come primarily from powering, heating, and cooling buildings, in particular increasing natural gas use.

- Pleasanton's second-largest source of emissions
- 30% of community emissions in 2017
- 20% of these emissions were from natural gas in 2017, and natural gas use increased 30% from 2005 to 2017

Performance since 2012

- Converted 5,400 sodium vapor streetlights to light emitting diodes (LEDs).
- Installed solar panels at four municipal buildings.

3 **uildings & Energy Goal(s)**

Reduce GHG emissions from buildings and associated energy consumption and increase buildings and energy resilience which will result in cost savings, improved public health, and improved infrastructure.

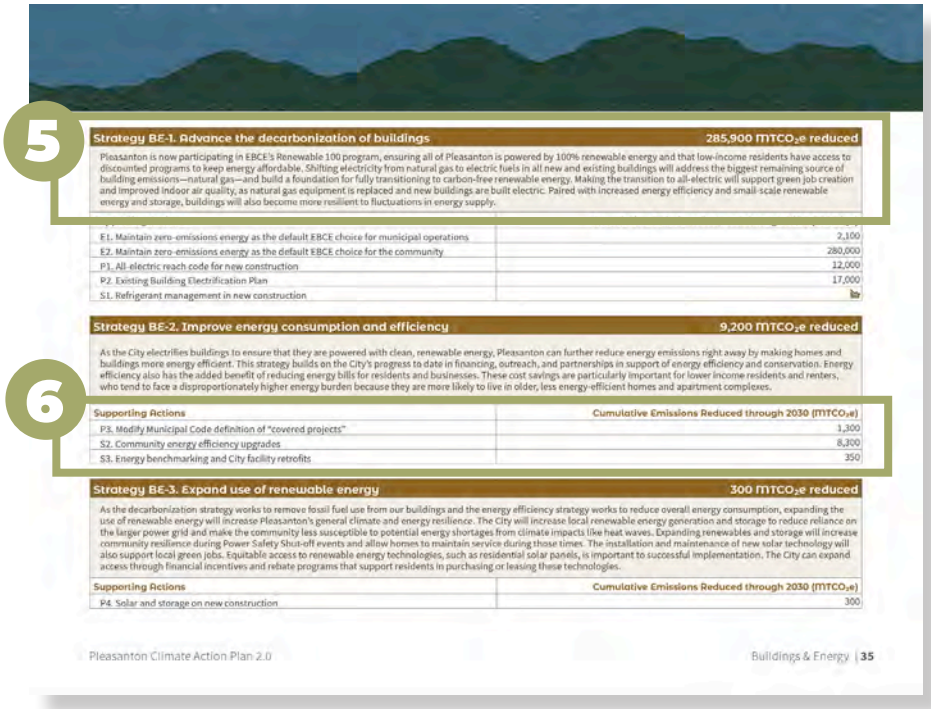
Key Performance Indicators (vs. 2017)

Success will be monitored in the Buildings and Energy sector by tracking progress against the following key performance indicators:

- Reduce building emissions 31%, to ~123,000 $MTCO_2e$
- Reduce natural gas consumption 7%, to ~20,900,000 therms
- Maintain energy consumption despite population growth
- Reduce the carbon intensity of energy 100%, to 0 $MTCO_2e$/kWh
- Increase solar and battery permits
- Decrease municipal energy use

4 By 2030, 31% of emissions reductions will come from this sector.

Pleasanton Climate Action Plan 2.0 Buildings & Energy | 34



5

Strategy BE-1. Advance the decarbonization of buildings — 285,900 $MTCO_2e$ reduced

Pleasanton is now participating in EBCE's Renewable 100 program, ensuring all of Pleasanton is powered by 100% renewable energy and that low-income residents have access to discounted programs to keep energy affordable. Shifting electricity from natural gas to electric fuels in all new and existing buildings will address the biggest remaining source of building emissions—natural gas—and build a foundation for fully transitioning to carbon-free renewable energy. Making the transition to all-electric will support green job creation and improved indoor air quality, as natural gas equipment is replaced and new buildings are built electric. Paired with increased energy efficiency and small-scale renewable energy and storage, buildings will also become more resilient to fluctuations in energy supply.

E1. Maintain zero-emissions energy as the default EBCE choice for municipal operations	2,100
E2. Maintain zero-emissions energy as the default EBCE choice for the community	280,000
P1. All-electric reach code for new construction	12,000
P2. Existing Building Electrification Plan	17,000
S1. Refrigerant management in new construction	

6

Strategy BE-2. Improve energy consumption and efficiency — 9,200 $MTCO_2e$ reduced

As the City electrifies buildings to ensure that they are powered with clean, renewable energy, Pleasanton can further reduce energy emissions right away by making homes and buildings more energy efficient. This strategy builds on the City's progress to date in financing, outreach, and partnerships in support of energy efficiency and conservation. Energy efficiency also has the added benefit of reducing energy bills for residents and businesses. These cost savings are particularly important for lower income residents and renters, who tend to face a disproportionately higher energy burden because they are more likely to live in older, less energy-efficient homes and apartment complexes.

Supporting Actions	Cumulative Emissions Reduced through 2030 ($MTCO_2e$)
P3. Modify Municipal Code definition of "covered projects"	1,300
S2. Community energy efficiency upgrades	8,300
S3. Energy benchmarking and City facility retrofits	350

Strategy BE-3. Expand use of renewable energy — 300 $MTCO_2e$ reduced

As the decarbonization strategy works to remove fossil fuel use from our buildings and the energy efficiency strategy works to reduce overall energy consumption, expanding the use of renewable energy will increase Pleasanton's general climate and energy resilience. The City will increase local renewable energy generation and storage to reduce reliance on the larger power grid and make the community less susceptible to potential energy shortages from climate impacts like heat waves. Expanding renewables and storage will increase community resilience during Power Safety Shut-off events and allow homes to maintain service during those times. The installation and maintenance of new solar technology will also support local green jobs. Equitable access to renewable energy technologies, such as residential solar panels, is important to successful implementation. The City can expand access through financial incentives and rebate programs that support residents in purchasing or leasing these technologies.

Supporting Actions	Cumulative Emissions Reduced through 2030 ($MTCO_2e$)
P4. Solar and storage on new construction	300

Pleasanton Climate Action Plan 2.0 Buildings & Energy | 35

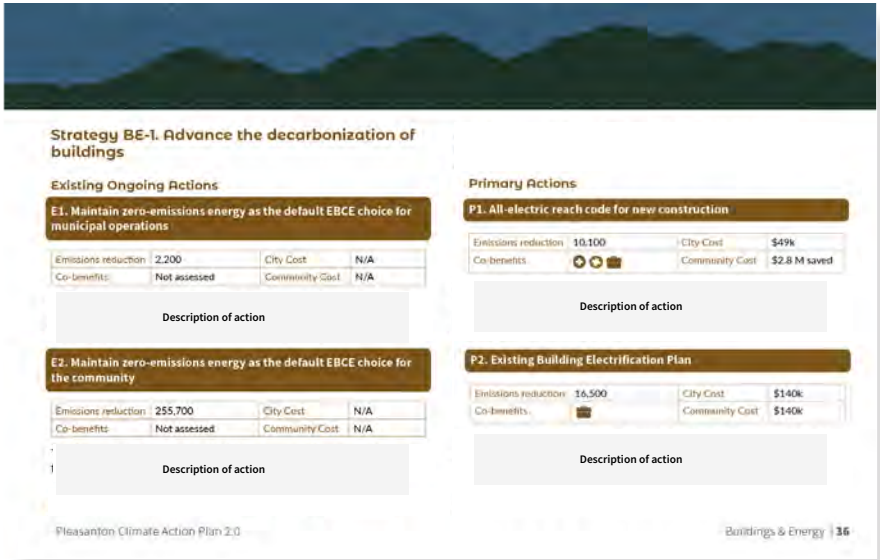
Orientation to Actions

Following the two-page overview, the existing ongoing, primary, and secondary actions supporting each strategy are described in detail.

Existing ongoing actions either directly or indirectly support the emissions reductions goals of the CAP 2.0. The City is already implementing these actions and will continue to do so to meet its targets. GHG emissions and co-benefits were evaluated for these, but costs were not, as they are already contemplated in other plans and policies. These actions are denoted with an "E."

Primary actions are new actions in the CAP 2.0 that are primarily GHG mitigating actions. These actions are needed to meet emissions reduction targets. They will be implemented according to the implementation plan. These actions are denoted with a "P."

Secondary actions are new actions in the CAP 2.0 that are primarily resilience building actions. These actions will only be implemented as resources (e.g., staff time, grants, and other funding sources) and/or partnership opportunities become available. These actions are denoted with a "S."



CO-BENEFITS

Increases resilience	Supports the ability of vital systems and the community to withstand or bounce back from climate change impacts and risks.
Improves public health	Provides direct or indirect public health benefits, such as improved air and water quality or healthier lifestyles.
Improves habitats and ecosystems	Positively affects natural systems, such as cleaner water or improved habitat.
Advances racial and social justice	Fairly distributes social, environmental, and economic benefits and costs across the community in consideration of historically marginalized and underserved groups.
Supports job creation	Likely to generate new jobs in Pleasanton.
Improves mobility and transportation safety	Improves public transit reliability and equitable access, or helps residents and shipments move around more easily and safely.

3.2 Action Prioritization Process

The following process was used to develop the CAP 2.0 actions:

1. **Develop initial set of actions**
An initial set of actions was prepared based on the CAP 1.0, current best practices and best available science, EEC workshop, peer cities, six focus groups, and community input. Importantly, all actions had to meet the three guiding principles of being **evidence-based, accountable, and actionable**.

2. **Conduct qualitative analysis of actions**
To effectively rank the list of actions, actions were evaluated based on effectiveness, cost, feasibility, level of support, equity, and realization of co-benefits. The qualitative analysis highlighted the most promising CAP 2.0 actions. The actions were reviewed through **public hearings with several committees and commissions, meetings with the Chamber of Commerce, and a public workshop**. Based on the qualitative analysis and feedback received, approximately **50 actions** were recommended to move forward to a quantitative analysis, along with a suite of existing ongoing actions the City plans to continue.

3. **Conduct quantitative cost-benefit analysis of existing ongoing and short list of actions**
For most actions, the potential **emissions reductions, costs (or cost savings)** to the City and community, and **City staff time** over the near-term (2022-2024), mid-term (2025-2028), and long-term (2029-2031). The cost-benefit analysis considered both start-up and ongoing costs and relied on published scientific literature, case studies, and expert opinion, including City staff input and consultation with peer cities, to conduct the analyses. Some actions were not modeled because they were not readily quantifiable, may have resulted in inconsequential GHG emissions reductions, or may have indirect benefits that do not result in emissions reductions. Results from the cost-benefit analysis are detailed in Sections 3.2 to 3.8. See Appendix A for the full analysis and results.

4. **Finalize existing ongoing, primary, and secondary actions**
The EEC, community, and City Council reviewed the results of the quantitative analysis. Based on the results, a set of 16 new primary actions and 9 new secondary actions are included in the CAP 2.0. Secondary actions will be implemented as time and resources allow. Additionally, a set of existing ongoing actions will be continued through the life of the CAP 2.0 and are included for reference.

Guiding Principles

Actions in the CAP 2.0 must be:

Evidence-based
Actions rely on the best available scientific and local knowledge.

Actionable
Actions are as ambitious as possible while being realistic about factors affecting implementation.

Accountable
Actions can be transparently evaluated, measured, and reported.

Buildings & Energy

Decarbonize buildings, expand the use of renewable energy sources, and use energy more wisely.

Buildings & Energy in Pleasanton

Building emissions come primarily from powering, heating, and cooling buildings, in particular increasing natural gas use.

- Pleasanton's second-largest source of emissions
- 30% of community emissions in 2017
- 20% of these emissions were from natural gas in 2017, and natural gas use increased 9% from 2005 to 2017

Performance since 2012

- Converted 5,400 sodium vapor streetlights to light emitting diodes (LEDs).
- Installed solar panels at four municipal buildings.

Buildings & Energy Goal(s)

Reduce GHG emissions from buildings and associated energy consumption and increase buildings and energy resilience which will result in cost savings, improved public health, and improved infrastructure.

Key Performance Indicators (vs. 2017)

Success will be monitored in the Buildings & Energy sector by tracking progress against the following key performance indicators:

- Reduce building emissions 38%, to ~110,000 $MTCO_2e$
- Reduce natural gas consumption 17%, to ~18,700,000 therms
- Maintain energy consumption despite population growth
- Reduce the carbon intensity of energy 100%, to 0 $MTCO_2e/kWh$
- Increase solar and battery permits
- Decrease municipal energy use

By 2030, 28% of local emissions reductions will come from this sector.

Strategy BE-1. Advance the decarbonization of buildings	331,500 $MTCO_2e$ reduced
Pleasanton is now participating in EBCE's Renewable 100 program, ensuring a high degree of Pleasanton is powered by 100% renewable energy and that low-income residents have access to discounted programs to keep energy affordable. Shifting from natural gas to electric (e.g., heat sources in homes) in all new and existing buildings will address the biggest remaining source of building emissions—natural gas—and build a foundation for fully transitioning to carbon-free renewable energy. Making the transition to all-electric will support green job creation and improved indoor air quality, as natural gas equipment is replaced and new buildings are built electric. Paired with increased energy efficiency and small-scale renewable energy and storage, buildings will also become more resilient to fluctuations in energy supply.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E1. Maintain zero-emissions energy as the default EBCE choice for municipal operations	2,200
E2. Maintain zero-emissions energy as the default EBCE choice for the community	269,600
P1. All-electric reach code for new construction	10,100
P2. Existing Building Electrification Plan	49,500
S1. Refrigerant management in new construction	

Strategy BE-2. Improve energy consumption and efficiency	9,900 $MTCO_2e$ reduced
As the City electrifies buildings to ensure that they are powered with clean, renewable energy, Pleasanton can further reduce energy emissions right away by making homes and buildings more energy efficient. This strategy builds on the City's progress to date in financing, outreach, and partnerships in support of energy efficiency and conservation. Energy efficiency also has the added benefit of reducing energy bills for residents and businesses. These cost savings are particularly important for lower income residents and renters, who tend to face a disproportionately higher energy burden because they are more likely to live in older, less energy-efficient homes and apartment complexes.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
P3. Modify Municipal Code definition of "covered projects"	1,300
S2. Community energy efficiency upgrades	8,300
S3. Energy benchmarking and City facility retrofits	400

Strategy BE-3. Expand use of renewable energy	2,300 $MTCO_2e$ reduced
As the decarbonization strategy works to remove fossil fuel use from our buildings and the energy efficiency strategy works to reduce overall energy consumption, expanding the use of locally generated renewable energy will increase Pleasanton's general climate and energy resilience. The City will increase local renewable energy generation and storage to reduce reliance on the larger power grid and make the community less susceptible to potential energy shortages from climate impacts like heat waves. Expanding renewables and storage will increase community resilience during Power Safety Shut-off events and allow homes to maintain service during those times. The installation and maintenance of new solar technology will also support local green jobs.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
P4. Solar and storage on "covered projects"	2,300

Strategy BE-1. Advance the decarbonization of buildings

Existing Ongoing Actions

E1. Maintain zero-emissions energy as the default EBCE choice for municipal operations

Emissions reduction	2,200	City Cost	N/A
Co-benefits		Community Cost	N/A

The City commits to maintain the highest renewable energy choice as the default for all municipal facilities, including opportunities to secure Power Purchase Agreements with other EBCE jurisdictions.

E2. Maintain zero-emissions energy as the default EBCE choice for the community

Emissions reduction	269,600	City Cost	N/A
Co-benefits		Community Cost	N/A

The City commits to maintain the highest renewable energy choice as the default for the community.

Primary Actions

P1. All-electric reach code for "covered projects"

Emissions reduction	10,100	City Cost	$49k
Co-benefits		Community Cost	($2.7M)

The City will adopt an all-electric building reach code for new construction that limits the development of new gas infrastructure where economically feasible. The City will ensure solutions are equitably tailored to different building, ownership, and use types, which will require a cost-effectiveness evaluation and further outreach Exceptions to the code will be considered.

P2. Existing Building Electrification Plan

Emissions reduction	49,500	City Cost	$138k
Co-benefits		Community Cost	$137k

The City will develop and implement an Existing Building Electrification Plan to advance electrification of buildings. This plan will be phased in over time to allow property owners time to adjust and plan for the transition. With this effort, the following should also be considered:

Grid Analysis/Improvements

- Work with EBCE, PG&E, and regional partners to ensure a robust regional electrical grid that minimizes the risk of power outages, increases storage, and reduces demand for diesel or gas generators. Partnerships should consider opportunities for local renewable generation and storage, consistent with Strategy BE-3.
- Conduct an existing building electrification analysis to identify areas of opportunities, building types, and prerequisites needed to make electrification cost-effective in the community.
- Consider feasibility for neighborhood microgrids (e.g., neighborhood solar and battery storage) to enhance grid resilience.

Municipal and Public Buildings

- Phase implementation of electrification into existing municipal buildings, consistent with Action S3.
- Partner with the school district to phase implementation of

electrification into school buildings.

Community Buildings

- Review and enhance permitting process to simplify the process (e.g., permit streamlining) as feasible to encourage adoption of electrification and energy storage back-up practices throughout the community.
- Leverage partnerships to provide financial incentives for existing residential and commercial building electrification (e.g., EBCE's Resilient Home program), consistent with Action S2.

Outreach and Education

- Build a residential and business toolkit (e.g., permit guide) to identify the steps needed to electrify buildings (e.g., panel upgrades) and promote rebates and incentives (e.g., hot water heater replacements and induction cooking through EBCE and Bay Area Regional Energy Network [BayREN]) to encourage and simplify the electrification process of existing buildings.
- Work with local businesses and change agents to influence behavior in community.
- Work with local organizations (e.g., Bay East Association of Realtors) to promote energy programs to business and homeowners.

Metrics and Evaluation

- Build in evaluation metrics to determine progress towards meeting electrification goals.
- Stay apprised of existing building electrification regulations, studies, and regional efforts.

Secondary Actions

S1. Refrigerant management in new construction

Emissions reduction		City Cost	$43k
Co-benefits		Community Cost	($262k)

The City will require that all new construction use the lowest global warming potential (GWP) refrigerants available for appliances and heating, ventilation, and air conditioning (HVAC) systems.

Strategy BE-2. Improve energy consumption and efficiency

Primary Actions

P3. Modify Municipal Code definition of "covered projects"

Emissions reduction	1,300	City Cost	$0
Co-benefits		Community Cost	$287k

The City will modify the Pleasanton Municipal Code (PMC) Green Building chapter to expand the definition of "covered projects" to cover all new commercial buildings and all new residential homes. Under the current PMC, the existing definition (which would be updated with P3) for a "covered project" means (1) construction of any City-sponsored project; (2) construction of any commercial project that includes 20,000 gross square feet or more of conditioned space; (3) renovation of any commercial project or City-sponsored project that adds 20,000 gross square feet or more of additional conditioned space, but not a renovation project that consists solely of interior improvements to an existing building; (4) construction of any single-family residential project that is 2,000 square feet or more in size; (5) construction of

any multi-family residential project; (6) construction of any mixed use project; (7) additions to residential projects where the addition is 2,000 square feet or greater; or (8) additions of any size to residential projects where the residential project was less than 2,000 square feet when built and it has been less than five years from the date the certificate of occupancy was issued. Covered projects do not include historic buildings or privately owned commercial or mixed use buildings within the boundaries of the downtown specific plan.

Secondary Actions

S2. Community energy efficiency upgrades

Emissions reduction	8,300	City Cost	$958k
Co-benefits		Community Cost	($1.9M)

The City will promote use of energy efficiency improvements (e.g., window upgrades, LED lighting) communitywide through incentives, partnerships, and/or education and outreach, consistent with P16.

S3. Energy benchmarking and City facility retrofits

Emissions reduction	400	City Cost	($3.1M)
Co-benefits		Community Cost	$0

The City will use the U.S. Environmental Protection Agency's Energy Star Portfolio Manager tool (or other similar tools) to measure and track energy and water usage across City facilities. The City will assess the performance of individual facilities over time, identify opportunities for efficiency upgrades and cost savings across City facilities, and conduct energy retrofits of existing City facilities and equipment. To build local resilience to energy shortages, the City will work with regional partners (e.g., EBCE) to install solar and storage systems on municipal facilities (e.g., parks, library) where they will be the most effective.

Strategy BE-3. Expand use of renewable energy

Primary Actions

P4. Solar and storage on "covered projects"

Emissions reduction	2,300	City Cost	$0
Co-benefits		Community Cost	$0

Within the PMC Green Building chapter, the City will require "covered projects" to include solar installation that meets the power needs of the new development if feasible. Where solar is being installed, the covered projects will also be required to install energy storage systems (e.g., battery storage). Additionally, the City will encourage solar water heaters for "covered projects" and consider the feasibility of requiring solar water heaters within "covered projects."

Transportation & Land Use

Advance vehicle decarbonization, alternative transportation, and sustainable land use.

Transportation & Land Use in Pleasanton

Transportation emissions come primarily from driving cars and light trucks, in particular on-road single occupancy vehicles.

- Pleasanton's largest source of emissions
- 64% of community emissions in 2017

Performance since 2012

Since 2012, Pleasanton has taken the following steps to reduce GHG emissions from the Transportation & Land Use sector.

- Doubled the amount of Class I bicycle paths and increased the Class II bicycle lanes from 27 to 40, including completion of the Iron Horse Trail through Hacienda Business Park and Johnson Drive Canal underpass to connect to Dublin.
- Supported the implementation of the LAVTA Rapid bus that increased transit ridership and reduced travel time to and from BART Station.
- Modified the PMC to require new residential developments within 1/2 mile of transit to offer discounted transit passes as part of HOA amenities.

Transportation & Land Use Goal(s)

Reduce GHG emissions from transportation and land use which will enhance community mobility, improve public health, and result in cost savings.

Key Performance Indicators (vs. 2017)

Success will be monitored in the Transportation and Land Use sector by tracking progress against the following key performance indicators:

- Reduce per-capita VMT 6%, to ~4,600 VMT per capita
- Reduce the average carbon intensity of passenger vehicles 51%, to 0.17 kg CO_2e/mile
- Increase electric vehicle charger permits
- Increase electric vehicles in municipal fleet
- Increase miles of bicycle lanes built
- Increase public transit ridership
- Increase percent of workforce that lives in Pleasanton

By 2030, 83% of local emissions reductions will come from this sector.

Strategy TLU-1. Advance vehicle decarbonization	391,500 $MTCO_2e$ reduced
The City of Pleasanton will expand existing zero-emissions vehicle (ZEV) fueling infrastructure throughout the community and transition the municipal fleet to EVs. Even with shifts toward active and public transportation, many community members in Pleasanton will still own or lease cars due to proximity and convenience. Acknowledging that car use will continue to persist (and perhaps dominate), this strategy is pivotal to reducing Pleasanton's emissions. By engaging the local community, including school districts and regional organizations, the City of Pleasanton will educate key audiences and identify funding partnerships to support the switch to ZEVs (e.g., electric or hydrogen-fuel celled vehicles). This switch will not only reduce local GHG emissions, but also improve local air quality—especially near major roadways.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
P5. ZEV Infrastructure Plan	315,300
P6. Electrify municipal small engine equipment and reduce emissions of off-road equipment upon replacement	
P7. Electrify community small engine equipment	76,200

Strategy TLU-2. Advance active, shared, and public transportation	31,400 $MTCO_2e$ reduced
Through continued work to support the Valley Link project and implement the City's Trail Master Plan, Bicycle & Pedestrian Master Plan, and Complete Streets program, the City is actively integrating accessible infrastructure that accommodates multiple modes of transportation. The City will continue to expand bicycle infrastructure, encourage transit ridership, and invest in school programs that reduce VMT for curricular and co-curricular activities. The City's investments in active, shared, and public transportation must expand into all areas of the city, and ensure reliable access to alternative transportation options. Convenience, affordability, and ease of use are imperative to the success of alternative transportation programs, as options that are inconvenient and difficult to navigate will likely not be used.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E3. Bicycle & Pedestrian Master Plan and Trails Master Plan	5,900
E4. Regional transit support	4,800
E5. Complete Streets implementation	1,000
P8. Bicycle amenities	1,800
P9. Bicycle rack incentive program	1,600
P10. Increase transit ridership	4,600
S4. VMT reduction for K-12 activities	11,700

Strategy TLU-3. Advance sustainable land use	32,600 $MTCO_2e$ reduced
Since Pleasanton's population and job base is expected to increase, General Plan Housing Element implementation and LEED ND will be essential to support not only responsible community development, but reduce VMT and provide access to active and/or shared transportation. This strategy will prioritize housing near transit and job centers and encourage sustainable land development for new projects that get built. Current hurdles to active and public transit include convenience and accessibility linked to land use patterns in Pleasanton. Some of these issues can be solved for future development through conscious efforts to develop with sustainable principles from plan concept to implementation.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E6. Housing Element implementation	17,200
P11. Promote LEED Neighborhood Development	15,300

Strategy TLU-1. Advance vehicle decarbonization

Primary Actions

P5. ZEV Infrastructure Plan

Emissions reduction	315,300	City Cost	$218k
Co-benefits		Community Cost	($31k)

The City of Pleasanton will develop and implement a ZEV Infrastructure Plan that strategically expands EV and other zero emissions fueling infrastructure throughout the community, electrifies portions of the municipal fleet, and bolsters community outreach and funding. As a part of this effort, the following should also be considered:

Infrastructure Analysis

- Review existing alternative fuels infrastructure to identify gaps (e.g., location and quantity of EV charging).
- Work with regional partners to create a job training program to expand trade knowledge around electric and zero emissions fueling alternative vehicles.
- Support regional organizations (e.g., EBCE and LAVTA) and other regional efforts to transition medium and heavy-duty trucks to electric and other ZEV (e.g., hydrogen-fuel celled vehicles).

Municipal Fleet

- Collaborate with EBCE to establish and implement a plan that guides municipal fleet transition to all-electric in the coming decade.

Community Infrastructure

- Update, adopt, and implement the EV Charger and Parking Ordinance requiring alternative vehicle parking and charging infrastructure for non-residential properties.
- Modify the PMC section requiring new housing units (e.g., apartments, condominiums, mixed use units, and single-family residences) include EV charging capabilities (e.g., in a SFR this may include a 220V outlet in the garage or for an apartment complex it may require several tenant charging stations).
- Expand publicly available EV infrastructure as indicated in the ZEV Infrastructure Plan, which may include installing EV chargers on municipal properties (e.g., parks, library, senior center). This may also include collaborating with schools to expand EV infrastructure on school properties.
- Collaborate with existing gas stations to encourage installation of EV and alternative carbon free fueling stations.
- Provide preferential parking for ZEVs in public parking lots.

Education, Outreach, and Funding

- Conduct an education and outreach campaign in the community and in high schools about electric vehicles, consistent with P16.
- Partner with regional organizations (e.g., EBCE) to promote incentives and rebates for ZEVs including EVs and electric bicycles. This may include identifying grant funds to help replace private vehicles with ZEVs, with a focus on supporting ZEV purchases for low-income demographics.
- Partner with businesses and employers, especially those with large vehicle fleets, to accelerate ZEV adoption.
- Provide alternative financial models for City-owned EV charging, including sliding scales and Electronic Benefits Transfer (EBT) card features.

P6. Electrify municipal small engine equipment and reduce emissions of off-road equipment upon replacement

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	$0

The City has already made significant progress to reduce emissions from off-road transportation. To further reduce those emissions, the City will identify municipal off-road equipment (e.g., mowers, chippers, tractors) that fall below current emissions standards and switch to lower-emissions alternatives upon replacement. City staff are encouraged to consider prioritizing high-emissions equipment for replacement. Further, the City will work with regional partners and local organizations (e.g., the Tri Valley Air Quality Community Alliance) to monitor advancements around battery technology in small-engine options and transition City operations to electric landscaping equipment when feasible.

P7. Electrify community small engine equipment

Emissions reduction	76,200	City Cost	$0
Co-benefits		Community Cost	($2.4M)

To build on the City's success significantly reducing off-road transportation emissions, the City will partner with local organizations to provide incentives to the community to purchase all-electric small-engine equipment (e.g., lawn mowers, leaf blowers) and will continue to investigate opportunities to incorporate all-electric small equipment in large-scale commercial projects. This will include a feasibility study to identify and implement a pathway to reduce citywide offroad construction equipment GHG emissions by 50% (e.g., adding conditions of approval). This action may also include a gas-powered leaf blower ban, consistent with new statewide legislation (AB 1346).

Strategy TLU-2. Advance active, shared, and public transportation

Existing Ongoing Actions

E3. Bicycle & Pedestrian Master Plan and Trails Master Plan

Emissions reduction	5,900	City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to implement the Bicycle & Pedestrian Master Plan and Trails Master Plan, with an emphasis on closing bicycle, pedestrian, and trail network gaps. Under the Trails Master Plan, trail miles will nearly double from 80 to 159 miles.

During implementation, the City will:

- Continue to implement existing programs as part of this process (e.g., the Commendable Commute program, which collaborates with employers to provide incentives as part of transportation demand management (TDM) programs to encourage alternative modes of travel and reduce single-occupant vehicle use).
- Encourage development project amenities (when amenities are required) to include contribution of funds or land to further the trails network as outlined in the Trails Master Plan and bicycle and pedestrian networks as in the Bicycle & Pedestrian Master Plan.
- Support the expansion of the complete streets network as outlined in the Bicycle & Pedestrian Master Plan with a focus on designated and protected bike lanes to businesses, parks, and schools.
- Prioritize City contributions to building and expanding networks and improving public access to open space and waterways.
- Report progress indicators such as miles of new bike lanes in CAP 2.0 monitoring.

E4. Regional transit support

Emissions reduction	4,800	City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue working with regional partners to support the Valley Link project. This new rail line will connect the Bay Area to northern San Joaquin County with seven new stops between the Dublin/Pleasanton BART station and the North Lathrop ACE station. Valley Link will increase connectivity to jobs, housing, and people within the Tri Valley and beyond, and serve as a model of sustainability in its design, construction, and operation.

E5. Complete Streets implementation

Emissions reduction	1,000	City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue implementing the City's Complete Streets program to ensure transportation improvement projects include multimodal elements and maintain safe and convenient street travel.

Primary Actions

P8. Bicycle amenities

Emissions reduction	1,800	City Cost	$0
Co-benefits		Community Cost	$2.4M

The City will update the PMC to require showers, lockers, changing areas, bike parking, and protected bicycle storage for new commercial developments of a certain size; and commercial, mixed-use, and multi-family projects to install bicycle parking (consistent with the Bicycle & Pedestrian Master Plan recommended programs 6.4.2 (2) and 6.6.2 (1)).

P9. Bicycle rack incentive program

Emissions reduction	1,600	City Cost	$8k
Co-benefits		Community Cost	($777k)

The City will develop and implement a citywide bicycle rack request program that receives requests from businesses and residents to install bicycle racks free of charge on public property next to business properties (consistent with the Bicycle & Pedestrian Master Plan recommended policy 4-2). The City will maintain an inventory of installed bicycle racks.

P10. Increase transit ridership

Emissions reduction	4,600	City Cost	$75k
Co-benefits		Community Cost	($585k)

The City will partner with transit agencies (e.g., BART, ACE, and LAVTA) to improve access across the city. Improving access across the city should consider the following:

- Provide convenient connections to destinations throughout the city (e.g., BART to Main Street and ACE to Hacienda).
- Provide connections between transit facilities and the bicycle and trail network.
- Ensure sufficient transit connections to higher-density areas that currently have low or limited access to transit.
- Enhance secure bicycle parking at transit stations and major bus stops.

Secondary Actions

S4. VMT reduction for K-12 activities

Emissions reduction	11,700	City Cost	$571k
Co-benefits		Community Cost	($6.3M)

The City of Pleasanton will explore opportunities to reduce VMT related to K-12 curricular and extra-curricular activities. As part of this effort, the following should be considered:

- Partner with school districts and clubs to encourage active transportation (i.e., walking and bicycling) and carpooling to schools and after-school activities (e.g., sports).
- Partner with school districts to create a bicycle safety course that can be integrated into the curriculum (e.g., physical education class or otherwise).
- Partner with the California Air District on the anti-idle campaign and working with schools to reduce idling.
- Adjust traffic signals to prioritize those walking and cycling around schools.
- Explore and encourage potential school bus ridership options.
- Incentivize and encourage electric bicycle usage.

Strategy TLU-3. Advance sustainable land use

Existing Ongoing Actions

E6. Housing Element implementation

Emissions reduction	17,200	City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to support General Plan Housing Element implementation including aiming to achieve a balance between jobs and housing. This action includes working with regional partners to prevent displacement and increase affordable housing, and encouraging transit-oriented development near BART stations, along transportation corridors, and in business parks/near employment hubs.

Primary Actions

P11. Promote LEED Neighborhood Development

Emissions reduction	15,300	City Cost	$1k
Co-benefits		Community Cost	($850k)

The City of Pleasanton will promote and encourage the use of LEED ND as new developments are proposed and redevelopment occurs in the city. It may be added to the CAP checklist for new development.

This action could also include introducing a more general mechanism to prioritize development applications with low GHG impacts.

Materials & Consumption

Reduce waste and promote sustainable consumption.

Materials & Consumption in Pleasanton

Materials and consumption emissions come primarily from solid waste collection and processing. Consumption-based emissions were not measured.

- 5% of community emissions in 2017

Performance since 2012

Since 2012, Pleasanton has taken the following steps to reduce GHG emissions from the Materials & Consumption sector.

- Expanded residential yard and food waste collection program to multi-family residences.
- Expanded commercial curbside recycling to include organics.

Materials & Consumption Goal(s)

Reduce GHG emissions from materials management and consumption which will support regional waste reduction efforts.

Key Performance Indicators (vs. 2017)

Success will be monitored in the Materials & Consumption sector by tracking progress against the following key performance indicators:

- Reduce waste in landfills by 8%, to ~93,800 tons annually
- Track per-capita waste generated across all streams

13% of local emissions reductions will come from this sector

Strategy MC-1. Increase waste diversion and optimize collection and disposal systems	135,100 $MTCO_2e$ reduced
Waste collection and processing release a significant amount of methane gas, a greenhouse gas with a global warming potential 84 times greater than carbon dioxide. Diverting waste from the landfill and optimizing collection and disposal not only reduces processing emissions, it increases the supply of recycled and composted content available for a variety of uses and helps improve local air and soil quality.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E7. SB 1383 implementation	135,100
E8. Outreach and education	
P12. Single use plastic reduction	

Strategy MC-2. Enhance sustainable production and reduce consumption	Supports emissions reduction
Recognizing the significant GHG emissions from consumption must ultimately be reduced through consumer behavior change, efforts to reduce barriers to and incentivize sustainable consumption are essential to meaningful reductions in consumption-based emissions. Sustainable consumption can increase waste diversion, which supports local air and soil quality improvements. It also supports the local economy and can strengthen social ties and financial resilience as communities rely more on local businesses.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E9. Local purchasing	
E10. Textile recovery	
S5. Environmentally preferable purchasing policy	
S6. Embodied Carbon Reduction Plan	

Strategy MC-1. Increase waste diversion and optimize collection and disposal systems

Existing Ongoing Actions

E7. SB 1383 implementation

Emissions reduction	135,100	City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to implement SB 1383, which includes establishing a robust food recovery program, developing an implementation plan to reduce methane emissions by decreasing organics in the landfill, and increasing education and outreach around compliance.

E8. Outreach and education

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will build upon existing outreach and education efforts around reducing waste generation, educating about proper sorting, and increasing waste diversion to bolster understanding of ways to reduce the amount of waste that ends up in landfills.

Primary Actions

P12. Single-use plastic reduction

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	$0

The City will continue to explore viable paths to reduce single-use plastic, working with key regional partners such as StopWaste. Actions aimed at reducing single-use plastics are popular in the community and benefit both human and ecosystem health. The City can support businesses in the transition to sustainable products to address potential business concerns. As part of this effort, the following should be considered:

- Update the PMC to require large and special events producers to provide and use reusables, provide recycling and composting infrastructure, and divert waste from landfill after the event.
- Work with regional partners to promote participation in waste reduction and reusable programs (e.g., ReThink Disposables), for businesses to incorporate more reusable food ware.
- Implement a citywide ordinance that reduces single-use plastics, and enhances the use of reusable products, particularly food and drink ware.

Strategy MC-2. Enhance sustainable production and reduce consumption

Existing Ongoing Actions

E9. Local purchasing

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue its ongoing efforts to promote local purchasing for businesses and residents to support local vendors, services, and stores and to reduce GHG emissions from commerce-related transportation, food production, and distribution.

E10. Textile recovery

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will implement textile recovery drop-off service as outlined in the City's Franchise Agreement with PGS. This service will support waste diversion goals and provide convenient means for residents and businesses to donate used textiles. This action will support SB 1383 implementation (Action E7).

Secondary Actions

S5. Environmentally preferable purchasing policy

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	$0

Using existing resources provided by Alameda County, the City will adopt an Environmentally Preferable Purchasing Policy that includes alternatives for the most carbon-intensive materials the City purchases, such as building materials (e.g., concrete, metals). This policy will complement local purchasing (Action E9) to further support local businesses and support SB 1383 implementation (Action E7).

S6. Embodied Carbon Reduction Plan

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	($89k)

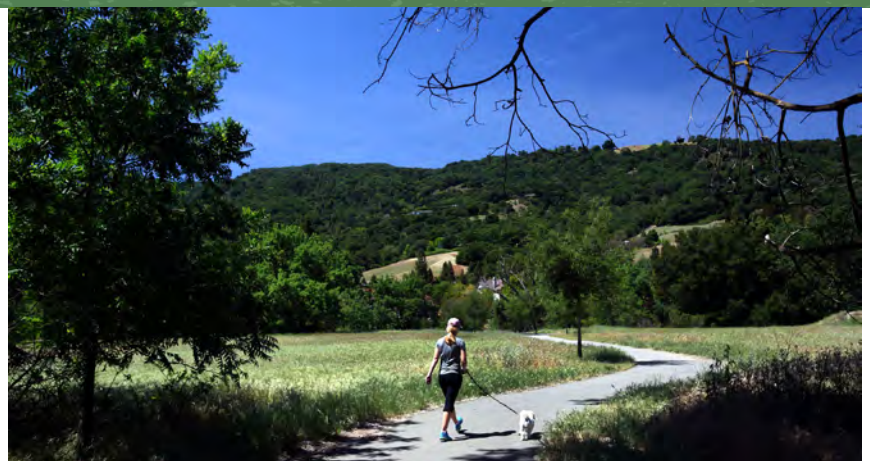
The City will participate and support a regional Embodied Carbon Reduction Plan that uses a variety of approaches to reduce the total lifecycle carbon footprint of materials (i.e., that considers the carbon footprint of raw materials, manufacturing, transportation, use, and disposal of products).

The regional Embodied Carbon Reduction Plan should consider:

- Whole building lifecycle analysis for new construction and incentives for achieving reductions
- Participation in regional efforts to build local supply chains and economic opportunities
- Partnerships to promote low-carbon products
- Encouraging carbon-smart and recycled building materials
- A low-carbon concrete requirement
- Education campaigns and resources

Natural Systems

Store more carbon on resilient natural landscapes.



Natural Systems in Pleasanton

Natural systems store significant amounts of carbon in leaves, trees, and soil. There is no estimate currently available of the carbon storage capacity of Pleasanton's natural systems.

- 700 acres of undeveloped open space

Performance since 2012

Since 2012, Pleasanton has taken the following steps to reduce GHG emissions via the Natural Systems sector.

- Distributed rebates for sustainable land management.
- Supported sustainability retrofits of irrigation and landscaping systems.
- Replaced or installed xeriscaping.

Natural Systems Goal(s)

Offset GHG emissions by fostering resilient natural landscapes that improve habitats, ecosystems, and public health.

Key Performance Indicators (vs. 2017)

Success will be monitored in the Natural Systems sector by tracking progress against the following key performance indicators:

- Increase carbon sequestration ~1,000 net $MTCO_2e$ in 2030
- Increase tree canopy
- Increase trees planted

By 2030, 1% of local emissions reductions will come from this sector.

Strategy NS-1. Increase and optimize carbon sequestration, improve ecosystem resilience	5,100 MTCO$_2$e reduced
The GHG emissions reductions needed to achieve per capita carbon neutrality by 2045 are significant. Even with significant emissions reductions, carbon sequestration (i.e., storing carbon in soil, trees, and vegetation) is a critical piece of meeting the City's targets. Carbon sequestration can offset emissions that may persist and be challenging to remove (e.g., natural gas from industries that do not currently have alternative fuel options). The City maintains a significant amount of open and green spaces, including parks, medians, the golf course, and hillsides so this strategy represents a significant opportunity for Pleasanton to offset emissions. Successful sequestration and ongoing sustainable land management will also restore and improve ecosystem resilience, alleviating the pressure and stress on Pleasanton's natural systems from global climate change and localized extreme heat, water shortages, pesticide use, and land development.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 (MTCO$_2$e)**
E11. Pesticide Posting Program	
E12. Municipal landscape management practice	
E13. Sustainable land management education	
P13. Urban Forest Master Plan	1,200[1]
P14. Soil management carbon sequestration projects	3,900[1]
S7. Carbon sequestration research and tracking	

[1] Represents carbon sequestration

Strategy NS-1. Increase and optimize carbon sequestration and improve ecosystem resilience

Existing Ongoing Actions

E11. Pesticide Posting Program

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to implement the Pesticide Posting Program and follow their Integrated Pest Management Program, using notices and signage to inform the public of ongoing pest management operations.

E12. Municipal landscape management practice

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to manage the amount, source, placement, and timing of plant nutrients and soil amendments in City parks, green spaces, and natural areas through actions such as applying recycled wood mulch from tree trimmings into planters, medians, and tree wells and leaving green waste on-site to the extent feasible.

E13. Sustainable land management education

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will build upon existing land management education such as continuing the City's Environmental Services Water Conservation efforts. For example, encouraging lawn conversion and improving landscape design through sheet mulching will reduce water use, support native habitats, and preserve the aesthetic benefits of well-designed outdoor spaces.

Primary Actions

P13. Urban Forest Master Plan

Emissions reduction	1,200[1]	City Cost	$486k
Co-benefits		Community Cost	$470k

The City will develop and implement an Urban Forest Master Plan that includes best practices for tree health and maintenance and reevaluates community tree regulations. The plan should aim to protect and increase tree canopy and native habitat, and to ensure trees are replanted with a "right-sized tree" sufficient minimum soil volume to thrive. As part of this effort, the following should be considered:

- Consider a community planting program that incentivizes the community to increase the quantity of trees planted throughout the city on private property.
- Create a community guide with information on the benefits of canopy cover, appropriate species (e.g., climate-adapted, drought-tolerant, and carbon sequestering species), and proper planting practices. For example, trees adjacent to channels should be properly sized and sited as to not impair the function or maintenance of channels.
- Modify the municipal code as needed to require climate adapted plantings for projects of a certain size, facilitate tree planting throughout the city, and discourage tree removal.

[1] Represents carbon sequestration.

- Partner with the school districts to increase tree canopy on school campuses.
- Continue to partner with local organizations (e.g., Go Green Initiative and Living Arroyos) to encourage increased tree canopy and native habitat throughout the city.
- Consider a tree well renovation program to increase soil volume for existing city trees and a plan to relieve rooting area compaction.
- Update the City tree well standard as needed to provide sufficient rooting space for trees.

P14. Soil management carbon sequestration projects

Emissions reduction	3,900[1]	City Cost	$35k
Co-benefits		Community Cost	$2.8M

The City will increase its carbon sequestration potential throughout the city to offset emissions, increase drought- and flood-resistance of soil, and further SB 1383 compliance. As part of this effort, the following should be considered:

Public Lands

- Implement carbon sequestration projects on City property where feasible (e.g., soil at City parks, golf courses, and open spaces).
- Reduce the use of synthetic fertilizer by amending soil with compost and protecting soil with mulch on new landscape installations.
- Partner with Zone 7 Water Agency, East Bay Regional Park District, StopWaste, and other public agencies to expand sequestration potential on public lands within the city's boundaries.

Private Lands

- Subsidize the cost of compost to encourage use of compost throughout the city on private property.
- Partner with Alameda County Resource Conservation District to implement carbon sequestration projects on working lands.
- Increase awareness of the benefits of land carbon sequestration through education campaigns, consistent with P16.

Secondary Actions

S7. Carbon sequestration research and tracking

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	$0

The City of Pleasanton will work with regional partners such as StopWaste and neighboring jurisdictions to develop methods to track carbon sequestration in the urban landscape. The City will stay apprised of leading research and technological advancements available that mechanically and naturally capture and/or remove carbon (e.g., direct air capture and carbon sequestration).

[1] Represents carbon sequestration.

Water Resources

Improve stormwater resilience, water supply, and conservation.

Water Resources in Pleasanton

Water-related emissions come primarily from providing drinking water and treating wastewater. Water uncertainty and increased flooding are among Pleasanton's major climate vulnerabilities.

- Pleasanton's smallest source of inventoried emissions
- Less than 1% of community emissions in 2017

Performance since 2012

Since 2012, Pleasanton has taken the following steps to reduce GHG emissions from the Water Resources sector.

- Installed over 20,000 new AMI smart water meters and retrofitted 500 existing meters.
- Installed "smart" irrigation systems throughout 80 acres of City-owned land.

Water Resources Goal(s)

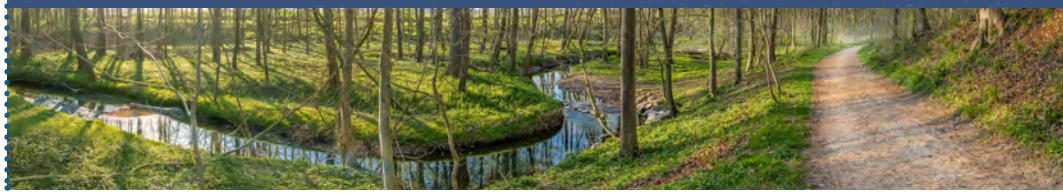
Reduce GHG emissions from water usage (including conveyance) and prepare community water resources for a changing climate which will result in cost savings, enhance water quality and availability, improve infrastructure, and increase resiliency.

Key Performance Indicators (vs. 2017)

Success will be monitored in the Natural Systems sector by tracking progress against the following key performance indicators:

- Maintain per-capita water consumption electricity usage to 23 kWh per service person.
- Decrease water used by community
- Decrease municipal water used
- Increase community use of water conservation programs

By 2030, this sector will improve the efficiency of water systems and build resilience to water insecurity.



Strategy WR-1. Improve water supply & increase conservation	Supports emissions reduction
Water is the foundation of life, and Pleasanton has already experienced mandated water cuts due to drought conditions. The City will continue to prioritize a sustainable, healthy water supply and storage, building on the success of existing programs such as the Controller Assistant Program and Water Conservation Program. Continued success in water efficiency and conservation also ensures enough water for natural systems, increasing both ecosystem and community resilience.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E14. Controller assistant program	
E15. Smart water meter installation	
E16. Water Conservation Program	
P15. Water efficiency and retrofits	

Strategy WR-2. Improve stormwater resilience	Supports emissions reduction
To maximize water reuse and efficiency, the City will increase stormwater infrastructure resilience to prepare for changes to flow and quality. By capturing stormwater, the City can both help to reduce flooding impacts of heavy rainfall periods and improve local water supplies. These benefits support community health, reduce water bills, may increase water availability for ecosystems, and may bring more green jobs to Pleasanton.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E17. On-site stormwater management	
S8. Green Stormwater Infrastructure Plan	

Strategy WR-1. Improve water supply & increase conservation

Existing Ongoing Actions

E14. Controller assistant program

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to provide the controller assistance program to Pleasanton residents. Through this program, City staff visit residents' homes and help them adjust their water controller to ensure they are watering their landscapes an appropriate amount and at optimal times of the day.

E15. Smart water meter installation

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

To protect against current and future water waste that could put both ecosystems and public health at risk, the City will continue to monitor and provide outreach to the community regarding their water leaks based on their smart water meter data.

E16. Water Conservation Program

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to promote its Water Conservation Program which provides water use related rebates, workshops, and outreach to the community.

Primary Actions

P15. Water efficiency and retrofits

Emissions reduction		City Cost	$1.6M
Co-benefits		Community Cost	($4.6M)

The City will expand incentives to reduce water use. Incentives may include, but are not limited to:

- Partner regionally with Zone 7 Water Agency to expand incentives and direct install programs to retrofit inefficient water fixtures in existing properties.
- Enhance existing incentives and rebates for native and drought-tolerant residential and commercial landscaping.
- Introduce a grass lawn/turf replacement program incentivizing the use of compost and mulch to smother turf in place through sheet mulching. This eliminates the need to send turf to landfill, avoids herbicide use, and increases carbon sequestration which supports Action E7 and P14.

Strategy WR-2. Improve stormwater resilience

Existing Ongoing Actions

E17. On-site stormwater management

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to require new developments of a certain size to have on-site stormwater management and minimal hardscape as regulated by the Alameda Countywide National Pollutant Discharge Elimination System (NPDES).

Secondary Actions

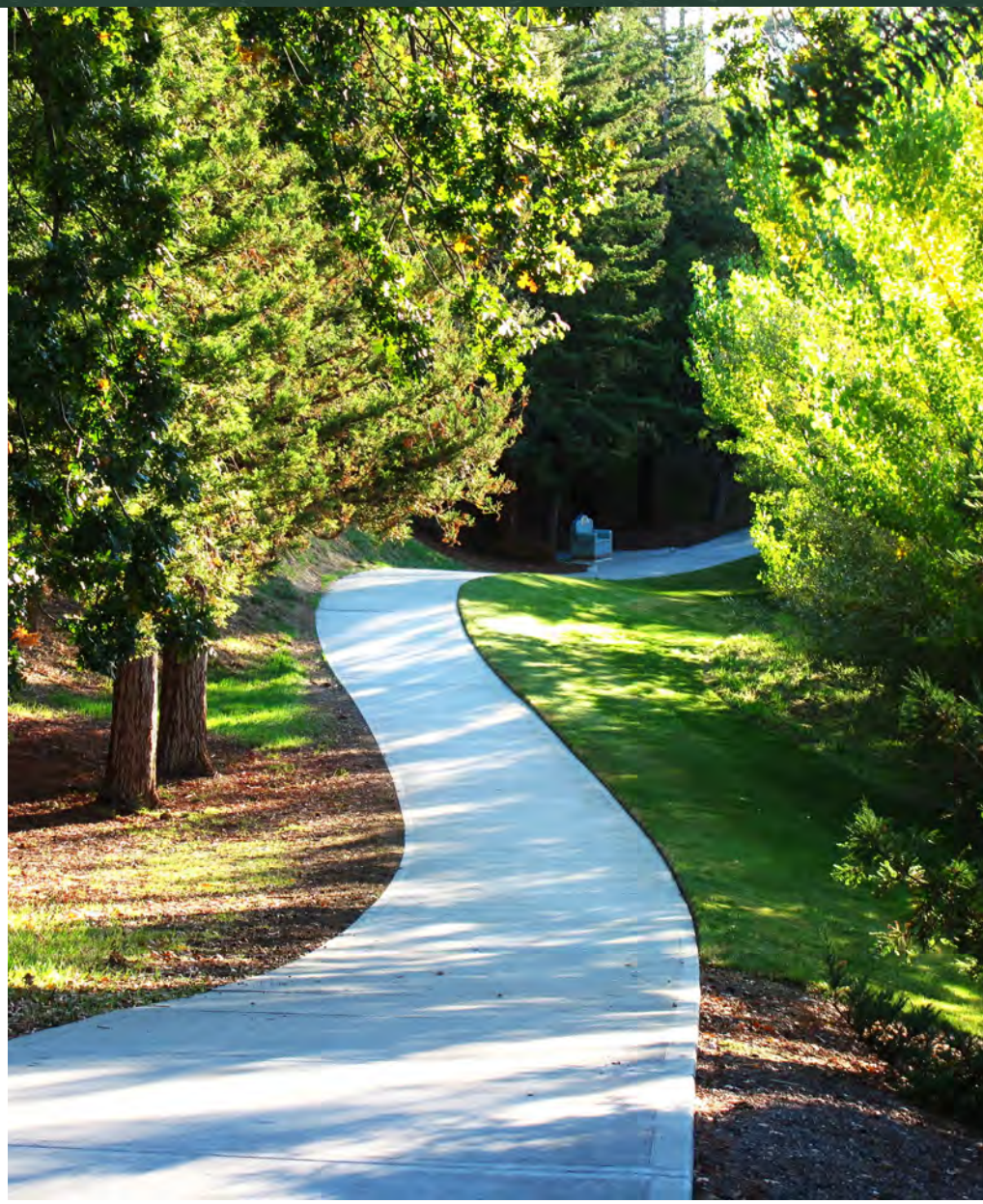
S8. Green Stormwater Infrastructure Plan

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	$0

To further support on-site stormwater management (Action E17) and sustainable infrastructure (Actions P3 and P11), the City will participate and support regional Green Stormwater Infrastructure Planning efforts that build off and support the City's NPDES permit to ensure a sustainable approach for managing stormwater runoff. The City can use the Green Stormwater Infrastructure Planning Level Analysis for Livermore-Amador Valley as a tool to inform efforts and choose the most cost effective and beneficial strategies.

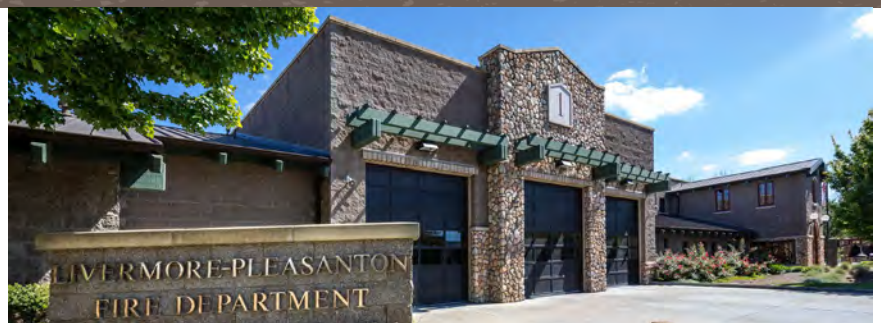
The efforts may include the following:

- Replace traditional grey infrastructure with bioretention areas, green roofs, permeable pavement, and rainwater catchment.
- Explore retrofit opportunities and integration of green infrastructure into existing and new City facilities.
- Incorporate green infrastructure and stormwater management into infrastructure projects (e.g., rainwater harvesting, permeable pavements, and green roofs).
- Ensure future infrastructure and retrofits are adequately sized to be able to handle future flows and storms exacerbated by climate change.



Community Resilience & Wellbeing

Strengthen community resilience and reduce vulnerability to climate change.



Community Resilience in Pleasanton

Pleasanton is expected to face more extreme weather such as flooding and heat waves, increased water uncertainty, and increased risk from wildfire, especially smoke. These vulnerabilities will stress public infrastructure, water provision, natural systems, and public health. [1]

Performance since 2012

Since 2012, Pleasanton has taken the following actions to strengthen community resilience.

- 14 businesses participating in the Alameda County Green Business Program.
- Hosted dozens of free community events, sustainability lectures, and workshops.
- Participated in Sustainability Circles, a comprehensive 6-month peer-learning program that embeds sustainable practices in organizations.
- Provided emergency preparedness training for the community through the Livermore-Pleasanton Fire Department (LPFD).
- Began using evacuation software ZoneHaven to coordinate efficient evacuation if needed and AC Alert to improve emergency notifications to the community.

Community Resilience Goal(s)

Prepare for climate and non-climate emergencies and integrate climate considerations across City and community decision-making.

Key Performance Indicators (vs. 2017)

- Population has access to a cooling center
- Increase community preparedness training participation

2030, 3% of emissions reductions will come from this sector.

[1] For more information, please see the Pleasanton Climate Vulnerability Assessment, available on the CAP 2.0 webpage (accessed August 16, 2021).

Strategy CRW-1. Improve community resilience & reduce vulnerability to climate change	26,200 $MTCO_2e$ reduced
Climate change is global, but it is felt at the local level. In Pleasanton, we have experienced poor air quality due to wildfires, mandatory water usage cuts due to droughts, and increased temperatures. Access to programming that supports, educates, and improves the quality of life for the most vulnerable communities is essential to improve resilience and prepare communities for climate impacts. Existing programs encourage active lifestyles and green space, which enhance public health. To continue to support healthy communities, the City of Pleasanton will maintain current community resilience programs and dedicate resources to comprehensive climate awareness, education, and outreach, both of which are critical to understanding how to prepare for climate change and the consequences of inaction.	
Supporting Actions	**Cumulative Emissions Reduced through 2030 ($MTCO_2e$)**
E18. School climate action planning	
E19. Access to green spaces	
E20. Community cooling centers	N/A
E21. Community gardens	
P16. Comprehensive climate awareness, education, and outreach	26,200
S9. Wildfire preparation, prevention, and education	

Strategy CRW-1. Improve community resilience and reduce vulnerability to climate change

Existing Ongoing Actions

E18. School climate action planning

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to partner with schools (e.g., provide funding and staff capacity) and support the activities of the climate action groups at schools, including connecting them to resources from GoGreen Initiative, StopWaste, and California Youth Energy Services.

E19. Access to green spaces

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to partner with local organizations to increase awareness of and access to green spaces and outdoor recreation for all residents.

E20. Community cooling centers

Emissions reduction	N/A	City Cost	N/A
Co-benefits		Community Cost	N/A

To address one of Pleasanton's major climate vulnerabilities—extreme heat—the City will continue to maintain adequate and accessible cooling centers and work with Alameda County to ensure sufficient notification systems are in place to notify residents of extreme heat events and available transportation routes to cooling centers. Potential locations include schools, City buildings, other public buildings, and multi-purpose rooms. These buildings should be considered high priority to address electrification, solar, and battery storage back-up in Action P2.

E21. Community gardens

Emissions reduction		City Cost	N/A
Co-benefits		Community Cost	N/A

The City will continue to partner with nonprofits, school districts, low-income communities, and underrepresented communities to expand urban agriculture opportunities (e.g., Bernal Community Farm) in community gardens, schools, parks, and on rooftops. The City will prioritize and promote programs that teach residents how to garden.

Primary Actions

P16. Comprehensive climate awareness, education, and outreach

Emissions reduction	26,200	City Cost	$119k
Co-benefits		Community Cost	$0

The City will implement comprehensive climate awareness, education, and outreach. The City should engage the community through several methods including in-person, mail (e.g., utility bills), on television, and online. In doing so, the City will consider all potential climate campaigns associated with CAP 2.0 implementation and phase campaigns over time accounting for staffing, resources, and balancing other community messaging to ensure feasibility. The City should leverage partnerships (e.g., Living Arroyos and Go Green Initiative) to achieve outreach goals. Outreach materials should be translated to Spanish, Chinese, and other commonly spoken languages in the community as identified by the Public Information Officer.

The City's expanded efforts may include:

- Develop and implement an empowerment program that helps residents, businesses, neighborhood leaders, and visitors reduce their personal carbon footprint and improve climate literacy. The program should consider including a carbon footprint calculator that generates a list of actions to reduce emissions at the household level and creating competitions to encourage adoption of programs.
- Develop a Library and Recreation Department program dedicated to conservation and stewardship projects for varying age groups, expanding upon existing programs (e.g., Ridge Runner, Arbor Day, and future bee and butterfly gardens programs).
- Create "sustainability awards" presented by the City Council during Earth Week to recognize community efforts and increase climate awareness. The community could also play a role in nominating "green" efforts throughout the city for business operations, development projects, and individual efforts throughout the city.
- Consider preparation of a checklist comparing LEED with CALGreen to simplify the process for development applications.
- Bolster education around community preparedness including using ZoneHaven, signing up for AC Alert, and participating in Family Disaster Preparedness training and Community Emergency Response Team (CERT) through LPFD.

Secondary Actions

S9. Wildfire preparation, prevention, and education

Emissions reduction		City Cost	$0
Co-benefits		Community Cost	$0

The City will increase wildfire resilience through a range of prevention and preparation initiatives. Together, these initiatives will address one of Pleasanton's greatest sources of climate vulnerability—wildfire and wildfire smoke—to increase resilience, support ecosystem health, and reduce exposure to wildfire smoke.

As part of these efforts, the City will:

- Leverage existing outreach and education campaigns and work with local organizations, (e.g., California Department of Forestry and Fire Protection [CalFire], Firewise, and Tri-Valley Air Quality Community Alliance) to increase awareness of homeowner actions to reduce and mitigate wildfire risk (e.g., create defensible space, reduce fuel loads, clean out leaves in rain gutters).
- Expand and improve targeted community messaging on how to respond to heat risks and poor air quality due to smoke.
- Work with regional partners to modify development regulations and codes and implement retrofit programs to increase resilience to wildfires.
- Work with CalFire and other partners to identify and implement controlled burns and other means to reduce combustible biomass and improve early wildfire detection for the city.
- Explore grant opportunities to assist with wildfire preparation, prevention, and education across the community.
- Provide clean air shelters in the event of poor air quality due to wildfires.

Section 4. Implementation

The Bigger Picture

Successful implementation requires not just a plan and resources, but an awareness and attention to how the city is and will continue to change, the City's unique role, and the vision and values that guide all decision making. As the City implements CAP 2.0, it will keep in mind:

Pleasanton's growing population:

Pleasanton has changed over the years, adding nearly 10,000 new residents since 2012 and becoming increasingly diverse. These changing demographics are mirrored across much of the Bay Area and may make Pleasanton an increasingly attractive city for businesses and new residents as the overall population of the Bay Area continues to grow.

The City's unique role in climate action:

The City has significant decision-making control over land use, development, and management of natural resources and wastewater. Through regional partnerships, and aligning with neighboring cities, the City also influences transportation, energy provision, water resources planning, and waste management. The City will continue to use these roles to build upon past progress and implement the meaningful, long-term climate programs and policies that are needed to prepare Pleasanton for an uncertain future.

Pleasanton's vision and values:

CAP 2.0 is designed to actualize the City and community's vision—reduced GHG emissions, improved quality of life and public health, and a resilient community with thriving ecosystems and economy—in a way that is evidence-based, inclusive, equitable, and accountable to generate high quality of life for current and future generations.

4.1 Overview

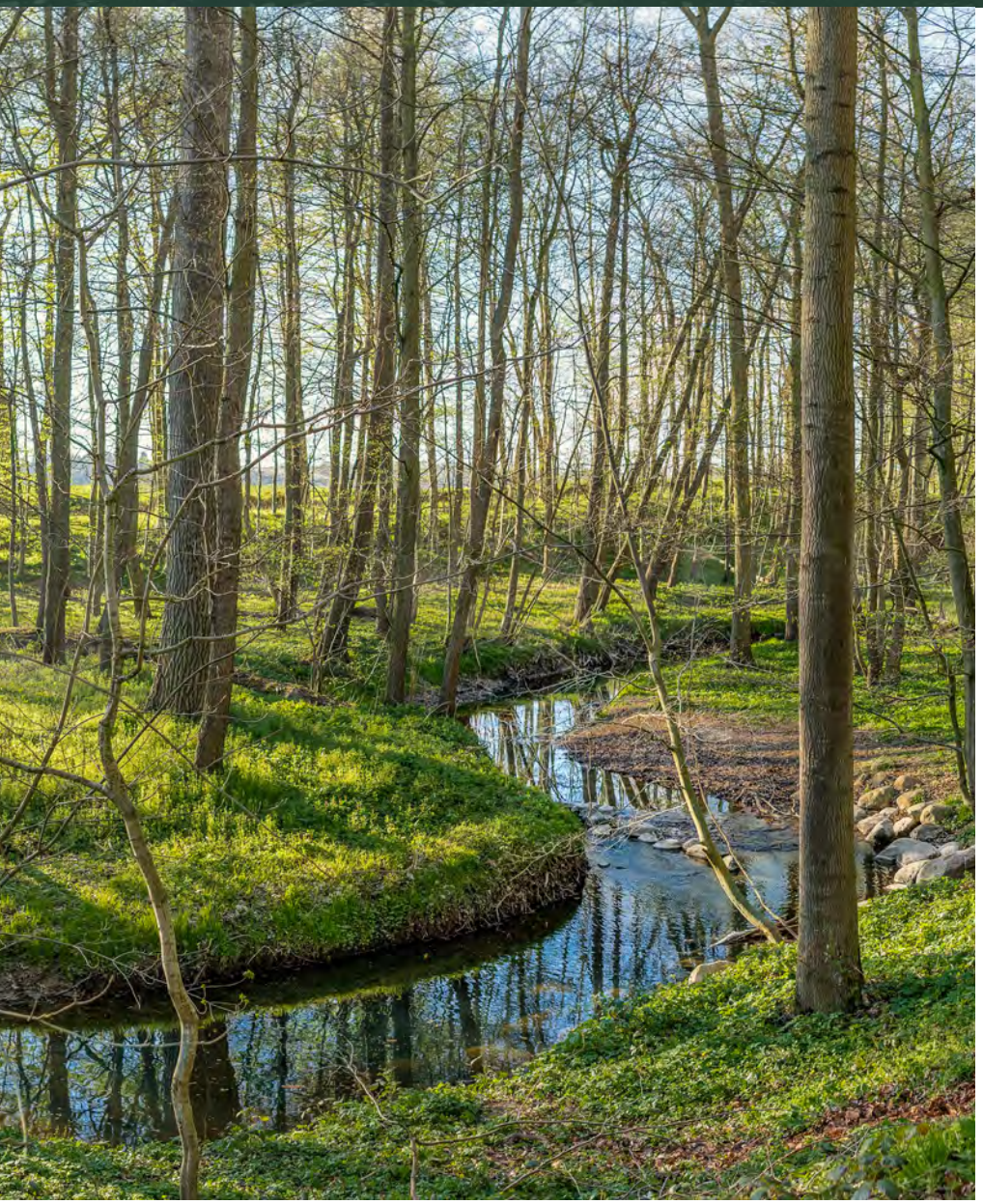
Since the 2012 CAP, the City of Pleasanton has made progress in reducing emissions, developing innovative sustainability initiatives, and building community support for climate action. CAP 2.0 was developed to build on key climate action successes and provide a pathway to reach state decarbonization targets by 2045—and exceed state targets for 2030. Importantly, the City prioritized a short list of highly impactful actions to improve implementation potential over the next 10 years.

To take the CAP 2.0 from vision to action will require City leadership and commitment, collaboration with the community and implementation partners, a realistic plan for funding and implementation, and strong monitoring and evaluation of progress. The following pages identify how the City will work toward CAP 2.0 goals:

- The **implementation Plan** outlines the cost, staff allocation, timeframe, responsible City department, and other considerations for implementation.
- **City Leadership and Accountability** identifies the role of City Council and City staff to lead implementation and report on progress.
- Key **Partnerships** emphasize the importance of collaboration.
- **Equity & Other Considerations** describes key areas of focus to support equitable implementation, specific actions that impact the most vulnerable communities, and the importance of keeping people at the center of the City's climate mitigation and adaptation work.

- **Funding and Financing** highlights the many resources available to support CAP 2.0 actions, specifically those that are the most expensive.
- To ensure that climate action and adaptation strategies meet the needs of the community and use resources efficiently, **Monitoring, Evaluation, and Reporting** lays out a series of key performance indicators (KPIs) and a reporting structure so that City staff can report progress to Council, gather feedback from and update the community, and measure successes.

Following CAP 2.0 adoption, a consolidated list of actions and the implementation plan will be available in CAPDash, a cloud-based reporting dashboard.



4.2 Implementation Plan

Implementation of CAP 2.0 will focus on reducing the city's largest sources of GHG emissions—transportation, natural gas use, and electricity use—and storing carbon in trees, plants, and soil in order to achieve the 2030 per-capita emissions reduction target. A later update of the plan will be needed to demonstrate and quantify a full pathway for reaching carbon neutrality by 2045.

The two tables below summarize the primary and secondary actions the City of Pleasanton will implement by 2030. Primary actions are prioritized actions that focus on GHG emissions reduction in the near- (2022-2024), mid- (2025-2028), and long-term (2029-2031) with identified responsible parties for implementation. Secondary actions are generally focused on adaptation and will be implemented when possible. A third table in the Equity & Other Considerations section (Section 4.5) summarizes other implementation considerations, such as feasibility, community support, and equity (Table 10). Existing actions are omitted from Section 4 as their implementation is already contemplated in other existing plans and policies.

Key for Understanding Implementation Actions

Priority	
Type of action	**P** = Primary **S** = Secondary
Logistics	
Phase	**I** = 2022-2024 **II** = 2025-2028 **III** = 2029-2031
Average Staff time (over action timeframe)	👤 = Less than 0.5 FTE 👤👤 = Between 0.5 and 1 FTE 👤👤👤= More than 1 FTE

Table 7. Implementation plan for existing ongoing and primary actions

Action	City Costs or (Savings)	Community Costs or (Savings)	Phase	Staff Time	Responsible Department
Buildings & Energy					
P1. All-electric reach code for new construction	$49k	($2.7M)	I	1	Community Development
P2. Existing Building Electrification Plan	$138k	$137k	II	1	Community Development
P3. Modify Municipal Code definition of "covered projects"	($0)	$287k	I	1	Community Development
P4. Solar and storage on "covered projects"	($0)	($0)	I	1	Community Development
Transportation & Land Use					
P5. ZEV Infrastructure Plan	$218k	($31k)	II	2	Community Development, Operations Services, City Manager's Office
P6. Electrify municipal small engine equipment and reduce emissions of off-road equipment upon replacement	($0)	($0)	II	1	Operations Services
P7. Expand community small-engine electrification	($0)	($2.4M)	I	1	Community Development & City Manager's Office
P8. Bicycle amenities	($0)	$2.4M	I	1	Community Development
P9. Bicycle rack incentive program	$8k	($777k)	II	1	Community Development & Economic Development
P10. Increase transit ridership	$75k	($585k)	III	2	Community Development
P11. Promote LEED Neighborhood Development	$1k	($850k)	I	1	Community Development
Materials & Consumption					
P12. Single use plastic reduction	($0)	($0)	II	1	City Manager's Office
Natural Systems					
P13. Urban Forest Master Plan	$486k	$470k	I	1	Operations Services and Engineering
P14. Soil management carbon sequestration projects	$35k	$2.8M	I	1	Operations Services
Water Resources					
P15. Water efficiency and retrofits	$1.6M	($4.6M)	II	1	Operations Services
Community Resilience & Wellbeing					
P16. Comprehensive climate awareness, education, outreach	$119k	($0)	I	1	All departments

KEY P = Primary action | S = Secondary action | I = 2022-24 | II = 2025-28 | III = 2029-31 | 1 = Less than 0.5 FTE | 2 = 0.5 to 1.0 FTE | 3 = More than 1 FTE

Table 8. Implementation plan for secondary actions

These actions will be implemented as staff time and resources allow.

Action	City Costs or (Savings)	Community Costs or (Savings)	Phase	Staff Time	Responsible Department
Buildings & Energy					
S1. Refrigerant management in new construction	$43k	($262k)	III	1	Community Development
S2. Community energy efficiency upgrades	$958k	($1.9M)	II	1	City Manager's Office
S3. Energy benchmarking and City facility retrofits	($3.1M)	($0)	I	1	City Manager's Office
Transportation & Land Use					
S4. VMT reduction for K-12 activities	$571k	($6.3M)	I	2	Community Development and City Manager's Office
Materials & Consumption					
S5. Environmentally preferable purchasing policy	($0)	($0)	I	1	City Manager's Office
S6. Embodied Carbon Reduction Plan	($0)	($89k)	III	1	Community Development
Natural Systems					
S7. Carbon sequestration research and tracking	($0)	($0)	II	1	City Manager's Office
Water Resources					
S8. Green Stormwater Infrastructure Plan	($0)	($0)	III	1	Operations Services
Community Resilience & Wellbeing					
S9. Wildfire preparation, prevention, and education	($0)	($0)	I	3	Fire

KEY	P = Primary action	S = Secondary action	I = 2022-24	II = 2025-28	III = 2029-31	1 = Less than 0.5 FTE	2 = 0.5 to 1.0 FTE	3 = More than 1 FTE

4.3 City Leadership and Accountability

For Pleasanton to take meaningful action on climate change, **it is important that city government leads implementation in partnership with the community and stakeholders** and that City Council continue to demonstrate leadership on climate change. **City Council** will have oversight responsibility for CAP 2.0. They will receive annual updates on the CAP 2.0 progress and make policy decisions, and budgetary appropriations that will facilitate implementation.

Staff with dedicated time and resources to climate action are required to ensure the CAP 2.0's success and to more fully mainstream climate change in existing City operations, policy development, and community partnerships. The **City Manager** will have an important role to play in allocating and balancing staff time devoted to CAP 2.0 implementation, including consideration of new roles such as a central coordinator for CAP 2.0 implementation and new responsibilities within existing roles such as implementation leads for each sector. Continuation of existing ongoing actions is already accounted for with existing staffing, and an additional 1.6 FTE per year on average will be needed implement primary actions. Adequate staffing will be crucial for success.

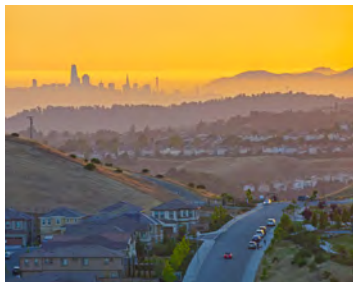
City staff will use an interactive tracking and reporting dashboard (CAPDash) to manage CAP 2.0 progress, oversee implementation, provide annual updates to City Council, and communicate progress to the public (see *Section 4.7 Monitoring* for details).

4.4 Partnerships

As the City of Pleasanton is part of the larger Bay Area, and one of many municipalities working to meet climate neutrality targets, the City has an opportunity to work collaboratively and collectively through local and regional networks to meet the goals outlined in CAP 2.0. The City will continue to work with key partners in the community, across the Bay Area, and at the state level, as it cannot achieve its goals alone. **Leveraging partnerships will be key to the City's success** in seeking funding opportunities, dividing workload, and improving the quality of life for individuals living in the region. Partnerships enable City staff to identify projects that align with both CAP 2.0 and community investment goals, and work to maximize cost-effectiveness, impact, and co-benefits like improved public health and job creation. Existing and new relationships with community groups are essential to effectively implement strategies, be equitable, and spread awareness. Many CAP 2.0 actions focus on or include significant community education and outreach, some of which is expected to maintain or increase support for climate action.

Key Stakeholders and Partnerships

Key stakeholders and partnerships, and their roles and responsibilities, include but are not limited to:



Neighboring jurisdictions

Connections with neighboring cities (e.g., Dublin, Livermore, and San Ramon) are essential to align policies and programs to bring regional cohesion to climate efforts and leverage Alameda County directives that support collective climate goals.

Regional transit partners

The City will provide localized context and knowledge to regional transit partners (e.g., Alameda County Transportation Commission, BART, Tri-Valley Air Quality Community Alliance, Bike East Bay, Altamont Corridor Express, LAVTA, MTC, San Joaquin Regional Rail Commission, Wheels, ACE, and BAAQMD) to accomplish both local and regional transit goals, reduce emissions, support alternative transportation, and improve air quality.

Utility and service providers

Continued relationships with utilities and energy-, water-, and waste-focused organizations (e.g., EBCE, PG&E, CPUC, BayREN, DSRSD, Zone 7 Water Agency, and Zone 7 Water Board, StopWaste and PGS) are crucial to stay abreast of cutting edge technologies and leverage funding opportunities.

Community groups

The City will listen to and engage with the diverse Pleasanton community (e.g., Chinese American Cooperative Council, Council on American Islamic Relations, HSS, Muslim Community Center, Tri-Valley Citizens Climate Education), which is essential to keeping equity at the center of CAP 2.0 implementation and ensure people are prioritized as climate goals are pursued.

Businesses and climate advocates

The City will build connections among local businesses (e.g., Visit Tri-Valley, Bay Area Realtors, Hacienda Business Park, Hines, Pleasanton Chamber of Commerce, Pleasanton Downtown Association, Lawrence-Livermore Lab, and Workday) and community climate leaders (e.g., East Bay Regional Park District, GoGreen Initiative, and Tri-Valley Citizens Climate Education, and Alameda County Resource Conservation District) to design interconnectivity between industry and the circular economy.

While the City emphasized actions within their sphere of control in developing CAP 2.0, some of the most impactful and costly actions rely on partnerships for implementation. These include the Existing Building Electrification Plan (P2) and ZEV Infrastructure Plan (P5). Partnerships will also be crucial to advancing secondary actions because they offer the additional capacity, mechanisms for identifying funding sources, and opportunities for collaborative funding and implementation the City will need to be able to implement them. Partnerships will also be crucial to advancing secondary actions because they offer the additional capacity, mechanisms for identifying funding sources, and opportunities for collaborative funding and implementation the City will need to be able to implement them.

4.5 Equity & Other Considerations

To truly consider equity during CAP 2.0 implementation, the City will need to go beyond merely distributing resources equally. Equitable participation in implementation and access to the benefits of climate action require meeting community needs in the context of existing vulnerabilities and inequalities, and **integrating equity in policy, outreach, and infrastructure development.** The most effective climate action initiatives protect and conserve the environment, build resilience, avoid unintended consequences, improve public health, and support livable communities with healthy local economies.

While equity must be considered in implementation of all actions, **certain actions will require particular attention to ensure implementation is equitable** (see Table 10). The City will focus on:

- **Fair distribution of benefits over time:** The City will consider not only where actions are implemented, but when, to ensure that vulnerable and historically marginalized communities are not the last to receive the benefits of climate action.
- **Financial burden:** The City will provide, either directly or through partners, financial rebates, incentives, and other measures to ensure that the household-level costs of CAP 2.0 implementation do not increase existing income burdens. This is especially relevant for actions that affect renters (e.g., landlord building electrification or energy efficiency) and actions with broadly distributed costs (e.g., EBCE Renewable 100).
- **Community engagement:** City staff will work to involve diverse community voices from the start of any new initiative and will track progress towards advancing equity (see Monitoring, Evaluation, and Reporting). They will also rely on and contribute to partnerships with the community groups and service providers who know Pleasanton's diverse communities best, and will consider when additional effort is needed to truly engage a community (e.g., significant changes like EV adoption and household-based energy and water efficiency).

Table 9. CAP 2.0 focus areas for equitable implementation and applicable actions

	Fair distribution of benefits over time	Financial burden	Community engagement
P2. Existing Building Electrification Plan	●	●	●
P5. Create and implement a Zero Emissions Vehicle (ZEV) Infrastructure Plan	●	●	●
P10. Increase transit ridership	●		
S2. Community energy efficiency upgrades		●	●
P15. Water efficiency and retrofits		●	●
S9. Wildfire preparation, prevention, and education	●		●

Table 10. Equity & other implementation considerations

Action	Considerations
P1. All-electric reach code for new construction	➲ Public engagement indicated that some businesses and residents oppose the introduction of a new building requirement and express concern about rising building costs. Education and outreach will be crucial for implementation success. ➲ Consider the nuance of how these regulations are written and where exceptions should be included (e.g., biotechnology industry). ➲ An all-electric reach code is highly feasible, and many Bay Area cities are introducing these code requirements.
P2. Existing Building Electrification Plan	➲ Equitable implementation will represent property owners and tenants with lower incomes in all implementation phases, have protections in place to avoid increased costs and other negative impacts, and support local installers.
P4. Solar and storage on new construction	➲ Not all properties and projects lend themselves to solar and battery storage due to shading and building orientation. Careful consideration of when to implement this action should be considered so as not to unduly impact projects where solar/storage benefits will not be realized. ➲ Adding rooftop solar to older buildings may be challenging due to roof loads and should be considered with the ordinance update.
S1. Refrigerant management in new construction	➲ The Biden administration recently announced it will reduce the use of HFCs used in air conditioning and refrigeration by 85% in the next 15 years and is investing $8 million over the next five years to find alternatives. ➲ Support to the business community should be considered to address challenges or costs of switching to a new refrigerant.
S2. Community energy efficiency upgrades	➲ Focused outreach and resources on low-income households will support the cost savings benefit of this action. ➲ Resources may include financial support such as a revolving loan fund for home performance audits and system upgrades.
P5. ZEV Infrastructure Plan	➲ Rising community interest in ZEVs, combined with recent and anticipated changes in national and state policy, make widespread ZEV expansion highly feasible. The key hurdles will be funding and ensuring ZEV is financially affordable and accessible for all Pleasanton residents. ➲ Concerted attention to reducing financial and infrastructure barriers to ZEV ownership for those with low incomes is essential to ensure implementation is equitable.
P7. Expand community small-engine electrification	➲ Community electrification of small-engine equipment will require special attention to landscape companies and people that come to Pleasanton to work but may also work in other jurisdictions with varying regulations. Consider partnering with neighboring jurisdictions for successful implementation.
P8. Bicycle amenities	➲ There may be some opposition from developers due to the new code requirement. Outreach to the development community should be highlighted. Early in the entitlement process, work with applicants to find the best solution for on-site facilities.
P10. Increase transit ridership	➲ The biggest hurdle will be to make public transit convenient and available enough to be a preferred mode of transportation across communities compared to single-occupancy vehicles.
S4. VMT reduction for K-12 activities	➲ The biggest hurdle will be to make public transit convenient and available enough to be a preferred mode of transportation compared to single-occupancy vehicles. This action will require concerted action with the school district and community organizations that sponsor youth activities.

Action	Considerations
S5. Environmentally preferable purchasing policy	➲ Alameda County is currently preparing a policy; consider partnering with the County and/or neighboring jurisdictions that may already have these policies in place.
S6. Embodied Carbon Reduction Plan	➲ This regional plan will benefit ecosystem health and support a local, circular economy, including the potential for new, green jobs. ➲ The plan is generally well-supported by the community, but the possibility of new requirements and citywide changes to construction approaches could concern some businesses and would benefit from additional engagement with those entities.
P13. Urban Forest Master Plan	➲ The benefits to public health, ecosystem health, and local air quality will build support for this plan by the community and among businesses. The possibility of more regulations may encounter some opposition and require additional engagement.
P14. Soil management and carbon sequestration projects	➲ While businesses and community members generally support the carbon storage, ecosystem health, and aesthetic benefits of these projects, their scale and location, as well as the relatively higher cost to the community, may face some pushback. Engagement with these community members is recommended.
S7. Carbon sequestration research and tracking	➲ Many carbon sequestration research and tracking methods are still under development and experimental research will require research and funding partners.
S8. Green Stormwater Infrastructure Plan	➲ Throughout its development and implementation, the plan should prioritize stormwater projects—paired with the anti-displacement efforts in the Housing Element (Action E6)—in underserved communities to prevent green gentrification and inequitable distribution of water resiliency.
P16. Comprehensive climate awareness, education, and outreach	➲ Ensure outreach is accessible across communities, such as by providing services and materials in multiple languages.
S9. Wildfire preparation, prevention, and education	➲ Wildfires and their associated impacts hit vulnerable populations especially hard; these populations should be a focus for this action.

4.6 Funding and Financing

The City of Pleasanton has several opportunities to finance CAP 2.0 strategies and actions. As climate impacts intensify and occur more frequently, **resources are becoming more readily available** from the federal government, State of California, local agencies, and utilities. The City will seek grants, matching funds, in-kind contributions, and other resources from state, federal, and philanthropic sources to help pay for actions, make wise use of the City's General Fund, and limit the cost of implementation to the City and Pleasanton community. Potential funding sources may include:

- Support for electrification of buildings and transportation through **grants and rebate opportunities** through EBCE and BayREN
- Municipal, commercial, and residential solar and energy storage rebates through BAAQMD, CPUC, and/or EBCE
- Air quality improvement **grants and rebates** from BAAQMD
- **Joint applications** with other local and regional agencies for competitive statewide and federal funding programs, especially those that support alternative transportation goals
- Existing funding sources as **matching funds** for regional, state, or federal funding such as the federal Infrastructure Investment & Jobs Act (2021)
- **General funds** from the City of Pleasanton for staff time to seek and apply for funding, fully cover project costs, or as a match to outside funding sources
- The establishment of a City **impact fee** to cover costs associated with emissions reductions for projects related to specific CAP 2.0 actions

CAP 2.0 will not be implemented all at once—it will take **time, investment, and ongoing work** within the community. The City has committed to fund and implement existing ongoing and primary actions, and will fund and implement secondary actions if resources become available.

4.7 Monitoring, Evaluation, and Reporting

A core requirement of a qualified GHG reduction plan under CEQA is to monitor implementation of adopted GHG emissions reduction strategies. Successful implementation requires a methodology, tools, and metrics to measure progress and track performance over time. The City will rely on **CAPDash**—a cloud-based tool—to continually monitor CAP progress. The City will conduct **regular GHG emissions inventories** (e.g., every 3 years), track and measure progress toward meeting CAP 2.0 targets and goals, and support transparent data and progress reporting with the community and stakeholders. City staff will use CAPDash as well as reports from implementation leads to develop an **annual City Council update** on CAP 2.0 implementation that includes progress against specific strategies and actions, as well as overall progress on reducing community climate vulnerability and GHG emissions.

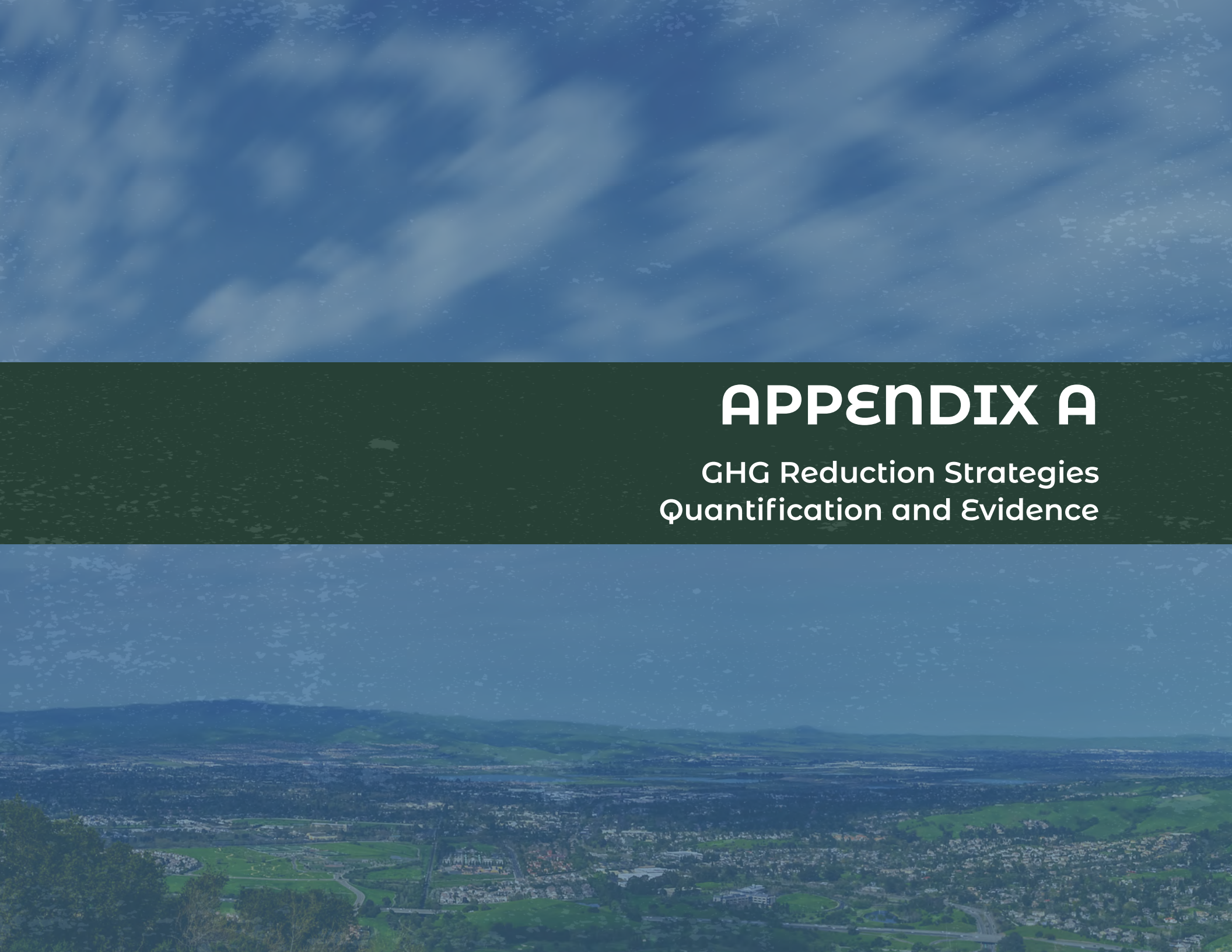
While monitoring, evaluation, and reporting of emissions reductions are essential to stay on track to meet CAP 2.0 goals, they can be time-consuming and detract from other critical monitoring such as assessing community perspectives and feedback on implementation. Both are needed to adaptively manage CAP 2.0 and ensure it meets both emissions reduction and community investment goals. Therefore, the City will establish through the work of the Committee on Energy and the Environment, an opportunity for **public feedback and recommendations** and share with City Council in the **annual update**.

Given the accelerating pace of climate change, the City will evaluate and **update the CAP 2.0 in 2030** to ensure that CAP 2.0 strategies and actions reflect the latest knowledge and best practices around climate change, Pleasanton's progress on implementation, and the changing landscape of local, state, and federal funding and environmental policies. It is expected that methodologies for measuring some KPIs may also evolve and improve over time. The City currently plans to track and report on the following KPIs, which emphasize strategies with significant GHG emissions reduction potential (see Table 11).

Table 11. 2030 Targets for Key Performance Indicators (KPIs)

Strategies	KPI	Unit	2017 Baseline	2030 Target	Change
Buildings & Energy					
BE-1. Advance the decarbonization of buildings	Building GHG emissions	$MTCO_2e$	178k	110k	-38%
	Natural gas consumption	therms	22.4M	18.7M	-17%
BE-2. Community energy efficiency upgrades	Energy consumption	MMBTU	4.13M	4.02M	-3%
	Municipal energy consumption	MMBTU	TBD[1]	TBD	Decrease
BE-3. Expand use of renewable energy	Electricity emissions factor	$MTCO_2e/kWh$	0.000096	0	-100%
	Solar & battery permits	#	TBD	TBD	Increase
Transportation & Land Use					
TLU-1. Advance vehicle decarbonization	Average passenger vehicle carbon intensity	$kgCO_2e/mile$	0.34	0.17	-51%
	EV charger permits	#	TBD	TBD	Increase
	EVs in municipal fleet	#	TBD	TBD	Increase
TLU-2. Advance active, shared, and public transportation	VMT per capita	vehicle miles	4.9k	4.6k	-6%
	Bike lanes & trails	miles of new infrastructure	TBD	TBD	Unknown
	Public transit ridership	% of mode share	TBD	TBD	Increase
TLU-3. Advance sustainable land use	Percent of workforce that lives in Pleasanton	%	TBD	TBD	Increase
Materials & Consumption					
MC-1. Increase waste diversion and optimize collection and disposal systems	Landfilled waste	short tons	102k	93.8k	-8%
	Material generated across all three streams	tons per service person	TBD	TBD	Decrease
Natural Systems					
NS-1. Increase and optimize carbon sequestration and improve ecosystem resilience	Carbon sequestration	net $MTCO_2e$	TBD	1k	Increase
	Tree canopy	%	TBD	TBD	Increase
	Trees planted	#	TBD	TBD	Increase
Water Resources					
WR-1. Improve water supply and conservation	Water consumption electricity usage	kWh per service person	TBD	23	Constant
	Community water use	average gallons per day	TBD	TBD	Decrease
	Municipal water use	gallons	TBD	TBD	Decrease
	Water conservation programs	# participants	TBD	TBD	Increase
Community Resilience & Wellbeing					
CRW-1. Improve community resilience and reduce vulnerability to climate change	Access to cooling center	% of population	100%	100%	Constant
	Community preparedness training participation	# participants	TBD	TBD	Increase

[1] "TBD" denotes that indicator is not currently tracked. City will collect data as part of initial CAP 2.0 implementation activities.



APPENDIX A

GHG Reduction Strategies Quantification and Evidence

GHG Reduction Strategies Quantification and Evidence

For Pleasanton CAP 2.0 | January 6, 2022 – REVISED September 1, 2022

Contents

Executive Summary

This document summarizes findings from a quantitative assessment of draft Pleasanton CAP 2.0 actions. The quantitative assessment provides high-level estimates of the **costs** and **emission reductions** associated with each action to provide a defensible plan for meeting the City's emission reduction goals. Key findings of the analyses include:

- Modeling suggests that implementation of proposed primary CAP 2.0 measures could **exceed the City's proposed 2030 target** (4.11 MTCO2e per capita) and SB-32 required reductions, resulting in emissions that drop from 13.6 $MTCO_2e$ per capita in 1990 to **4.09 $MTCO_2e$ per capita in 2030**. The following CAP strategies and actions are the highest contributors of GHG emission reductions through 2030:
    - Vehicle decarbonization (ZEV Infrastructure Plan)
    - Renewable electricity (Zero emissions as default EBCE choice)
    - Organic waste prevention and management (SB 1383 implementation)
    - Community small engine electrification
    - Existing Building Electrification Plan
    - Comprehensive climate awareness, education, and outreach
- Modeling suggests that the total net present value (NPV) City cost over the next ten years through 2031 of implementing all the primary CAP 2.0 actions will be **$2.8 million**—equivalent to around **$276,000 per year**.[1]
- The estimated NPV cost to the community over the next ten years through 2031 of implementing all the actions in the shortlist is a **net savings of $5.9 million**—equivalent to around **$587,000 in savings per year**. Much of these savings to the community are in the form of rebates/incentives and fuel cost savings.
- Implementing all the actions in the shortlist will require staff time, ranging from an estimated **1.6 FTE per year through 2031.** These FTE may be absorbed into existing staff duties or new staff may be hired. The following actions have the highest total FTE estimated from 2022-2031:
    - Wildfire preparation, prevention, and education
    - Increase transit ridership
    - ZEV Infrastructure Plan
    - VMT reduction for K-12 activities
    - Urban Forest Master Plan

This document is organized as follows:

- The **Overview** introduces the approach and key assumptions that drove the analysis.
- The **Findings Summary** provides the emissions reductions, City staff time, NPV, and cost-effectiveness for proposed CAP 2.0 actions.
- The remaining sections detail emissions reduction and cost results by sector**:**
    - **Buildings & Energy**
    - **Materials & Consumption**
    - **Natural Systems**
    - **Water Resources**
    - **Transportation & Land Use**
    - **Community Resilience & Wellbeing**
- A detailed **References** list documents the sources used to conduct the analyses.

[1] Does not include City labor costs.

Overview

This document summarizes findings from a quantitative assessment of the prioritized shortlist of actions for inclusion in the draft Pleasanton CAP 2.0. The quantitative assessment provides high-level estimates of the **costs** and **emission reductions** associated with each action (detailed below), to provide a defensible plan for meeting the City's emission reduction goals.

Some actions in the CAP are directly **quantifiable**, while others are not. Many of the actions in the prioritized shortlist may not be readily quantifiable, may result in inconsequential GHG reductions, or may have indirect benefits that do not result in emissions reductions as calculated in the City's inventory. These actions, often defined as "**supportive**," may be critical for implementation success even if they are not quantified. For example, actions to enhance energy battery storage are crucial for large-scale implementation of renewable energy and electrification, but do not themselves reduce GHG emissions. Another example is education and incentive programs, which can encourage reductions but do not necessarily result in significant reductions, depending on the reach, efficacy, and permanence of the implemented changes. In contrast, an ordinance to require all-electric new construction is a quantifiable action that carries a very high and defensible likelihood of significant and measurable emissions reductions.

Some proposed CAP 2.0 actions are focused on improving community resiliency to climate change impacts rather than reducing GHG emissions. While the resilience benefits of these **"climate adaptation" actions** were not quantified, taking action to build climate resiliency and preparedness are nonetheless critical for addressing climate change in the Pleasanton community and should be considered as an important part of Pleasanton's climate action strategy.

The project team took an action quantification approach like that taken by the City of Dublin for their recent CAP, which provided quantitative estimates for CAP measures (see table on the following page). The approach of quantifying actions ensures that the package of measures in the Pleasanton CAP 2.0 will result in sufficient emissions reductions needed to meet short-term goals and establish a strong foundation for meeting long-term goals.

Action impact was explicitly modelled based on **available information** and **case studies**, including data on historic and projected energy usage, population and development trends, and technology and policy impact. The consultant drew from literature and expert opinion—including studies done by the U.S. Department of Energy and California Air Resources Board—as well as from available City data and staff input.

Actions were analyzed based on predetermined implementation **timeframes**, which were categorized as follows:

- Near-term (1-3 years); 2022 to end of 2024
- Mid-term (4-7 years); 2025 to end of 2028
- Long-term (8-10 years); 2029 to end of 2031

Actions were further divided into the following categories:

- **Existing actions**: Actions that are already underway, planned, and/or budgeted for implementation and will result in future GHG emissions reductions.
- **Primary CAP actions**: Actions to be implemented as part of CAP 2.0 implementation.
- **Secondary CAP actions**: Actions to be implemented as time and resources allow.

Cost Estimation

Action implementation costs were estimated for both costs to the City and community:

- **Community costs** estimate how much it will cost an average resident, business, or developer to implement the measure as compared to a business-as-usual scenario.
- **City costs** estimate costs related to consultant services and procurement.

Like the impact analysis, the consultant estimated costs for all measures in the prioritized shortlist. The estimated cost was based on consultant experience, available literature, consultation with peer cities, and City staff input, and included the following cost elements:

- **Initial start-up costs**, in the form of consultant and capital expenses.
- **Ongoing costs** through 2031 over a 10-year timeframe, including continued labor expenses, maintenance, and monitoring/evaluation of resource needs.

City staff time required for action implementation was evaluated separately and is not included in the cost estimations as some of the anticipated staff time may be absorbed into existing City staff.

City staff reviewed the cost estimations—especially the City cost element (e.g., estimated FTE requirements). To the extent possible, the consultant provided citations for consulted literature and case studies, although information on climate action costs is very limited at this time.

Where known, the analysis includes consideration of partnerships. However, the analysis does not include potential grants and other funding sources, so estimates here may be conservative representations of the City's final cost. A more detailed funding plan will be provided in future stages of the plan.

Emission Reduction Estimation

The consultant explicitly modelled emissions reductions associated with proposed CAP 2.0 actions. Modeling built from the emissions forecast and considered interacting actions to avoid double counting, such as impacts of EV vehicle use on community electricity consumption. All assumptions are provided for transparency and City/stakeholder review and outcomes are visualized in both table and graphical format.

Findings Summary

Results from the cost and impact analysis are summarized in the table below. The "Summary At-a-Glance" table on the subsequent page includes the following information associated with each proposed CAP 2.0 action:

- **Net Present Value (NPV) cost to the City and community:** The anticipated net cost of the action for the City government and Pleasanton community, considering current and future costs and cost savings benefits (through 2031). Negative NPV values represent cost savings.
- **GHG savings:** Estimated cumulative GHG emission reduction benefits resulting from action implementation (through 2030).
- **Cost effectiveness:** Estimated cost effectiveness of the action (cost per unit GHG emission reduction achieved).
- **Co-benefits:** Benefits that would result from the action in addition to direct climate benefits, including resilience, equity, job creation, public health, ecosystem and habitat health, and mobility and transport safety. In addition to the co-benefits highlighted, many actions—including many not quantified for GHG savings—also present an opportunity for City leadership, are foundational to overall sustainability or to ensure the success of more directly impactful actions, or support youth engagement and capacity for climate action

The Summary At-a-Glance table is followed by the following additional summary sections:

- **GHG Reductions** highlights the combined impact of all strategies and actions in reaching Pleasanton's overall and per capita emissions reduction targets. It also summarizes which strategies and actions contribute most to emissions reduction.
- **Cost** details the estimated city staff time, in FTE, required to implement CAP 2.0. It also includes the NPV cost by strategy and by action, organized by sector.
- **Cost effectiveness** includes the overall cost-effectiveness of CAP 2.0 implementation for the City and community, highlights the most cost-effective actions, and summarizes cost effectiveness for every action.

Summary At-a-Glance

Co-Benefits Key		
Resilience	Public health	Ecosystem and habitat health
Equity	Job creation	Mobility & transport safety

Acronym/Abbreviation Key		
Comm.	Community	
NPV	Net present value	Net current value of all current and future cash flows associated with the project; considers both costs and cost savings (i.e., benefits). Negative values are a net cost savings.
GHG	Greenhouse gas	Methane, carbon dioxide, and nitrous oxides that contribute to climate change
$MTCO_2e$	Metric tons carbon dioxide equivalent	Common unit for quantifying GHG emissions
	Denotes actions with notable direct or indirect GHG savings that were not quantified due to measurement constraints.	

			NPV Costs ($)		GHG savings (MTCO2e)	Cost Effectiveness ($/MTCO2e)		Co-benefits
Sector	ID	Action	NPV Costs to City	NPV Costs to Community	Cumulative Savings - to 2030	City	Comm-unity	
BE	P1	All-electric reach code	$49,020	($2,784,572)	10,136	$5	($275)	
BE	P2	Existing Building Electrification Plan	$138,455	$137,032	49,533	$3	$3	
BE	S1	Refrigerant management in new construction	$42,675	($262,307)		N/A	N/A	
BE	P3	Modify Municipal Code definition of covered projects	$0	$287,074	1,290	$0	$223	
BE	S2	Community energy efficiency upgrades	$958,041	($1,959,201)	8,260	$116	($237)	
BE	S3	Energy Benchmarking and City Facility Retrofits	($3,103,111)	$0	351	($8,833)	$0	
BE	E2	Zero emissions energy as default EBCE choice	N/A	N/A	269,609	N/A	N/A	
BE	P4	Solar and storage on new construction	$0	$0	2,341	$0	$0	
TLU	P5	ZEV Infrastructure Plan	$217,582	($31,005)	315,283	$1	$0	
TLU	P6	Small-engine and off-road equipment electrification - municipal	$0	$0		N/A	N/A	
TLU	P7	Small-engine electrification - community	$0	($2,448,960)	76,247	$0	($32)	
TLU	E3	Bicycle, pedestrian, and trails network expansion	N/A	N/A	5,883	N/A	N/A	

			NPV Costs ($)		GHG savings (MTCO2e)	Cost Effectiveness ($/MTCO2e)		Co-benefits
Sector	ID	Action	NPV Costs to City	NPV Costs to Community	Cumulative Savings - to 2030	City	Comm-unity	
TLU	P8	Bicycle amenities	$0	$2,492,542	1,753	$0	$1,422	
TLU	P9	Bicycle rack incentive program	$7,562	($777,244)	1,650	$5	($472)	
TLU	P10	Increase transit ridership	$75,384	($585,351)	4,601	$16	($127)	
TLU	S4	VMT reduction for K-12 activities	$571,058	($6,358,627)	11,663	$49	($546)	
TLU	E6	Housing Element	N/A	N/A	17,257	N/A	N/A	
TLU	P11	Promote LEED Neighborhood Development	$910	($849,750)	15,331	$0	($55)	
MC	E10	Textile recovery	N/A	N/A		N/A	N/A	
MC	P12	Single use plastic reduction	$0	$0		N/A	N/A	
MC	S6	Embodied carbon reduction plan	$0	($88,625)		N/A	N/A	
MC	S5	Environmentally preferable purchasing policy	$0	$0		N/A	N/A	
NS	P13	Urban Forest Master Plan	$486,089	$469,585	1,195	$407	$393	
NS	P14	Soil management carbon sequestration projects	$34,711	$2,868,511	3,890	$9	$737	
NS	S7	Carbon sequestration research and tracking	$0	$0		N/A	N/A	
WR	P15	Water efficiency programs including water fixture retrofits	$1,634,626	($4,650,298)		N/A	N/A	
WR	S8	Green Stormwater Infrastructure Plan	$0	$0		N/A	N/A	
WR	E17	On-site stormwater management	N/A	N/A		N/A	N/A	
CRW	E21	Community gardens	N/A	N/A		N/A	N/A	
CRW	S9	Wildfire preparation, prevention, and education	$0	$0		N/A	N/A	
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	$118,522	$0	26,254	$5	$0	
		TOTAL	$1,231,524	($14,541,197)	822,527	$1	-$18	

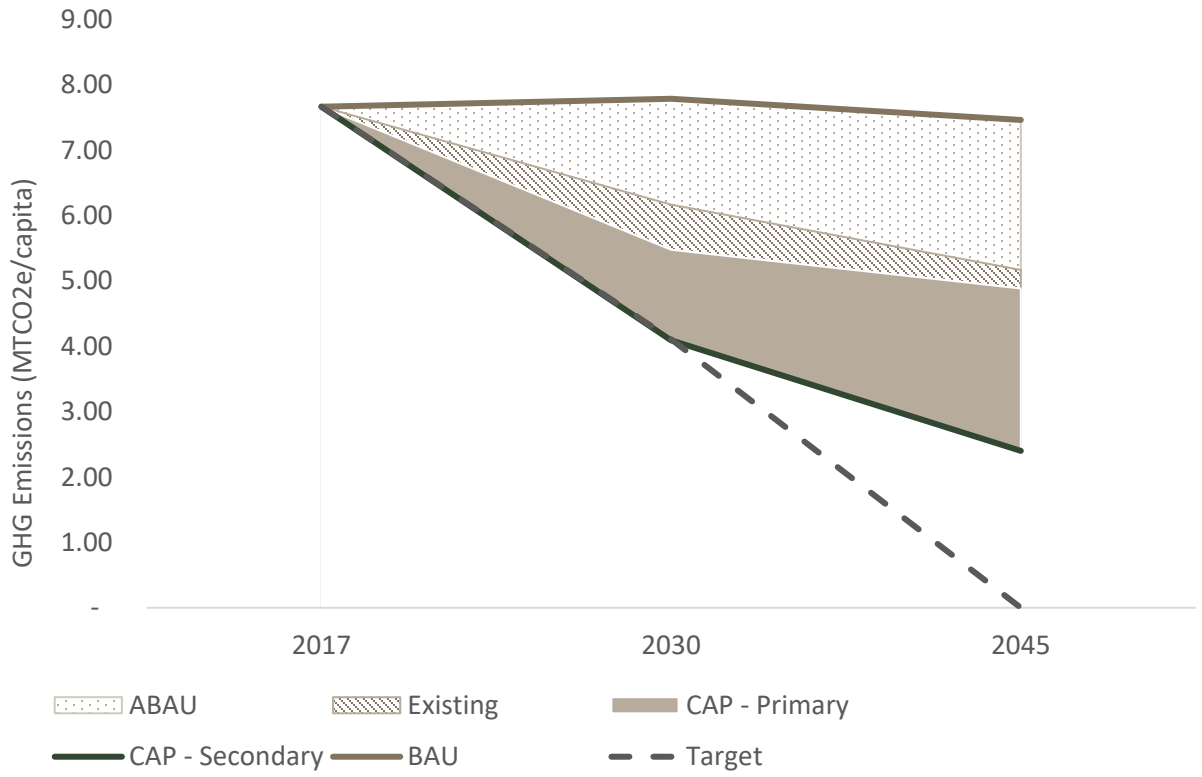
**Blank cells were not quantified.*

GHG Reductions

Modeling suggests that proposed CAP 2.0 primary measures result in the City achieving its 2030 emission goal (4.11 $MTCO_2e$ per capita) and SB 32 requirements. Specifically, modeling indicates the City could surpass this goal—reducing emissions to 4.09 $MTCO_2e$ per capita in 2030. The following CAP strategies and actions are the highest contributors of GHG emission reductions through 2030:

- Vehicle decarbonization (ZEV Infrastructure Plan)
- Renewable electricity (Zero emissions as default EBCE choice)
- Organic waste prevention and management (SB 1383 implementation)
- Community small engine electrification
- Existing Building Electrification Plan
- Comprehensive climate awareness, education, and outreach

Figure 1. Aggregated pre-capita GHG emissions.



Acronym Key:

ABAU: adjusted business-as-usual; emission reductions resulting from external federal and state policies.
Existing: emission reductions resulting from continuation of existing City actions.
CAP - Primary: Emission reductions resulting from primary CAP 2.0 action implementation.
CAP - Secondary: Emission reductions resulting from secondary CAP 2.0 action implementation.
BAU: business-as-usual; emissions trajectory assuming no climate action.
Target: Target emissions trajectory

Table 1. GHG emission reductions associated with state and federal legislation adjustments, all potential CAP 2.0 strategies and actions, and existing City actions (in MTCO2e). Unless otherwise indicated, reductions are isolated to those achieved within the indicated year compared to the BAU scenario. Cumulative values are through 2030.

			MTCO2e Reductions (mass)			MTCO2e Reductions (per capita)		
Sector	**Strategy**	**Type**	**Cumulative to 2030**	**2030**	**2045**	**Cumulative to 2030**	**2030**	**2045**
All	ABAU reduction		947,836	134,477	224,576	11.42	1.62	2.29
BE	Decarbonization of buildings	Existing	271,838	29,649	(0)	3.27	0.36	(0.00)
BE	Decarbonization of buildings	Primary	59,668	15,698	41,059	0.72	0.19	0.42
BE	Decarbonization of buildings	Secondary	-	-	-	-	-	-
BE	Energy efficiency & consumption	Existing	-	-	-	-	-	-
BE	Energy efficiency & consumption	Primary	1,290	279	65	0.02	0.00	0.00
BE	Energy efficiency & consumption	Secondary	8,611	1,335	0	0.10	0.02	0.00
BE	Renewable energy generation & storage	Existing	-	-	-	-	-	-
BE	Renewable energy generation & storage	Primary	2,341	726	(0)	0.03	0.01	(0.00)
BE	Renewable energy generation & storage	Secondary	-	-	-	-	-	-
TLU	Active, shared transport	Existing	11,722	1,839	427	0.14	0.02	0.00
TLU	Active, shared transport	Primary	19,666	4,220	1,452	0.24	0.05	0.01
TLU	Active, shared transport	Secondary	-	-	-	-	-	-
TLU	Sustainable land use	Existing	17,257	3,251	865	0.21	0.04	0.01
TLU	Sustainable land use	Primary	15,331	1,577	372	0.18	0.02	0.00
TLU	Sustainable land use	Secondary	-	-	-	-	-	-
TLU	Vehicle decarbonization	Existing	-	-	-	-	-	-
TLU	Vehicle decarbonization	Primary	391,530	85,195	209,826	4.72	1.03	2.14
TLU	Vehicle decarbonization	Secondary	-	-	-	-	-	-
MC	Waste diversion	Existing	135,118	22,585	26,499	1.63	0.27	0.27
MC	Waste diversion	Primary	-	-	-	-	-	-
MC	Waste diversion	Secondary	-	-	-	-	-	-
MC	Sustainable consumption	Existing	-	-	-	-	-	-
MC	Sustainable consumption	Primary	-	-	-	-	-	-
MC	Sustainable consumption	Secondary	-	-	-	-	-	-
NS	Carbon sequestration & ecosystem resilience	Existing	-	-	-	-	-	-
NS	Carbon sequestration & ecosystem resilience	Primary	5,085	860	1,259	0.06	0.01	0.01
NS	Carbon sequestration & ecosystem resilience	Secondary	-	-	-	-	-	-
WR	Supply & conservation	Existing	-	-	-	-	-	-
WR	Supply & conservation	Primary	-	-	-	-	-	-
WR	Supply & conservation	Secondary	-	-	-	-	-	-
WR	Stormwater resilience	Existing	-	-	-	-	-	-
WR	Stormwater resilience	Primary	-	-	-	-	-	-
WR	Stormwater resilience	Secondary	-	-	-	-	-	-
CRW	Community resilience & vulnerability	Existing	-	-	-	-	-	-
CRW	Community resilience & vulnerability	Primary	26,254	5,133	1,829	0.32	0.06	0.02
CRW	Community resilience & vulnerability	Secondary	-	-	-	-	-	-
	Total Reduction		1,913,547	306,823	508,227	23.05	3.70	5.19
	Resulting Emissions		6,128,331	339,821	222,328	N/A	4.09	2.27

Table 2. Top 10 actions for reducing GHG emissions through 2030.

			MTCO2e Reductions (mass), by year		MTCO2e Reductions (mass), cumulative	
	ID	Action	2030	2045	Cumulative - to 2030	Cumulative - to 2045
1	P5	ZEV Infrastructure Plan	67,550	186,998	315,283	2,263,229
2	E2	Zero emissions energy as default EBCE choice	29,457	(0)	269,609	485,837
3	E7	SB 1383 Implementation	22,585	26,499	135,118	506,627
4	P7	Small-engine electrification - community	17,646	22,828	76,247	382,395
5	P2	Existing Building Electrification Plan	13,070	18,101	49,533	285,836
6	P16	Comp. climate awareness, education, and outreach	5,133	1,829	26,254	75,906
7	E6	Housing Element	3,251	865	17,257	48,585
8	P11	Promote LEED Neighborhood Development	1,577	372	15,331	28,784
9	S4	VMT reduction for K-12 activities	2,211	523	11,663	30,606
10	P1	All-electric reach code	2,628	22,959	10,136	204,985

Table 3. Emissions trajectories under examined scenarios.

	MTCO2e Emissions (mass emissions)		MTCO2e Emissions (per capita)	
	In 2030	In 2045	In 2030	In 2045
BAU	646,644	730,555	7.79	7.47
ABAU	512,167	505,979	6.17	5.17
Existing	454,844	478,189	5.48	4.89
CAP - Primary	341,155	222,328	4.11	2.27
CAP - Secondary	339,821	222,328	4.09	2.27
% CAP Reduction (compared to 1990 baseline)	51%	68%	70%	83%
Target	341,188	-	4.11	-
Gap	(33)	222,328	(0.00)	2.27

Cost

City Staff Time

The consultant examined anticipated City staff resources required for CAP implementation, detailed by action below. City staff time are presented in full-time equivalencies (FTE). City staff FTE are a required City resource—the FTE requirements may become part of existing staff duties and assigned to various divisions, or new staff may be required.

Sector	ID	Action	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
B&E	P1	All-electric reach code	0.00	0.00									**0.00**
B&E	P2	Existing Building Electrification Plan					0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
B&E	S1	Refrigerant management in new construction								0.00	0.00	0.00	**0.00**
B&E	P3	Modify Municipal Code definition of covered projects	0.02										**0.02**
B&E	S2	Community energy efficiency upgrades				0.25	0.10	0.10	0.10	0.10	0.10	0.10	**0.85**
B&E	S3	Energy Benchmarking and City Facility Retrofits	0.25	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	**0.97**
B&E	E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice											**0.00**
B&E	P4	Solar and storage on new construction	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.11**
T&LU	P5	ZEV Infrastructure Plan			1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	**4.50**
T&LU	P6	Small-engine and off-road equipment electrification - municipal				0.05	0.05	0.05	0.05	0.05	0.05	0.05	**0.35**
T&LU	P7	Small-engine electrification - community	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	**0.23**
T&LU	E3	Bicycle, pedestrian, and trails network expansion											**0.00**
T&LU	P8	Bicycle amenities including required bike parking at MF/Comm developments	0.02										**0.02**
T&LU	P9	Bicycle rack incentive program				0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.07**
T&LU	P10	Increase transit ridership								0.59	0.59	0.59	**1.76**
T&LU	S4	VMT reduction for K-12 activities	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			**4.00**
T&LU	E6	Housing Element											**0.00**
T&LU	P11	Promote LEED Neighborhood Development								0.02	0.01	0.01	**0.04**
M&C	E10	Textile recovery		0.01									**0.01**
M&C	P12	Single use plastic reduction	0.07	0.07	0.07	0.07							**0.27**
M&C	S6	Embodied carbon reduction plan								0.05	0.08	0.08	**0.21**
M&C	S5	Environmentally preferable purchasing policy	0.02										**0.02**
NS	P13	Urban Forest Master Plan	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	**4.00**
NS	P14	Soil management carbon sequestration projects	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	**2.50**

Sector	ID	Action	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
NS	S7	Carbon sequestration research and tracking				0.02	0.02	0.02	0.02	0.02	0.02	0.02	**0.13**
WR	P15	Water efficiency programs including water fixture retrofits	0.06	0.06	0.06	0.06	0.06						**0.30**
WR	S8	Green Stormwater Infrastructure Plan								0.10	0.10	0.10	**0.30**
WR	E17	On-site stormwater management											**0.00**
CRW	E21	Community gardens											**0.00**
CRW	S9	Wildfire preparation, prevention, and education	1.50	1.50	1.50	1.50	1.50						**7.50**
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	0.36	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	**1.80**
		TOTAL	**3.52**	**3.06**	**4.05**	**3.88**	**3.66**	**2.10**	**2.10**	**2.86**	**2.37**	**2.37**	**29.97**

Other Costs

Modeling suggests that the total net present value (NPV) City cost through 2031 of implementing all primary CAP 2.0 actions will be $2.8 million—equivalent to around $276,000 per year.[2] The estimated cost to the community through 2031 is a net savings of $5.9 million—equivalent to around $587,000 per year. Much of these savings to the community are in the form of rebates/incentives and fuel cost savings.

Table 4. Net costs associated with proposed CAP 2.0 strategies and actions therein (negative values are net cost savings).

			Net Cost to City	Net Cost to Community
Sector	**Strategy**		**NPV to 2030**	**NPV to 2030**
BE	Decarbonization of buildings	Primary	$187,475	($2,647,540)
BE	Decarbonization of buildings	Secondary	$42,675	($262,307)
BE	Energy efficiency & consumption	Primary	$0	$287,074
BE	Energy efficiency & consumption	Secondary	($2,145,070)	($1,959,201)
BE	Renewable energy generation & storage	Primary	$0	$0
BE	Renewable energy generation & storage	Secondary	$0	$0
TLU	Active, shared transport	Primary	$82,946	($1,319,014)
TLU	Active, shared transport	Secondary	$571,058	($6,358,627)
TLU	Sustainable land use	Primary	$910	($849,750)
TLU	Sustainable land use	Secondary	$0	$0
TLU	Vehicle decarbonization	Primary	$217,582	($31,005)
TLU	Vehicle decarbonization	Secondary	$0	$0
MC	Waste diversion	Primary	$0	$0
MC	Waste diversion	Secondary	$0	$0
MC	Sustainable consumption	Primary	$0	$0
MC	Sustainable consumption	Secondary	$0	($88,625)
NS	Carbon sequestration & ecosystem resilience	Primary	$520,801	$3,338,096
NS	Carbon sequestration & ecosystem resilience	Secondary	$0	$0
NS	Ecosystem resilience	Primary	$0	$0
NS	Ecosystem resilience	Secondary	$0	$0
WR	Supply & conservation	Primary	$1,634,626	($4,650,298)
WR	Supply & conservation	Secondary	$0	$0
WR	Stormwater resilience	Primary	$0	$0
WR	Stormwater resilience	Secondary	$0	$0
CRW	Community resilience & vulnerability	Primary	$118,522	$0
CRW	Community resilience & vulnerability	Secondary	$0	$0
	TOTAL		**$1,231,524**	**($14,541,197)**
	AVG PER YEAR		**$123,152**	**($1,454,120)**
	AVG PER CAPITA-YEAR		**$2**	**($18)**
	TOTAL (PRIMARY ONLY)		**$2,762,861**	**($5,872,437)**
	AVG PER YEAR (PRIMARY ONLY)		**$276,286**	**($587,244)**

[2] Does not include costs associated with City staff time or potential funding sources (e.g., grants).

Sector	Strategy		Net Cost to City NPV to 2030	Net Cost to Community NPV to 2030
	AVG PER CAPITA-YEAR (PRIMARY ONLY)		$1,940	($4,125)
	TOTAL (SECONDARY ONLY)		($1,531,337)	($8,668,760)
	AVG PER YEAR (SECONDARY ONLY)		($153,134)	($866,876)
	AVG PER CAPITA-YEAR (SECONDARY ONLY)		($20)	($113)

*Using average projected population over the implementation period (2022 through end of 2031).

Table 5. Net present value (NPV) net cost estimates for CAP 2.0 action implementation (through 2031).

Sector	ID	Action	NPV Costs to City	NPV Costs to Community
B&E	P1	All-electric reach code	$49,020	($2,784,572)
B&E	P2	Existing Building Electrification Plan	$138,455	$137,032
B&E	S1	Refrigerant management in new construction	$42,675	($262,307)
B&E	P3	Modify Municipal Code definition of covered projects	$0	$287,074
B&E	S2	Community energy efficiency upgrades	$958,041	($1,959,201)
B&E	S3	Energy Benchmarking and City Facility Retrofits	($3,103,111)	$0
B&E	E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice		
B&E	P4	Solar and storage on new construction	$0	$0
T&LU	P5	ZEV Infrastructure Plan	$217,582	($31,005)
T&LU	P6	Small-engine and off-road equipment electrification - municipal	$0	$0
T&LU	P7	Small-engine electrification - community	$0	($2,448,960)
T&LU	E3	Bicycle, pedestrian, and trails network expansion		
T&LU	P8	Bicycle amenities including required bike parking at MF/Comm developments	$0	$2,492,542
T&LU	P9	Bicycle rack incentive program	$7,562	($777,244)
T&LU	P10	Increase transit ridership	$75,384	($585,351)
T&LU	S4	VMT reduction for K-12 activities	$571,058	($6,358,627)
T&LU	E6	Housing Element		
T&LU	P11	Promote LEED Neighborhood Development	$910	($849,750)
M&C	E10	Textile recovery		
M&C	P12	Single use plastic reduction	$0	$0
M&C	S6	Embodied carbon reduction plan	$0	($88,625)
M&C	S5	Environmentally preferable purchasing policy	$0	$0
NS	P13	Urban Forest Master Plan	$486,089	$469,585
NS	P14	Soil management carbon sequestration projects	$34,711	$2,868,511
NS	S7	Carbon sequestration research and tracking	$0	$0
WR	P15	Water efficiency programs including water fixture retrofits	$1,634,626	($4,650,298)
WR	S8	Green Stormwater Infrastructure Plan	$0	$0
WR	E17	On-site stormwater management		
CRW	E21	Community gardens		
CRW	S9	Wildfire preparation, prevention, and education	$0	$0
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	$118,522	$0
		TOTAL	**$1,231,524**	**-$14,541,197**

Cost Effectiveness

On average, modeling suggests that implementing all the actions on the shortlist will cost the City $2 per $MTCO_2e$ reduced and will save the community about $18 per $MTCO_2e$ reduced. Highly cost-effective actions include:

- All-electric reach code
- Existing Building Electrification Plan
- ZEV Infrastructure Plan
- Bicycle rack incentive program
- Required bike parking at MF/Comm developments
- LEED Neighborhood development
- Housing Element of General Plan
- Community climate outreach

Table 6. Cost effectiveness of proposed draft CAP 2.0 actions. Actions marked as "N/A" were not quantified for GHG emission reductions.[3]

			Cost Effectiveness ($/MTCO2e)	
Sector	ID	Action	City	Community
BE	P1	All-electric reach code	$5	($275)
BE	P2	Existing Building Electrification Plan	$3	$3
BE	S1	Refrigerant management in new construction	N/A	N/A
BE	P3	Modify Municipal Code definition of covered projects	$0	$223
BE	S2	Community energy efficiency upgrades	$116	($237)
BE	S3	Energy Benchmarking and City Facility Retrofits	($8,833)	$0
BE	E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice	N/A	N/A
BE	P4	Solar and storage on new construction	$0	$0
TLU	P5	ZEV Infrastructure Plan	$1	($0)
TLU	P6	Small-engine and off-road equipment electrification - municipal	N/A	N/A
TLU	P7	Small-engine electrification - community	$0	($32)
TLU	E3	Bicycle, pedestrian, and trails network expansion	N/A	N/A
TLU	P8	Bicycle amenities including required bike parking at MF/Comm developments	$0	$1,422
TLU	P9	Bicycle rack incentive program	$5	($472)
TLU	P10	Increase transit ridership	$16	($127)
TLU	S4	VMT reduction for K-12 activities	$49	($546)
TLU	E6	Housing Element	N/A	N/A
TLU	P11	Promote LEED Neighborhood Development	$0	($55)
MC	E10	Textile recovery	N/A	N/A
MC	P12	Single use plastic reduction	N/A	N/A
MC	S6	Embodied carbon reduction plan	N/A	N/A
MC	S5	Environmentally preferable purchasing policy	N/A	N/A
NS	P13	Urban Forest Master Plan	$407	$393
NS	P14	Soil management carbon sequestration projects	$9	$737
NS	S7	Carbon sequestration research and tracking	N/A	N/A
WR	P15	Water efficiency programs including water fixture retrofits	N/A	N/A
WR	S8	Green Stormwater Infrastructure Plan	N/A	N/A
WR	E17	On-site stormwater management	N/A	N/A

[3] Table presents costs over implementation timeframe (2022 to 2031) divided by cumulative $MTCO_2e$ reductions through target year (2030).

			Cost Effectiveness ($/MTCO2e)	
Sector	ID	Action	City	Community
CRW	E21	Community gardens	N/A	N/A
CRW	S9	Wildfire preparation, prevention, and education	N/A	N/A
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	$5	$0
		TOTAL	**$2**	**($17)**

Buildings & Energy

GHG Reductions

GHG analysis assumptions and outcomes for the buildings & energy sector are summarized below. Blank "MTCO2e savings" cells indicate that the action was identified as supportive and not quantified.

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/ Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
P1	All-electric reach code	Yes	Direct	Near-term (0-3 years)	- 90% of natural gas switch to electricity for all new construction (assumes some exceptions).	N/A	337,817	204,985	10,136
P2	Existing Building Electrification Plan - VOLUNTARY	Yes	Direct	Mid-term (4-7 years)	- 15% switch to electric by 2030. - Replace 30% of space/water heating equipment by 2030	Dublin CAP estimated 22% retrofits to all-electric (Appendix C, p.12) given heating energy use trends and equipment life spans	550,810	285,836	49,533
S1	Refrigerant management in new construction	Yes	Supportive	Long-term (8-10 years)	N/A		-	-	-
P3	Modify Municipal Code definition of covered projects	Yes	Direct	Near-term (0-3 years)	- Covered buildings are 25% more efficient than previously.	US Green Building Council	15,945	7,748	1,290
S2	Community energy efficiency upgrades	Yes	Direct	Mid-term (4-7 years)	- 2025 start date. - 15% reduction in energy use as a result of program. (Assume slightly more savings than source due to inclusion of incentives.)	Dublin CAP identifies a meta-analysis that found that education-only campaigns can produce 10-12% energy savings.	43,479	17,907	8,260
S3	Energy Benchmarking and City Facility Retrofits	Yes	Direct	Near-term (0-3 years)	- 20% reduction in City facility energy use by 2025, steady thereafter.	ACEEE 2018	1,517	590	351

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/ Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice	Yes	Direct	Near-term (0-3 years)	- Zero electricity EF for residential/commercial starting in 2023. - Assume 5% opt-out rate.	California Public Utilities Commission (as referenced in Dublin CAP Appendix C, p. 5); EBCE	485,837	485,837	269,609
P4	Solar and storage on new construction	Yes	Direct	Near-term (0-3 years)	- 90% of new construction will have on-site solar by 2030, with continuing trend thereafter.	Consistent with voluntary participation rate cited in Action 1176.	36,981	18,135	2,341
P15	Water efficiency and retrofits	Both	Supportive	Mid-term (4-7 years)	- 3% reduction in activity data by 2030 (energy consumption, solid waste disposal); ramping up starting in 2022; steady thereafter.	Consultant estimate	33,421	14,190	5,642
E1	Maintain the highest renewable energy choice as the default for all municipal facilities, including opportunities to secure Power Purchase Agreements with other EBCE jurisdictions.	Yes	Direct	Ongoing	- All electricity use is zero emissions in 2022 and beyond.	Consultant estimate	9,306	3,577	2,230

Cost

Cost assumptions and outcomes for the buildings & energy sector are summarized below:

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P1	All-electric reach code	$49,020	($2,784,572)	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies; Dublin CAP - Appx C p. 8	Staff time required for cost effectiveness evaluation plus community outreach, reach code development, drafting an ordinance for City Council consideration, and initial implementation of the new ordinance. Reach code takes two years to get into place.	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies; Dublin CAP - Appx C p. 7; Electrification Cost Effectiveness Memo_Update_Final	All-electric buildings are generally cheaper to build and cheaper to operate over time when compared to traditional buildings with both gas and electricity - Assume $95/yr in net utility savings per single-family household, $21/yr for multi-family homes, $24,300/yr for businesses (blend of retail and office buildings). Assumes new construction reflected by anticipated increases in households and businesses.
P2	Existing Building Electrification Plan	$138,455	$137,032	ACEEE Electrifying Commercial Buildings 2020 p. v; Dublin CAP - Appx C p. 13	One-time costs are to develop the plan and electrify municipal buildings. FTE is for ongoing implementation.	E3 report p. xi, 66 & 81; ACEEE Electrifying Commercial Buildings 2020 p. v; Dublin CAP - Appx C p. 13	According to E3, 84% of single-family households and 8% of multifamily households would achieve net lifecycle cost savings by completing a retrofit of the HVAC and hot water heater. An additional 16% of single-family homes and 39% of multifamily homes would see lifecycle costs of less than $100 a year. (The remaining 53% of multifamily households could see up to $200/yr added costs.) ACEEE's 2020 study found that 27% of commercial floor space heated with fossil fuel systems can be electrified today with a simple payback of less than 10 years and without any rebates or carbon pricing. To achieve a 10% overall reduction in natural gas use by 2030, retrofits on 20% of multi-family homes (8% with net savings, 12% with $100/yr lifecycle costs) are assumed to begin mid-way into the implementation period to allow for program ramp-up.

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
S1	Refrigerant management in new construction	$42,675	($262,307)	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies. Like action 1001 (Dublin CAP - Appx C p. 8) but forging new ground; good background info: https://www.cmsmechanical.com/the-path-to-a-safe-refrigerant-transition/	Staff time required for community outreach, standards/code development, and implementation. Standards/code takes three years to get into place.	https://explorer.localenergycodes.com/pleasanton-city/forecast/12-PGE/studies/1,2,3	While low GWP refrigerants impact consumer up-front costs, high efficiency appliances are cheaper to operate over time - Assume $150 in net annual savings per single family household.
P3	Modify Municipal Code definition of covered projects	$0	$287,074	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies. Like action 1001 (Dublin CAP - Appx C p. 8) but no need for cost-effectiveness study; requires more community outreach and education than amending energy code: https://localenergycodes.com/content/reach-codes/building-efficiency-renewables	Staff time required for community outreach, code development, and implementation. Assumes 1 year for code update to get into place.	https://explorer.localenergycodes.com/pleasanton-city/forecast/12-PGE/studies/2,3?exclude_package_types=13,19,55,1,4,6,20,15&show_only_cost_effectiveness=	Expanding electrification requirements to cover new multi-family housing and commercial buildings may increase annual costs ($168 per multi-family household), however including energy efficiency and high efficiency appliance requirements will likely result in substantial net savings ($1,389 per retail building).

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
S2	Community energy efficiency upgrades	$958,041	($1,959,201)	EPA Energy Star Portfolio Manager p. 10; Ann Arbor CAP 3.0 - p. 52-55; Dublin CAP - Appx C p. 10	Assumes staff time for program implementation and annual funding for energy audits (300 per year averaging $500 each); one-time cost to develop and set up incentives and annual cost to partner with organizations and offer rebates to enable low-income residents to benefit from energy efficiency improvements. Assumes rebates averaging $10k covering half of Pleasanton households with under $50k annual incomes during the 10-year period.	EPA Energy Star Portfolio Manager p. 10; Dublin CAP - Appx C p. 10	Annual savings for City-funded energy audits (300 per year averaging $500 each) plus net energy savings related to undertaking energy efficiency and renewable energy improvements.
1167	LEED certification for new construction			CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies. Similar to action 1001 (Dublin CAP - Appx C p. 8) but may require analysis beyond existing studies: https://localenergycodes.com/content/reach-codes/building-efficiency-renewables	One-time required for initial analysis to ensure effort will result in desired energy/GHG savings plus community outreach, code development, drafting an ordinance for City Council consideration, and implementation of the new ordinance. Code revision takes 1 year to get into place.	US GBC policy brief 2018; LEEDv4 in SF 2017; Browne 2020 p. 8	LEED Silver typically can be achieved with no additional costs; improves the quality, efficiency, and comfort of new buildings at no additional net cost to building owners and occupants. Achieving desired energy and GHG savings will also result in net utility savings for new construction, assumes 20% as seen in DC.

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
S3	Energy Benchmarking and City Facility Retrofits	($3,103,111)	$0	Corte Madera CAP p. 43-44; https://www.energysage.com/local-data/solar-panel-cost/ca/alameda-county/pleasanton/; https://www.energysage.com/local-data/energy-storage-cost/ca/alameda-county/pleasanton/	Assume staff and consultant time for benchmarking + performance monitoring; energy efficiency measures selected achieving 12-year simple payback shown as annual savings starting in year 3, including lighting and upgrades totaling $560k plus installing solar+storage at 20 city facilities averaging 60 kW of PV each (averaging 14% capacity factor) and 52 kWh of batteries.	n/a - city facilities	n/a - city facilities
E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice			EBCE Power Mix & Compare Plans; Dublin CAP - Appx C p. 24	Staff time for cost effectiveness analysis, supporting decision-making, and supporting education/outreach.	EBCE Power Mix & Compare Plans; Community Power Coalition; Dublin CAP - Appx C p. 5	Opting-up communitywide accounts to EBCE's Renewable 100 power portfolio will increase rates by 2%; assumes a 5% opt out rate.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P4	Solar and storage on new construction	$0	$0	CA Energy Codes & Standards Cost-Effectiveness Explorer; CA SGIP; Dublin CAP p. 1-7; Appx C p. 7 & 11	California Green building Code requires solar on new residential construction (other than for homes damaged or destroyed by disaster); assumes staff time to develop, administer and conduct outreach - 40 hours of one-time staff costs to update checklist and develop promo materials, and 20 hours per year for ongoing outreach and implementation. Dublin CAP: "City cost associated with battery storage permit streamlining are anticipated to be between $7,000 and $10,000. Anticipated costs will be from staff time for review and possible updating of the battery storage permit application. Future staff time may be saved due to potential application streamlining."	CA SGIP; Dublin CAP - Appx C p. 11	n/a - voluntary & variable

Materials & Consumption

GHG Reductions

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
E10	Textile recovery	Yes	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A
P12	Single use plastic reduction	Yes	Supportive	Mid-term (4-7 years)	N/A	N/A	N/A	N/A	N/A
S5	Environmentally preferable purchasing policy	Yes	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A
S6	Embodied carbon reduction plan	Yes	Supportive	Long-term (8-10 years)	N/A	N/A	N/A	N/A	N/A
P15	Water efficiency and retrofits	Both	Supportive	Mid-term (4-7 years)	- 3% reduction in activity data (energy consumption, solid waste disposal).	Consultant estimate	25,086	19,464	4,144
E9	Local purchasing	Yes	Supportive	Ongoing	N/A	N/A	N/A	N/A	N/A
E7	SB 1383 Implementation	Yes	Direct	Ongoing	- 75% reduction in organics, applied in 2025 and continued through 2030 (and thereafter)	SB 1383 (consistent with Dublin CAP - Appendix C, p22)	642,951	506,627	135,118
E8	Outreach and Education	Yes	Supportive	Ongoing	N/A	N/A	N/A	N/A	N/A

Cost

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
E10	Textile recovery			Redmond ESAP Action Costs - MWM Tab	No City costs other than FTE. Based on Redmond action to increase opportunities for sort and drop-off of reuse and recyclable materials.		No direct community costs as action is led by City -- however, haulers may choose to pass on some costs to customers.
P12	Single use plastic reduction	$0	$0	Ann Arbor CAP (pg. 62-63); Dublin CAP - Appendix C (pg. 23, 27)	Ideally the staff time needed to develop code will be built into existing processes. Costs for staff time is estimated between $10,000 and $15,000 (~0.1 FTE). The estimated cost range is based on the average cost to develop a new policy and/or code for the City of Dublin. (e.g., EPP, Low-Carbon Concrete, Life Cycle Emissions Code). Assumes nominal costs for partnership w/StopWaste.		There are no anticipated costs to the community.
S5	Environmentally preferable purchasing policy	$0	$0	Redmond ESAP Action Costs - MWM Tab (FTE Assumption) Dublin CAP - Appendix C (pg. 27) (Cost Assumptions)	Initial costs for developing the policy are estimated to be between $5,000 to $10,000 in staff time (~0.02-0.05 FTE). Assumes a lower-end estimate given the existing resources from Alameda County. Assumes it will take less than 1 year to develop and approve EPP. Assumes costs for environmentally friendly purchases are cost neutral to traditional products -- however, prices will vary by product.		No costs to the community as this action is focused on municipal operations.
S6	Embodied carbon reduction plan	$0	($88,625)	Marin County Code Amendment Toolkit; Dublin CAP - Appendix C (pgs. 6.4-5 & 23)	A regional plan, so City costs would just include staff time. One-time costs for staff time to conduct outreach and work with partners to develop a plan will range from $8,000- $15,000 (~0.1 FTE). Assumes that additional ongoing FTE required will be comparable to the $8,000 - $17,000 range, or ~0.1 FTE for plan implementation. Inspired by the average costs associated with developing comparable plans in the Dublin CAP (i.e., Renewable Resource Buildout Plan, Bike/Ped Plan, Parking Management Plan, TDM Plan).	USFS Life-Cycle Assessments Can Help You Make Sustainable Choices	Costs to the community were based on a U.S. Forest Service sample analysis. Conducting the LCA was ~$10,000 but had an average cost-savings ratio of 3.87 (i.e., $38,700).

Natural Systems

GHG Reductions

Action Information							MTCO2e Savings	
ID	Action	Mitigation Action?	Direct/ Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - through 2050	Cumulative - through 2045	Cumulative - through 2030
1150	Urban Forest Master Plan	Yes	Direct	Near-term (1-3 years)	- 200 trees planted per year. - Annual sequestration assumes average 10" DBH of representative tree species.	Pleasanton CAP 1.0 EC4-3	11,554	7,968	1,195
1219	Soil management carbon sequestration projects	Yes	Direct	Near-term (1-3 years)	- All City managed acres under improved soil management by 2023. - 20% of community acres under improved soil management by 2030; steady thereafter. - Net sequestration at a rate of 0.2 MTCO2e/acre.	i-Tree Planting Calculator; City Parks Dept; De Gryze et al. 2009	16,314	13,208	3,890
1220	Carbon sequestration research and tracking	Yes	Supportive	Mid-term (4-7 years)	N/A	N/A	-	-	-
1145	Climate adapted plantings	Both	Supportive	Long-term (8-10 years)	N/A	N/A	-	-	-
1099	Restore and conserve native grassland, rangeland, and riparian habitats	No	N/A	Long-term (8-10 years)	N/A	N/A	-	-	-
1204	Community conservation programs	No	N/A	Mid-term (4-7 years)	N/A	N/A	-	-	-
NS1	Pesticide Posting Program	No	N/A	Ongoing	N/A	N/A	-	-	-
NS2	Municipal Landscape Management Practice	Both	N/A	Ongoing	N/A	N/A	-	-	-
NS3	Sustainable land management education	Both	Supportive	Ongoing	N/A	N/A	-	-	-

Cost

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P13	Urban Forest Master Plan	$486,089	$469,585	Redmond ESAP Action Costs, Pleasanton CAP 1.0	See Redmond ESAP N1.89, N1.90, and N5.495. Assume same budget proposal for tree planting in public open space ($305,000). $150,000 one-time cost for developing the Urban Forest Master Plan. Combined staff cost for evaluating tree canopy and developing tree canopy plans for neighborhoods. Assume 200 trees planted per year with $50 in tree planting materials per tree. Assume $10,000 in annual incentives towards community planting (see Pleasanton CAP 1.0 EC4-3).	City of Oceanside - CAP Benefit Cost Report (pg. 17) El Cajon CAP_BenefitCostAnalysis (pg. 27)	Assume cost of $3.06 per MTCO2e reduced, with an average annual MTCO2e savings of 20,348 per year (see impact analysis). The City of Oceanside CBA mentions that they can achieve an annual reduction of ~176 MTCO2e reductions a year from trees at a cost of ~$315. This has been adapted to Pleasanton to assume a cost of $539 (average of Oceanside and El Cajon CBAs). The community is anticipated to incur costs associated with the purchase, planting, and maintenance of trees within the urban forest. The price is estimated as the average costs outlined in the City of Oceanside and El Cajon CBA's. Overall costs to the community may be reduced based on the number of incentives the City provides. While there are other external benefits associated with tree planting (e.g., reduced energy costs), these benefits are difficult to estimate with confidence and are therefore not included in this analysis. Assumes $10k a year in incentives from City.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P14	Soil management carbon sequestration projects	$34,711	$2,868,511	Pleasanton CAP 1.0, Redmond ESAP Action Costs	Pleasanton CAP 1.0 says that the cost for implementing the community zero-waste plan and encouraging composting, recycling, and waste reduction would be 1/4 FTE (See SW2-2, SW2-6, SW2-7, SW2-16). Assume similar costs for implementing carbon sequestration projects and encouraging composting. Assume subsidy is equal to that of climate-adapted planting subsidy in Redmond ESAP (See N2.2.46). In Redmond, the initial cost is $30,000 in startup costs with initial incentives and $5000 in additional annual subsidies. Assume 50% of these costs are already covered through SB1383 activities.	CalRecycle_Estimated Costs of SB1383 (pg. 14)	Average cost per business would be approximately $662 annually and assumes 5% of businesses participate each year. Average increased cost per household of $17 per year and assumes that 5% of residents participate each year. Costs include the direct costs of expanding organic waste management infrastructure, expanding organic waste collection, and impacts from education, enforcement, and monitoring of soil projects.
S7	Carbon sequestration research and tracking	$0	$0	Redmond ESAP Action Costs	Assuming 40 hours of staff time dedicated towards research and mapping of carbon sequestration projects. This is based off of similar action of tracking trend changes from COVID.		No direct or significant financial cost change to community.

Water Resources

GHG Reductions

No actions in this sector were quantified for GHG impact because they were either classified as "supportive" or climate adaptation actions.

Cost

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
P15	Water efficiency programs including water fixture retrofits	$1,634,626	($4,650,298)	Redwood City's water conservation programs; http://www.cityofpleasantonca.gov/gov/depts/os/env/water/rebates.asp	If using Redwood City's programs as an example, I estimated free home water savings kit at $55, smart irrigation meter at $170. The cost to the city is $225.00 per 1000 residents- $225x 1000= $225,000. I estimated .25 FTE to work with Zone 7, schedule retrofit upgrades and perform water conservation evaluations. However, Pleasanton already has programs, and this is an expansion that can easily be done without adding much, so reduced to 0.03 FTE. Current incentives residential $.25 per sf and $.50 per sf to Irrigation Meter Customers who replace lawn for Bay-friendly landscape. Garden By Number Program offers $50 to transform the front lawn. Per the Policy Institute of California, on page 9 Table 2, average lawn for the Bay Area is estimated at 6300sf. If using current Pleasanton incentives, that would max out the $1,000 cap per resident. Assume 1,000 residents participate at the max rebate ($1,000) over 5 years (200/year). Assume 100 business participate at the max rebate ($5,000) over 5 years (20/year). Again, this is an expansion that can easily be done without adding much, so reduced to 0.03 FTE.	Redwood City's water conservation programs; City of Pleasanton water rebates and Public Policy Institute of California lawns and water demand	Cost savings of $225 per resident who uses incentive ($55 + $170) estimated that 1,000 residents use this incentive. Annual savings of 50% on outdoor water use and 35% on monthly water usage per resident who uses the total of this incentive (smart irrigation meter, upgrades fixtures and has a home evaluation done by a water technician per the Redwood City's estimates). Assume average monthly bill is $100. Current incentives residential $.25 per sf and $.50 per sf to Irrigation Meter Customers who replace lawn for Bay-friendly landscape. Garden By Number Program offers $50 to transform the front lawn. Per the Policy Institute of California, on page 9 Table 2, average lawn for the Bay Area is estimated at 6300sf. If using current Pleasanton incentives, that would max out the $1,000 cap per resident. Assume 1,000 residents participate at max rebate of $1,000 and 100 business participate at the max rebate of $5,000.
S8	Green Stormwater Infrastructure Plan	$0	$0	City of Dublin Green Stormwater Infrastructure Plan Appendix A pg 35	- .1 FTE to work with partners.		No direct or significant financial cost change to community.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
E17	On-site stormwater management			Pleasanton CAP 1.0	Pleasanton CAP 1.0 estimates 25 hours of work for municipal code update.		No direct or significant financial cost change to community.

Transportation & Land Use

GHG Reductions

Action Information							MTCO2e Savings		
ID	**Action**	**Mitigation Action?**	**Direct/ Supportive**	**Timeframe**	**Key Assumptions**	**Key Sources**	**Cumulative - to 2050**	**Cumulative - to 2045**	**Cumulative - to 2030**
P5	ZEV Infrastructure Plan	Yes	Direct	Mid-term (4-7 years)	- 30% of passenger vehicle VMT from EVs by 2030. - 25% of commercial vehicle VMT from EVs by 2030 (including installation of sufficient charging stations for heavy-duty vehicles). - ZEV Infrastructure Plan will identify quantity of chargers needed to achieve target EV transition above. - Start ramping up beginning in 2023.	CARB (infrastructure needs); California Energy Commission (EV counts for Alameda County); N-79-20 (projected EV sales); similar assumptions were used for Dublin CAP; assume adoption of EV Charger & Parking Ordinance; the draft Advanced Clean Fleets regulation is working to accelerate the market for zero-emission trucks and buses by requiring fleets to transition to ZEVs, where feasible. Proposed requirements include a requirement that fleets purchase only ZEVs beginning in 2024 and remove ICE vehicles at end of their useful life OR ~30-50% of fleet is ZEV by 2030.[4]	3,333,735	2,263,229	315,283
P6	Small-engine and off-road equipment electrification - municipal	Yes	Supportive	Mid-term (4-7 years)	N/A	N/A	0	0	0

[4] https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets/advanced-clean-fleets-fact-sheets

Action Information							MTCO2e Savings		
ID	**Action**	**Mitigation Action?**	**Direct/ Supportive**	**Timeframe**	**Key Assumptions**	**Key Sources**	**Cumulative - to 2050**	**Cumulative - to 2045**	**Cumulative - to 2030**
P7	Small-engine electrification - community	Yes	Direct	Near-term (0-3 years)	- 95% reduction in lawn & garden equipment emissions by 2030; ramping up in 2022. Assumes ban on gas/diesel-powered lawn/garden equipment by 2030. Steady thereafter. - 25% reduction in emissions from other nonroad equipment (with focus on construction) by 2030, steady thereafter.[5] Would require that half of all construction equipment used in City is zero emissions by 2030.[6]	EO N-79-20[6] ; McKinsey & Company (2019)[7]; Pleasanton is currently drafting policy that would ban gas/diesel-powered leaf blowers	501,720	382,395	76,247
P8	Bicycle amenities	Yes	Direct	Near-term (0-3 years)	- Commuting is 30% of passenger VMT. - Bicycling commuting doubles by 2030. - 0.3% VMT reduction by 2030.	CAPCOA 2010 (p. 202); Alameda County VMT reduction tool	4,768	4,603	1,753
P9	Bicycle rack incentive program	Yes	Direct	Mid-term (4-7 years)	- 0.5% reduction in passenger VMT by 2030, steady thereafter.	CAPCOA 2010 (p. 202); Alameda County VMT reduction tool	6,217	5,969	1,650

[5] With an emphasis on construction equipment, which comprises 50% of projected offroad GHG emissions.

[6] EO N-79-20 directs CARB to achieve 100% zero emissions for off-road vehicles and equipment operations by 2035, where feasible. As part of effort, CARB has been working to introduce regulations and programs, such as the Zero-Emission forklifts program and zero-emission airport ground support equipment program. CARB is also currently developing proposed amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation to further reduce emissions beyond current regulations (https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation/proposed-amendments-use-road-diesel). Also, there is an increasing list of zero-emission off-road equipment cases currently available or under demonstration stages, including several electric construction equipment examples (https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road-1).

[7] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/harnessing-momentum-for-electrification-in-heavy-machinery-and-equipment

Action Information							MTCO2e Savings		
ID	**Action**	**Mitigation Action?**	**Direct/ Supportive**	**Timeframe**	**Key Assumptions**	**Key Sources**	**Cumulative - to 2050**	**Cumulative - to 2045**	**Cumulative - to 2030**
P10	Increase transit ridership	Yes	Direct	Long-term (8-10 years)	- 3% reduction in passenger VMT by 2040, steady thereafter.	Pleasanton CAP 1.0; Fehr & Peers 2019; Alameda County VMT reduction tool	25,776	24,241	4,601
S4	VMT reduction for K-12 activities	Yes	Direct	Near-term (0-3 years)	- 2% reduction in passenger VMT by 2030, steady thereafter.	Fehr & Peers 2019; Alameda County VMT reduction tool	31,703	30,606	11,663
E6	Housing Element	Yes	Direct	Near-term (0-3 years)	- 3% reduction in passenger vehicle VMT annually by 2030. -10% improvement in jobs within 4 mi of residence by 2030 and continuing trend thereafter. - 0.3% VMT reduction per 1% improvement. - Start ramping up in 2023.	Impact of Jobs-Housing Balance on Passenger Vehicle Use and Greenhouse Gas Emissions. CARB. 2014.	50,399	48,585	17,257
P11	Promote LEED Neighborhood Development	Yes	Direct	Near-term (0-3 years)	- 1.5% reduction in passenger VMT by 2030, steady thereafter.	Impact of Jobs-Housing Balance on Passenger Vehicle Use and Greenhouse Gas Emissions. CARB. 2014. Alameda County VMT reduction tool	29,564	28,784	15,331
P16	Comprehensive climate awareness, education, and outreach	Both	Direct	Near-term (0-3 years)	- 3% reduction in activity data (energy consumption, solid waste disposal).	Consultant estimate	43,734	42,252	16,467
E3	Bicycle & Pedestrian Master Plan and Trails Master Plan	Yes	Direct	Near-term (0-3 years)	-50 miles of new bike lanes by 2030. - 1% passenger VMT reduction by 2030; steady thereafter.	-50 miles of new bike lanes by 2030. - 1% passenger VMT reduction by 2030; steady thereafter.	16,035	15,479	5,883
E4	Regional transit support	Yes	Direct	Ongoing	- 11,000 VMT reduced per day - Start in 2025.	Mike Tassano (City Traffic Engineer)	10,756	10,443	4,837
E5	Complete Streets Implementation	Yes	Direct	Ongoing	- 0.5% VMT reduction annually.	Consultant estimate	1,443	1,419	1,002

Cost

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P5	ZEV Infrastructure Plan	$217,582	($31,005)	Alternative Fuels Data Center: California Laws and Incentives; Dublin CAP	One time cost to develop an EV infrastructure plan is anticipated to be $150,000 and 40 hours of staff labor towards municipal ordinances. Costs to the City to install and maintain publicly available charging stations are anticipated to be in excess of $100,000. Assume 50% of these costs are ongoing maintenance costs that will be covered by EBCE. Assume that 75% of the total project costs are covered by the Peninsula-Silicon Valley Project. Assume 1/2-time staff dedicated towards implementing this plan and another 1/2 staff towards outreach and engagement efforts.	Pleasanton Impact Analysis (ZEV Projection Model), Zero Emission Vehicle and Infrastructure Statistics, Cost-effectiveness Explorer, Pleasanton Housing Design Guidelines, Pleasanton Municipal Code, Dublin CAP	-Assume 4-year waiting period for implementation to start. - Assume 296 new multi-family units built by 2030 (30/year); 1.75 parking spaces/unit. - EV Infrastructure requirements will increase construction costs by $400 or more per parking space. - Savings come from retrofit estimates of $2,700 per parking space (cheaper to build new than retrofit). -Assume 20% of new MF units must have EV charging.
P6	Small-engine and off-road equipment electrification - municipal	$0	$0	Redmond ESAP Action Costs (See T1.3.0).	Estimate 0.05 FTE to implement this action (fleet evaluation, replacement support and coordination). Assume no cost or savings as electric and gasoline off-road equipment usually break-even in costs in 5-10 years.		No direct or significant financial cost change to community.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P7	Small-engine electrification - community	$0	($2,448,960)	Yountville Gas Leaf blower Ban	Incentive program with $30,000 budget funded by TVAQCA or BAAQMD to residents on a first-come, first-serve basis. Assume that the City costs are all staff time.	Consumer Reports: Leaf Blower Buying Guide, Consumer Reports: Electric Lawn Mowers That Rival Gas Models, Consumer Reports: Chainsaw Face-off, Home Depot: Pre-mixed Fuel Pack, Power Outdoor Equipment Global Market	Voluntary measure so assumption of $0 cost to community. Electric maintenance equipment can be slightly more expensive up-front but have similar overall costs as gasoline versions within 5-10 years with fuel cost-savings considered. The one exception is leaf blowers which have cheaper upfront and maintenance costs. Outdoor equipment sales were equal to 113 million units, which is roughly 34% of the U.S. population (332,643,210) in 2020. Assume 3% of Pleasanton households switches out their leaf blowers each year (because this is incentive-based). The cost difference between a gasoline vs electric leaf blower is $480 - $220 = $260. The cost of a 6 pack of pre-mixed fuel is $34.41.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
E3	Bicycle, pedestrian, and trails network expansion			Pleasanton Bike/Ped Plan, CAP 1.0, Pleasanton Trails Master Plan	Costs reflect costs associated with Bike/Ped Master Plan and Trails Master Plan implementation: - Assume 1/2-time staff position for Transit, Pedestrian and Bicycle Facilities Coordinator. - Assume 75 initial staff hours towards municipal code revisions and competitive grant applications and progress reporting indicators (see Pleasanton CAP 1.0 NM1-1, 1-2, 1-11). - $400,000 in annual maintenance costs according to the PBMP (included in the ongoing FTE cost). - Assume doubling of Area 6 trails maintenance crew which is currently 3 crew members who spend 15% of their time on trails maintenance (0.15 FTE*3 crew members = 0.45 FTE) (see Trails Master Plan p.130). - Trails Master Plan construction, amenities, and trail road crossing costs total to $63,846,398 in 2018 dollars (Table 5-5 in TMP). - Bike and Pedestrian Plan costs total to $69,945,000 total in 2016 dollars (Table 7-2 in PBMP). - Assumes that city covers 20% match of capital infrastructure costs according to Pleasanton Bike/Ped Plan Funding sources notes in Appendix D (p. 164). - Assumes that 50% of costs attributed to existing, planned Trails Master Plan and Bike/Ped Plan implementation (consistent with impact analysis).	Pleasanton Impact Analysis	Assume average annual passenger VMT reduction of ~3 million by 2030 (see impact analysis - ~1% VMT reduction by 2030). Estimated reduced gasoline costs for switching from car travel to bike/ped travel. Assumes displaced VMT are from gasoline-powered vehicles.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P8	Bicycle amenities incl uding required bike parking at MF/Comm developments	$0	$2,492,542	Pleasanton CAP 1.0	Pleasanton CAP 1.0 Cost Benefit Analysis (CBA) estimates 25 hours of staff time per municipal code update.	Madrax: How to Affordably Park Multiple Bicycles, Recreation Management: Fundamental Considerations in Locker Room Design and Maintenance, City of Pleasanton Major Development Projects; Key Assumptions (Cost Effectiveness Explorer)	Assume 3 new commercial developments per year. Assume each new commercial development builds 24 secure bike parking spaces with a cost of $290 per bike. Assume each building has 640 square feet of locker room for each gender with a cost of $700 per square foot (70% of high-end gym locker room cost per square foot). Average passenger VMT reduction of 0.2% per year (925,731 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles. Assume 259 (4% of 6,470 multi-family units) new multi-family units built each year. Assume large multi-family developments build bike storage for 10% of its units with a cost of $290 per bike.
P9	Bicycle rack incentive program	$7,562	($777,244)	Orlando Bicycle Rack Request Program	In 2019 dollars. Assume $700 annual budget for bike rack installations. Assumes 40 hrs of staff time to set up the program. Assume 20 hours of annual staff time towards maintaining the inventory and corresponding with businesses and residents. Orlando has an annual budget of $5000 to $7000 for bike rack installations. With an installation price of $100-350 per bike rack (we assume the upper end of $350 per bike rack). Pleasanton is 10x smaller in land area than Orlando, so we assume $700 budget with $350 per bike rack which is 2 bike rack installations per year.		Average passenger VMT reduction of 0.2% per year (903,589 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P10	Increase transit ridership	$75,384	($585,351)	Pleasanton CAP 1.0	Combined Pleasanton CAP 1.0 Cost Benefit Analysis estimates for TR1-2 through TR1-5 (100 hours upfront cost in staff time and 180 hours annually in staff costs= 0.087 FTE). Also included annual cost estimates for 0.5 FTE of a Transit, Pedestrian, and Bicycle Facilities Coordinator and 75k in capital improvements converted from 2012 dollars to 2021 dollars (See NM1-12).	Pleasanton Impact Analysis	Average passenger VMT reduction of 0.5% per year (2,504,481 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.
S4	VMT reduction for K-12 activities	$571,058	($6,358,627)	Pleasanton CAP 1.0, Redmond ESAP Action Costs	Based on NM1-8 in Pleasanton CAP 1.0 CBA and Redmond's ESAP actions-T1.1.13. Added the costs from these actions.	Pleasanton Impact Analysis	Average passenger VMT reduction of 1.1% per year (6,154291 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.
E6	Housing Element			Pleasanton CAP 1.0, Redmond ESAP Action Costs	Based on Pleasanton CAP 1.0 CBA staff research and municipal code revision cost and time estimates for measures LU1-1 through LU1-7 and LU2-1-LU2-7.	Pleasanton Impact Analysis	Average passenger VMT reduction of 1.7% per year (9,102,419 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.

Community Resilience & Wellbeing

GHG Reductions

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
S9	Wildfire preparation, prevention, and education	Both	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A
P16	Comprehensive climate awareness, education, and outreach	Yes	Direct	Near-term (0-3 years)	- 3% reduction in activity data (energy consumption, solid waste disposal).	Consultant estimate	83,116	75,869	26,242
E18	School climate action planning	Yes	Supportive	Ongoing	N/A	N/A	N/A	N/A	N/A
E19	Access to green spaces	No	0	Ongoing	N/A	N/A	N/A	N/A	N/A
E20	Community cooling centers	No	0	Ongoing	N/A	N/A	N/A	N/A	N/A
E21	Community gardens	Both	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A

Cost

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
E21	Community gardens			Local Government Commission	The city provides administrative, office and staff support and in-kind equipment contributions. It oversees eight community gardens at a total annual cost of $40,000. FTE breakdown based on Alameda's community garden in Sweeney Park in conjunction with Alameda Food Bank. Does not reflect one time startup cost.	Oakland Parks and Rec	If partnered with a nonprofit, no additional cost to low-income communities.
S9	Wildfire preparation, prevention, and education	$0	$0	Saratoga Community Wildfire Protection Plan	Funding could be from FEMA and grants from state and federal agencies to offset costs. Used FTE from Fire, Public Works and Sustainability Departments to accomplish this measure. Ex. Funding offsets - $3,465,000 for CFIP cost share grants		There is no direct or significant financial cost change to the community.
P16	Comprehensive climate awareness, education, recognition, and outreach	$118,522	$0	Ann Arbor CAP 3.0 p. 62-63 & 94-95 ($1MM total over 10 years)	Staff time to develop plan, develop and implement calculator and webpages including annual cost for translations. Assume 0.1 FTE staff time for CAP checklist analysis (Year 1) plus 0.1 FTE (Year 2) for implementation of update. Assume start up and annual staff time and direct costs for award criteria development, selection, webpage maintenance and promotional materials like https://dublin.ca.gov/1323/Green-Shamrock-Business-Recognition-Prog		No direct or significant financial cost change to community.

References

GHG Analysis

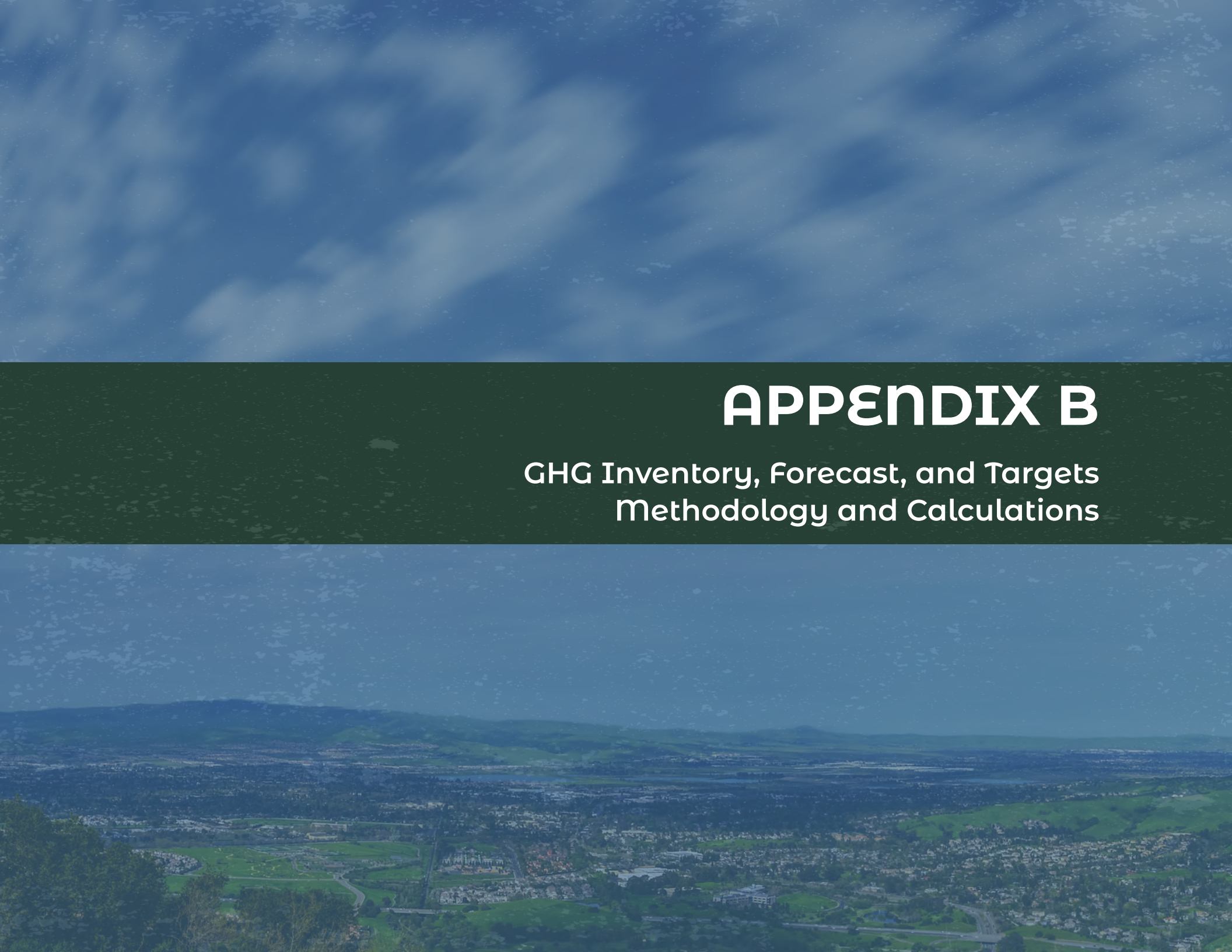
Source Name	URL (if applicable)	Description
Dublin CAP		Appendix C contains detailed impact information and evidence per measure.
Pleasanton CAP 1.0		Impact estimations in the city's last CAP - Appendix D.
Hopkins et al. 2018. Decarbonization of Heating Energy Use in California Buildings	https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf	Cited by Dublin CAP; stats on proportion of residential and commercial water and space heating from natural gas.
EIA 2018 Comparison of commercial green vs. non-green certified buildings	https://www.eia.gov/consumption/commercial/data/2012/pdf/green_buildings_cbecs.pdf	Study found that green certified buildings use about 25% less energy per square foot).
US Green Building Council, "LEED certification for residential"	https://www.usgbc.org/leed/rating-systems/residential	Cites that on average, certified homes use 20 to 30 percent less energy than non-green homes.
Browne-LEED Certification_July 2020	https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/LEED%20Certification%20Nyanya%20Browne_July%202020.pdf	Report on the effect of LEED certification on residential and commercial office buildings in Washington DC in 2018
ACEEE Strategies for Energy Savings in Buildings 2018	https://www.aceee.org/toolkit/2018/04/strategies-energy-savings-buildings	Reports that efficiency retrofits after energy audits can typically reduce energy bills by 5-30%. Comprehensive upgrades can reduce commercial building use by 20-50%.
CARB_Technical_Analysis_EV_Charging_Nonresidential_CALGreen_2019_2020	https://ww2.arb.ca.gov/sites/default/files/2020-09/CARB_Technical_Analysis_EV_Charging_Nonresidential_CALGreen_2019_2020_Intervening_Code.pdf	EV Charging Infrastructure: Nonresidential Building Standards. CARB staff recommends a minimum 10 percent requirement for new construction to assist with filling the mid-range gap in Level 2 chargers needed by 2025.
EO-N-79-20	https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf	Executive order calling for all passenger vehicle sales to be ZEVs by 2035 and by 2045 for medium- and heavy-duty vehicles.
California Energy Commission: Zero Emission Vehicle and Infrastructure Statistics	https://www.energy.ca.gov/data-reports/energy-insights/zero-emission-vehicle-and-charger-statistics	Statistics on the number of vehicles by fuel type in CA, including by County.
Fehr & Peers 2019 TDM-Strategies-Evaluation	https://www.fehrandpeers.com/wp-content/uploads/2019/12/TDM-Strategies-Evaluation.pdf	Provides updated elasticities and GHG reduction estimates compared to the CAPCOA 2010 guidelines for TDM measures.
CAPCOA 2010 Quantifying Greenhouse Gas Mitigation Measures	https://www.contracosta.ca.gov/DocumentCenter/View/34123/CAPCOA-2010-GHG-Quantification-PDF	GHG emission reduction estimates for a variety of project-level mitigation measures.
CARB 2014_Impact_of_Jobs-Housing_Balance_on_Passenger_Vehicle_Use_and_Greenhouse_Gas	https://ww2.arb.ca.gov/sites/default/files/2020-06/Impact_of_Jobs-Housing_Balance_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Policy_Brief_0.pdf	
SB 1383	https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1383	Requires actions to produce a 75% reduction in disposal of organic waste by 2025.

Source Name	URL (if applicable)	Description
California Public Utilities Commission, as cited in "Community Power Coalition" presentation	https://www.mcecleanenergy.org/wp-content/uploads/2018/06/June-2018_FINAL-1.pdf	Source cited in Dublin CAP for info on CCA opt-out rates.
i-Tree Planting Calculator	https://planting.itreetools.org/help/	Estimates carbon sequestration rates for tree plantings of various types, sizes, etc.
De Gryze et al. 2009 Modeling shows that alternative soil management can decrease GHGs	https://escholarship.org/content/qt83p4m8qn/qt83p4m8qn_noSplash_8dfcc7dde94247d48b7c00319007875e.pdf?t=lnp5mk	Provides estimates for carbon sequestration associated with improved soil management.

Cost Analysis

Source Filename	Description
Dublin CAP	Sept 2020; Appendix C contains detailed cost information and evidence per measure.
Pleasanton CAP 1.0	There were cost estimations in the city's last CAP - Appendix D.
Redmond ESAP Action Costs	Spreadsheet used by subconsultant to estimate costs to City of implementing plan measures.
Walnut Creek CAP	Appendix 2 contains the quantification of costs and reductions of municipal measures (page A2-1)
El Cajon CAP_BenefitCostAnalysis	Presents costs to the City and community per MTCO2e reduced for various measures
08-10-2017 LEEDv4BDC vs CalGreen cost	Information about LEED certification.
LEED v4 Cost -USGBC Policy Brief 2018	Information about LEED certification.
Electrification Cost Effectiveness Memo_Update_Final	Oct 2020 Memo provided by subconsultant Rincon that estimates costs for building electrification.
Browne-LEED Certification_July 2020	https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/LEED%20Certification%20Nyanya%20Browne_July%202020.pdf
ACEEE Electrifying Commercial Buildings 2020	https://www.aceee.org/sites/default/files/pdfs/b2004.pdf
EPA Energy Star Portfolio Manager 2013	https://www.epa.gov/sites/production/files/2015-08/documents/overview_of_epas_energy_star_portfolio_manager.pdf
EBCE Power Mix & Compare Plans	https://ebce.org/our-power-mix/; https://ebce.org/compare-plans-business/; https://ebce.org/compare-plans-residential/index.htm
Community Power Coalition 2018	https://www.mcecleanenergy.org/wp-content/uploads/2018/06/June-2018_FINAL-1.pdf
CA SGIP	https://www.cpuc.ca.gov/sgip/
Local Gov't Commission- community gardens	https://www.lgc.org/resource/community-gardens/
Oakland Parks and Rec- Community Gardens	https://localwiki.org/oakland/Community_Gardens
USDN- Resilience Hub	http://resilience-hub.org/wp-content/uploads/2019/10/USDN_ResilienceHubsGuidance-1.pdf
SF Living Roof Cost Benefit Study page 9	https://default.sfplanning.org/Citywide/livingroof/SFLivingRoofCost-BenefitStudyReport_060816.pdf
Dublin San Ramon Services District - recycled wastewater	https://www.dsrsd.com/Home/Components/News/News/1318/18?selectview=1&npage=4&arch=1
San Jose Park and Rec- Fresh Approach farmers market	https://www.sanjoseca.gov/Home/Components/News/News/2607/5103
Saratoga Community Wildfire Protection Plan Table 6.1-6.5 Timelines	https://www.saratoga.ca.us/DocumentCenter/View/1760/Saratoga-Community-Wildfire-Protection-Plan-CWPP?bidId=
Santa Clara County CCWP- funding sources for fire resiliency (D-3)	https://www.sccfd.org/images/documents/fire_prevention/CWPP/CWPP_Strategic_Countywide_Appendices_08_29_16.pdf
ILG Beacon Program	https://www.ca-ilg.org/beacon-program
CA Energy Codes & Standards Cost-Effectiveness Explorer	https://explorer.localenergycodes.com/pleasanton-city/forecast/12-PGE/studies/1,2,3?exclude_prototypes=5,6,7,3,21&show_only_cost_effectiveness=
City of Pleasanton Economic Profile	http://dev.cityofpleasantonca.gov/gov/depts/ed/profile.asp

Source Filename	Description
U.S. Energy Information Administration	https://www.eia.gov/tools/faqs/faq.php?id=45&t=8#:~:text=One%20thousand%20cubic%20feet%20(Mcf,1.037%20MMBtu%2C%20or%2010.37%20therms
Utilities Local: Pleasanton, CA	https://utilitieslocal.com/states/california/pleasanton/
U.S. Census QuickFacts	https://www.census.gov/quickfacts/pleasantoncitycalifornia
Pleasanton_FY1921_BugdetBook_Master_Doc 071919	City of Pleasanton Operating Budget for Fiscal Year 2019-2020 through Fiscal Year 2020-2021.
Ann Arbor Zero-Climate-Action-Plan-_3.0 Apr 2020	Ann Arbor's Living Carbon Neutrality Plan
CalRecycle_Estimated Costs of SB1383	Presents monetary costs and non-monetary benefits of SB1383 implementation
Trails Master Plan	Includes cost estimates.
Pleasanton Bike/Ped Plan	Includes cost estimates.
Consumer Reports: Pay Less with Vehicle Maintenance with an EV	https://www.consumerreports.org/car-repair-maintenance/pay-less-for-vehicle-maintenance-with-an-ev/#:~:text=Consumers%20who%20purchase%20an%20electric,powered%20car%2C%20CR's%20study%20shows.&text=%E2%80%9CThe%20oil%20changes%20and%20engine,by%20the%20EV's%20relative%20simplicity.%E2%80%9D
Zero Emission Vehicle and Infrastructure Statistics	https://www.energy.ca.gov/data-reports/energy-insights/zero-emission-vehicle-and-charger-statistics
Yountville Gas Leaf Blower Ban	https://www.townofyountville.com/departments-services/public-works/electric-leaf-blower-incentive-program
Consumer Reports: Leaf Blower Buying Guide	https://www.consumerreports.org/cro/leaf-blowers/buying-guide/index.htm#:~:text=Gas%20handheld%20leaf%20blowers%20go,limited%20runtime%20per%20battery%20charge.&text=Wheeled%20blowers%20pack%20the%20most%20power%20by%20far.
Consumer Reports: Electric Lawn Mowers That Rival Gas Models	https://www.consumerreports.org/push-mowers/electric-lawn-mowers-that-rival-gas-models/#:~:text=The%20best%20electric%20push%20mower,out%20after%20about%2010%20years.
Consumer Reports: Chainsaw Face-off	https://www.consumerreports.org/chainsaws/electric-dewalt-vs-gas-stihl-chainsaw/
Home Depot: Pre-mixed Fuel Package	https://www.homedepot.com/p/TruFuel-50-1-Pre-Mixed-Fuel-6-Pack-6525638/202604386?source=shoppingads&locale=en-US&mtc=Shopping-B-F_D28I-G-D28I-28_37_OUTDOOR_POWER_ACC-NA-NA-NA-SMART-NA-NA-SMART_SHP&cm_mmc=Shopping-B-F_D28I-G-D28I-28_37_OUTDOOR_POWER_ACC-NA-NA-NA-SMART-NA-NA-SMART_SHP-71700000079956011-58700006728091443-92700060957828827&gclid=CjwKCAjwhMmEBhBwEiwAXwFoEa8n7-xTZnHJg721HVvXRH0PzUvSfsgtSWb0CHt5jzPgBXHdTuCkixoCpCMQAvD_BwE&gclsrc=aw.ds
USGBC Certification Fees	https://www.usgbc.org/tools/leed-certification/fees
City of Pleasanton: Housing Site Development Standards and Design Guidelines	http://www.cityofpleasantonca.gov/civicax/filebank/blobdload.aspx?BlobID=33648
City of Pleasanton: Municipal Code	http://qcode.us/codes/pleasanton/?view=desktop&topic=18-18_88-18_88_035
City of Pleasanton Major Development Projects	http://www.cityofpleasantonca.gov/gov/depts/cd/planning/plans_n_programs/major_development_projects.asp
Alternative Fuels Data Center: California Laws and Incentives	https://afdc.energy.gov/laws/all?state=CA



APPENDIX B

GHG Inventory, Forecast, and Targets Methodology and Calculations

GHG Inventory, Forecast, and Targets Methodology and Calculations

Pleasanton Climate Action Plan Update

prepared for

City of Pleasanton
200 Old Bernal Avenue
Pleasanton, California 94566

prepared by

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, California 94612

June 7, 2021

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Tables

Figures

1 Introduction

California considers greenhouse gas emissions (GHG) emissions and the impacts of climate change to be a serious threat to the public health, environment, economic well-being, and natural resources of the State and has taken an aggressive stance to mitigate the impact of climate change at the State-level through the adoption of legislation and policies. Many cities and counties within California have developed local climate action plans and aligned goals to correspond with State emissions reduction targets. The two major State GHG emissions-related goals are established by Assembly Bill (AB) 32 and Senate Bill (SB) 32. AB 32 required State agencies reduce State GHG emissions to 1990 levels by 2020, whereas SB 32 requires a 40 percent reduction below 1990 levels by 2030. The goals set by AB 32 were achieved even earlier by the State in 2016,[1] and many California jurisdictions are completing updated GHG inventories to quantify progress toward their specific 2020 goals as well as develop targets to align with the requirements of SB 32. There is also Executive Order B-55-18, which was passed in 2018 by Governor Jerry Brown and set a goal for achieving carbon neutrality Statewide by 2045. An older Executive Order (EO), EO S-3-05 (2005), which set a goal of 80 percent reduction in GHG emissions by 2050, is also considered in this technical appendix, but is generally considered superseded by the longer-term GHG emissions reduction goal set by EO B-55-18. These Executive Orders currently are only required by law for State Agencies, but future climate legislation and goals are expected by to be passed by the California legislature in the future.

This technical appendix details the methodology and results of the greenhouse gas (GHG) emissions inventories completed for Pleasanton, the forecast of future GHG emissions, and the provisional GHG emissions reduction targets identified for the Pleasanton Climate Action Plan (CAP) Update for the years 2030 (Senate Bill [SB] 32 target year), 2045 (Executive Order [EO] B-55-018 target year), and 2050 (EO S-3-05 target year). This technical appendix also quantifies the reduction impact that State regulations will have on Pleasanton's *business-as-usual forecast*[2] and presents the results in an *adjusted forecast.*[3] Target setting is an iterative process that must be informed by reductions that can realistically be achieved through development of feasible GHG reduction measures. As such, the targets identified herein (particularly the 2030, 2045, and 2050 targets) remain provisional until quantification and analysis of potential GHG reduction measures has been completed.

The City of Pleasanton has completed GHG emissions inventories[4] for 2010, 2015, and 2017 and updated the 2005[5] GHG inventory to measure progress toward the 2020 GHG reduction goals established in the first Pleasanton Climate Action Plan (CAP).[6] These inventories use the most recent population, employment, and emission factor data allowing for consistent and comparable methodologies across all inventory years and between Bay Area jurisdictions that are also using the

[1] California Air Resources Board. 2020. California Greenhouse Gas Emissions Inventory. Accessed: <https://ww3.arb.ca.gov/cc/inventory/inventory.htm>. Accessed: April 14, 2020

[2] Forecasts emissions based on population and job growth, with no reduction measures from federal, State, or local governments.

[3] The adjusted forecast scenario incorporates expected federal, State, and local GHG reduction measures into the emissions forecast to develop a more accurate forecast of emissions through 2045 and 2050.

[4] Note that all reference to inventories, forecasts, and targets in this memorandum are in reference to communitywide GHG emissions.

[5] The Updated 2005 GHG Emissions Inventory is an update of the previously prepared 2005 inventory that informed the first City CAP. This was done to use the most recent methodology, emission factors, and data sources available, as well as for consistency between other inventory years. The original updated 2005 inventory was created by East Bay Energy Watch, and then updated by Rincon (for more information on these updates, refer to Section 2.3 of the Technical Appendix).

[6] City of Pleasanton. 2012. City of Pleasanton Climate Action Plan. Available: <http://www.cityofpleasantonca.gov/gov/depts/os/env/cap/resources.asp>. Accessed April 14, 2020.

East Bay Energy Watch (EBEW) GHG calculation methodology. These various inventories will assist in the preparation of the Pleasanton CAP Update by tracking progress in specific GHG emission sectors and to forecast future GHG emissions and develop a respective gap analysis that will assist in identifying CAP Update policies that will achieve longer-term GHG emissions targets.

1.1 Regulatory Background

The State of California considers GHG emissions and the impacts of global warming to be a serious threat to the public health, environment, economic well-being, and natural resources of California, and has taken an aggressive stance to mitigate the State's contribution to climate change through the adoption of legislation, plans, and policies, the most relevant of which are summarized below.

- **Executive Order S-3-05 (2005),** signed by former Governor Schwarzenegger in 2005, establishes Statewide GHG emissions reduction goals to achieve longer-term climate stabilization as follows: by 2020, reduce GHG emissions to 1990 levels and by 2050, reduce GHG emissions to 80 percent below 1990 levels. The 2050 goal was accelerated by the 2045 carbon neutral goal established by Executive Order (EO) B-55-18, as discussed below.[7]
- **Assembly Bill 32 (2006),** known as the Global Warming Solutions Act of 2006, requires California's GHG emissions be reduced to 1990 levels by the year 2020 (approximately a 15 percent reduction from 2005 to 2008 levels). The AB 32 Climate Change Scoping Plan, first published in 2008, identifies mandatory and voluntary measures to achieve the Statewide 2020 emissions limit, and encourages local governments to reduce municipal and community GHG emissions proportionate with State goals.[8]
- **Climate Change Scoping Plan (2008),** the original California Climate Change Scoping Plan, includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted and implemented since approval of the Scoping Plan.
- **Climate Change Scoping Plan Update (2013),** the first update to the California Climate Change Scoping Plan, defines CARB climate change priorities for the next five years and set the groundwork to reach post-2020 Statewide GHG emissions reduction goals. The Scoping Plan Update highlighted California's progress toward meeting the 2020 GHG emission goals defined in the original Scoping Plan. It also evaluated how to align the State's longer-term GHG reduction strategies with other State policy priorities, including those for water, waste, natural resources, clean energy, transportation, and land use.
- **Executive Order B-30-15 (2015)** - Establishes Statewide GHG emissions reduction goals of reducing GHG emissions to 40 percent below 1990 levels by 2030.
- **Senate Bill 32 (2016),** signed by former Governor Brown in 2016, codified the Statewide mid-term GHG reduction goal of 40 percent below 1990 levels by 2030. CARB formally adopted an updated Climate Change Scoping Plan in December 2017, laying the roadmap to achieve 2030 goals and giving guidance to achieve substantial progress toward 2050 State goals.

[7] Executive Orders are binding only unto State agencies. Accordingly, EO S-03-05 will guide State agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local government or private actions.

[8] Specifically, the AB 32 Climate Change Scoping Plan states CARB, "encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce GHG emissions by approximately 15 percent from current levels by 2020" (p. 27). "Current" as it pertains to the AB 32 Climate Change Scoping Plan is commonly understood as between 2005 and 2008.

- **Executive Order B-55-18 (2018),** signed by former Governor Brown in 2018, expanded upon EO S-3-05 by creating a Statewide GHG goal of carbon neutrality by 2045. EO S-55-18 identifies CARB as the lead agency to develop a framework for implementation and progress tracking toward this goal in the next Climate Change Scoping Plan Update.

The State of California, via CARB, has issued several guidance documents concerning the establishment of GHG emissions reduction targets for local climate action plans to comply with legislated GHG emissions reductions goals and CEQA Guidelines Section 15183.5(b). In the first California *Climate Change Scoping Plan,*[9] CARB encouraged local governments to adopt a reduction target for community emissions paralleling the State commitment to reduce GHG emissions. In 2016, the State adopted SB 32 mandating a reduction of GHG emissions by 40 percent from 1990 levels by 2030 and in 2017 CARB published *California's 2017 Climate Change Scoping Plan* (hereafter referred to as the Scoping Plan Update) outlining the strategies the State will employ to reach these targets.[10] With the release of the Scoping Plan Update, CARB recognized the need to balance population growth with emissions reductions and in doing so, provided a new methodology for proving consistency with State GHG reduction goals through the use of per capita efficiency targets. These targets are generated by dividing a jurisdiction's GHG emissions for each horizon year by the jurisdiction's total population for that target year and are discussed further in Section 5.

1.2 Baseline Inventory Greenhouse Gas Emissions

The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. In 2017, Pleasanton GHG emissions were estimated to be 588,553 metric tons (MT) of carbon dioxide equivalent (CO_2e).[11] Data was originally gathered by EBEW and then reviewed and updated by Rincon for consistency with the latest methodology available in the Community Protocol[12] and California Supplement[13]. The updated 2005 GHG Inventory corrected a few typological errors in the water and wastewater inventory sectors and removed the Bay Area Rapid Transit (BART) emissions, because the City of Pleasanton does not have direct control over BART and is unable to reduce these emissions and because BART data was not available for the subsequent inventories. Emissions from nitrous oxide (N_2O), methane (CH_4), and carbon dioxide (CO_2) are included in this assessment. Each GHG has a different capability of trapping heat in the atmosphere, known as its global warming potential (GWP), which is normalized relative to CO_2 and expressed as carbon dioxide equivalent, or CO_2e. The CO_2e values for these gases are derived from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change GWP values for consistency with the yearly CARB GHG inventory, as shown in Table 1.[14,15]

[9] California Air Resources Board. 2008. Climate Change Scoping Plan. Available: <https://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf>. Accessed: April 14, 2020

[10] California Air Resources Board. California's 2017 Climate Change Scoping Plan. Available: <https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf>. Accessed: April 14, 2020

[11] Carbon dioxide equivalent is a term for describing GHG emissions in a common unit, signifying for any GHG the amount of CO_2 that would have the equivalent global warming impact. The equivalent amount of CO_2 is calculated based on the GHG global warming potential value.

[12] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: April 14, 2020.

[13] Association of Environmental Professionals. 2013. The California Supplement to the United States Communitywide GHG Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 14, 2020.

[14] Intergovernmental Panel on Climate Change. 2014. Fifth Assessment Report: Climate Change. Direct Global Warming Potentials.

[15] All calculations use Intergovernmental Panel on Climate Change Fifth Assessment Report GWP values.

Table 1 Global Warming Potentials of Greenhouse Gases

Greenhouse Gas	Molecular Formula	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous Oxide	N_2O	265

MT CO_2e: metric tons of carbon dioxide equivalent

Included Emissions

The 2017 community inventory for the City of Pleasanton includes estimated emissions for the following sectors:

- Energy (electricity, natural gas, direct access electricity)
- On-road Transportation (passenger, commercial)
- Off-road Transportation
- Waste (solid waste, alternative daily cover)
- Water
- Wastewater (direct, indirect)

Excluded Emissions

The following emissions sectors were excluded from Pleasanton's CAP 1.0 inventory for 2005 and are also excluded from the updated 2005, 2010, 2015, and 2017 inventories. Additional updates were also made to the 2005, 2010, and 2015 inventories in order to maintain consistency between all inventory years. These changes are summarized in Sections 2.2 and 2.3.

Consumption-based Emissions

GHG emissions from consumption of goods within the city are excluded from the inventory and forecast of Pleasanton's emissions. This is due to no widely accepted standard methodology currently existing for reporting consumption-based inventories from CARB or the ICLEI U.S. Community Protocol.

Natural and Working Lands Emissions

GHG emissions from carbon sinks and sources in natural and working lands are not included in this inventory and forecast due to the lack of granular data and standardized methodology. CARB has included a State-level inventory of natural and working lands in the 2017 Scoping Plan Update[16] GHG inventory; however, at the time of this City of Pleasanton community-wide inventory, sufficient data and tools were not available to conduct a jurisdiction-specific working lands inventory. The Nature Conservancy and California Department of Conservation[17] are exploring options for a tool that may be able to perform these inventories at a more specific geographic level.

[16] California Air Resources Board. 2017. California Climate Change Scoping Plan Update.

[17] California Department of Conservation. TerraCount Scenario Planning Tool. Available: <https://maps.conservation.ca.gov/terracount/>. Accessed: April 15, 2020

Agricultural Emissions

Emissions from agricultural activities are not included in this inventory as the Community Protocol and California Supplement[18] both note agricultural activity is not a required component of Community Protocol inventories and should be included only if relevant to the community conducting the inventory. Regulations exist to encourage urban agriculture within the City boundaries. Many of the emissions from these activities (e.g. energy) are covered under other sectors included in this inventory and no major commercial-scale livestock activity is noted within the city boundaries.

High GWP Emissions

High GWP emissions, including chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs) used as substitutes for ozone-depleting substances are not included in this inventory as it is not a required component of the Community Protocol and the California Supplement notes these emissions are not generally included in California inventories, including in Pleasanton. Furthermore, many of these emissions are from industrial manufacturing sources and are already accounted for in the California Cap-and-Trade program.

1.3 Future GHG Emissions Forecasts and Targets

Prior to 2018, the City of Pleasanton completed a communitywide GHG emissions inventory for the year 2005 and was used in their 2012 CAP 1.0. This was based on an emissions inventory completed in 2008 by ICLEI. The CAP 1.0 inventory also includes forecasts of 2020 and 2025 emissions, that was based on the current population, housing, and employment growth estimates available at the time. As part of the 2020 CAP Update, new GHG inventories were developed for the years 2005, 2010, 2015 and 2017 by EBEW using the most recent population, employment and emission factor data. These changes allowed for consistent and comparable methodologies across years and between jurisdictions who are using the EBEW GHG calculation methodology. This updated methodology made several changes to the 2005 inventory which resulted in changes to the overall GHG emissions in 2005 and 1990 (which is back cast from 2005). A complete description of the differences between the CAP 1.0 GHG inventory and the updated 2005 inventory is included in Section 2.3.

Future Pleasanton GHG emissions were forecasted for six different years (2020, 2025, 2030, 2040, 2045, and 2050) in terms of both a business-as-usual scenario[19] and an adjusted forecast scenario[20] in order to quantify expected emissions through 2050. In addition, five GHG emissions reduction target pathways are presented to establish 2025, 2030, 2035, 2040, 2045, and 2050 GHG emission reduction goals that may be adopted as part of the CAP Update.

This memorandum also summarizes the State GHG emissions targets, Pleasanton 2012 CAP emissions targets, provisional Pleasanton targets, and Pleasanton target pathway options to meet those targets. The provisional targets analyzed for the Pleasanton CAP Update include:

[18] Association of Environmental Professionals. 2013. The California Supplement to the United States Community-Wide Greenhouse Gas (GHG) Emissions Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 15, 2020.

[19] Forecasts emissions based on population and job growth, with no reduction measures from federal, State, or local governments.

[20] The adjusted forecast scenario incorporates expected federal, State, and local GHG reduction measures into the emissions forecast to develop a more accurate forecast of emissions through 2045.

- Reduce GHG emissions a minimum of 15 percent below 2005 levels by 2020, which is consistent with Assembly Bill (AB) 32;[21]
- Reduce GHG emissions 40 percent below 1990 levels by 2030, which is consistent with SB 32[22] and in line with the reduction trajectory to achieve the State 2050 reduction goal (80 percent below 1990 levels) identified in Executive Order S-3-05;[23] and
- Reduce GHG emissions 80 percent below 1990 levels by 2050, consistent with Executive Order S-3-05 or achieve carbon neutrality by 2045, which is consistent with E0 B-55-18.[24]

1.4 Progress Towards Pleasanton 2020 GHG Emissions Reduction Targets

The first Pleasanton Climate Action Plan was adopted in 2012.[25] It identified how the City and broader community can reduce Pleasanton GHGs and included a GHG emissions reduction target of 15 percent reduction below 2005 emissions levels by 2020 or a total reduction of 121,970 MT CO_2e. This target was consistent with the Statewide goal established by AB 32 in 2006 of reducing emissions to 1990 levels by 2020. This 15 percent reduction target was in line with current best practices at the time for the climate action plans developed for the County of Alameda and several Bay Area cities that also utilized 2005 baselines. According to the updated 2005 and 2017 inventories (which both use the same methodologies), Pleasanton exceeded the 2020 reduction goal three years ahead of schedule by decreasing emissions by an estimated 154,456 MT CO_2e, which equates to an overall mass emissions reduction of 28 percent below 2005 levels.

This 2017 inventory and forecast also considered per capita emissions reductions to measure Pleasanton's GHG emissions reduction progress when accounting for the rate at which Pleasanton has grown since 2005. This will be useful for the City to reference if it chooses to adopt a per capita target pathway for future GHG emissions reductions (see the Provisional GHG Emissions Targets section below for more information regarding per capita efficiency target pathways). In 2005, GHG emissions were an estimated 12.2 MT CO_2e per person. This was calculated by dividing total GHG emissions from the updated 2005 GHG inventory by the Pleasanton 2005 population. In 2017, per capita emissions dropped to 7.7 MT CO_2e per person. This equates to a per capita emissions reduction of 37 percent below 2005 levels. Details and discussion of previous inventories and changes made for consistency as part of this update can be found in Section 2.

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21 AB 32 codified the State 2020 GHG emissions target by directing the California Air Resources Board (CARB) to reduce California's Statewide emissions to 1990 levels by 2020 (approximately equivalent to a 15 percent reduction from 2005 to 2008 levels). The AB 32 Scoping Plan encourages local governments to adopt a target that parallels the State target.

22 SB 32 codified the State's 2030 GHG emissions target by directing CARB to reduce California's Statewide emissions to 40 percent below 1990 levels by 2030. CARB is currently working on a Scoping Plan to demonstrate how the State will achieve of the 2030 target.

23 Executive Order S-3-05 established ambitious GHG reduction targets for the State: reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. SB 32 establishes a Statewide mid-term GHG reduction target of 40 percent below 1990 levels by 2030. To remain consistent with the trajectory of SB 32 and S-03-05, emissions would need to be reduced 40 percent below 1990 levels over the 20-year period between 2030 and 2050, which is equal to approximately 2 percent per year. Since 2035 is 5 years past 2030, emissions would need to be reduced by an additional 10 percent over the 2030 target, which is 50 percent below 1990 in 2035 (equivalent to 58 percent below 2008 levels).

24 The Pleasanton Climate Action Plan Update will not include measures designed for implementation out to years 2045 or 2050 but rather present 2045 or 2050 forecast emissions and identify preliminary 2045 or 2050 targets to demonstrate the City commitment to achieve the City's fair share of GHG emissions of State long-term 2045 or 2050 goal presented in Executive Orders B-55-18 or S-3-05, respectively.

25 Pleasanton, City of. 2012. Pleasanton 2020 Climate Action Plan. Available: <http://www.cityofpleasantonca.gov/gov/depts/os/env/cap/resources.asp>. Accessed: April 2020.

2 Previous GHG Emissions Inventories

A summary of previous GHG emissions inventories prepared for Pleasanton can be found in Table 2. A description of the variability between methodologies used in each of the inventory years is summarized in the following sections.

Table 2 Pleasanton GHG Inventories Summary

Sector	1990[1] ($MT CO_2e$)	2005 CAP 1.0[2] ($MT CO_2e$)	2005 CAP 2.0[3] ($MT CO_2e$)	2010 ($MT CO_2e$)	2015 ($MT CO_2e$)
Residential Energy	96,013	113,565	112,957	110,603	91,334
Nonresidential Energy	130,864	151,860	153,958	133,401	122,438[4]
Direct Access Electricity	18,256	N/A	21,478	14,352	19,277
On-Road Transportation	328,919	401,550	386,963	367,968	340,830
Off-Road Transportation	99,506	25,410	117,067	19,205	48,262
Waste	30,172	38,826	35,497	21,912	27,063
Wastewater	1,319	N/A[5]	1,559	1,495	1,492
Water	4,361	34,426	5,130	4,090	3,820
Municipal Operations	N/A	5,370[6]	N/A	N/A	N/A
Total Emissions	**691,161**	**770,844**	**813,131**	**658,675**	**635,239**
Emissions per capita	13.7	11.5	12.2	8.44	8.38

$MTCO_2e$: metric tons of carbon dioxide equivalent

[1] All 1990 inventory data calculated as a 15 percent reduction from CAP 2.0 EBEW 2005 inventory levels per California Air Resources Board guidelines.

[2] Methodology inconsistent, cannot be compared directly to other years.

[3] EBEW inventory for 2005, using same methodology as 2010 and 2015 inventories. Used to back cast 1990 inventory numbers, and to compare emissions for 2017 inventory (CAP 2.0 baseline year).

[4] Nonresidential natural gas emissions adjusted to include estimated emissions from industrial sources, which were not reported by PG&E due to CPUC privacy rules.

[5] Wastewater emissions included with water emissions in original CAP 1.0 inventory.

[6] Municipal operations are a subset of community emissions (included in the community emissions inventory), in 2005 an inventory of municipal emissions was calculated separately for comparison purposes.

2.1 1990 Reference-Year Inventory

The State of California uses 1990 as a reference year to remain consistent with AB 32 and SB 32, which codified the State's 2020 and 2030 GHG emissions targets by directing CARB to reduce Statewide emissions to 1990 levels by 2020 and 40 percent below 1990 levels by 2030. The City of Pleasanton's initial inventory was conducted for the year 2005. The State indicated in the first Climate Change Scoping Plan in 2008 that local governments wishing to remain consistent with State targets could use a 15 percent reduction from 2005-2009 levels as a proxy for a 1990 baseline.[26] The updated 1990 proxy baseline used for target setting by Pleasanton is 691,161 MT CO_2e.[27]

2.2 CAP 1.0 2005 Inventory

In 2008, Pleasanton collaborated with ICLEI to develop a 2005 community GHG emissions inventory. The 2005 inventory quantified community emissions and forecast business-as-usual (BAU) conditions to 2020 based on expected population, employment, and growth. It included emissions from the residential energy, commercial/industrial energy, on-road transportation (using data from the Metropolitan Transportation Commission (MTC) for VMT data), and waste sectors.

In 2012, this 2005 inventory was updated to include additional sectors (referred to here as the CAP 1.0 2005 inventory) and develop forecasts of emissions for 2020 and 2025. The CAP 1.0 inventory added emissions from off-road vehicles, direct access electricity, water and wastewater systems, municipal operations, and utilized the Alameda County CMA Travel Demand Model (now known as Alameda CTC) for VMT estimates. This led to an overall 6.5% decrease in GHG emissions for the 2005 baseline inventory year compared to the original 2005 inventory completed by ICLEI.

The CAP 1.0 inventory from 2012 was updated as part of this current 2020 inventory and forecast effort for the CAP Update, using the most recent methodology, data, and emissions factors. This updated 2005 inventory for the CAP Update, along with inventories for 2010, 2015, and 2017, were originally developed by East Bay Energy Watch in 2019 and then updated by Rincon. (see section 2.3 below for more details on changes made by Rincon to these inventories).

Table 3 compares changes in emissions by sector between the previous CAP 1.0 2005 inventory and updated CAP 2.0 2005 inventory. Overall, emissions in the updated CAP 2005 inventory increased by 5 percent, mainly due to an increase in emissions from the off-road transportation sector.

[26] Due to lack of 1990 inventory data for local governments, page 27 of the 2008 Climate Change Scoping Plan identifies 15 percent below "current" (2005-2009) levels by 2020 as consistent with the State goals of 1990 levels by 2020, allowing local governments to back-cast to develop 1990 baselines for future GHG reduction targets.

[27] Calculated using updated 2005 CAP 2.0 inventory created by EBEW and completed by Rincon.

Table 3 GHG Emissions Comparison Between CAP 1.0 and CAP 2.0 2005 Inventories

	2005 CAP 1.0 Emissions (MT CO_2e)[28]	Updated 2005 CAP 2.0 Emissions (MT CO_2e)	Percent Change
Residential Electricity	46,881	46,782	-0.21%
Residential Gas	66,684	66,175	-0.76%
Nonresidential Electricity	105,107	89,385	-14.96%
Nonresidential Gas	46,753	43,094	-7.83%
Direct Access Electricity	N/A[1]	21,479	-
On-road Transportation	401,550	386,963	-3.63%
Off-road Transportation	25,410	117,067	+360.71%
Solid Waste Disposal	38,826[1]	35,497	-8.57%
Water and Wastewater	34,264	6,689	-80.48%
Municipal Operations	5,370	N/A[2]	-
Total	**770,884**	**813,131**	**+5.48%**

kWh: kilowatt hours; mgy: million gallons per year; N/A: not applicable; MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

1: Direct access electricity data included in nonresidential electricity category.

2: Municipal operations are a subset of community emissions in the updated 2005 CAP 2.0 inventory and were not calculated separately.

2.3 2005, 2010, 2015, and 2017 East Bay Energy Watch Inventories

In 2019, East Bay Energy Watch (EBEW) developed GHG inventories for jurisdictions across the Bay Area. GHG inventories for 2005, 2010, 2015, and 2017 were established for Pleasanton as a part of this effort (referred to from here as the EBEW inventories). Although the EBEW inventories use slightly different methodologies than the 2005 inventory, due to the availability of data, the consistency between years and between jurisdictions, and the use of the most recent emission factors and data sources, Pleasanton has adopted the EBEW inventories and will incorporate them into the CAP process.

The most significant differences between the EBEW inventories and CAP 1.0 2005 inventory is that the CAP 1.0 2005 inventory used the Alameda County Traffic Commission's Countywide Traffic Demand Model for VMT data modeling, while the EBEW CAP 2.0 inventories (2005, 2010, 2015, and 2017) utilize the Bay Area Metropolitan Transportation Commission (MTC) VMT data model for VMT data and projections. This led to a significant increase in on-road VMT activity data and on-road transportation emissions compared to the CAP 1.0 2005 inventory.

In addition, several updates were performed as part of the current effort to adjust the EBEW inventories specifically to Pleasanton and create a single methodology across the 2005, 2010, 2015, and 2017 inventories. These included adding natural gas emissions from the industrial sector in 2015 (due to the data being unavailable from PG&E reporting due to CPUC privacy rules) and updating the waste and water sections to better reflect the specific conditions in Pleasanton.

[28] Original 2005 CAP 1.0 inventory here refers to the 2012 CAP 1.0 inventory, which had previously been updated from ICLEI's 2005 inventory (completed in 2008 for use in Pleasanton's 2012 CAP 1.0).

The following discussion outlines the changes made to the EBEW inventories for consistency with the ICLEI Community Protocol[29] and inventory years.

Direct Access Electricity

Direct access electricity[30] was not reported by PG&E for the 2005 and 2010 reporting year due to California privacy rules, specifically what is known as the 15-15 rule[31]. It was determined by examining the available PG&E data for Pleasanton (obtained via PG&E's Green Communities portal) that direct access electricity users triggered the 15-15 rule for years before 2011. This prevented PG&E from reporting 2005 and 2010 direct access electricity activity data as a part of the data request for Pleasanton's energy data, which was listed as 'ZZZZZ'. This direct access electricity data was reported in all years between 2011 and 2017.

To allow for accurate comparison of energy sector emissions between inventory years, direct access electricity usage and emissions were estimated for 2005 and 2010. This was done by using the average rate of direct access electricity usage for Alameda County in 2005, which was 13.9 percent of nonresidential electricity.[32] The rate of 13.9 percent is lower than that seen in 2017 and therefore, may underestimate the use of direct access electricity in the baseline year. Therefore, this is considered a conservative estimate which would require additional reductions to meet the 40% reduction from 1990 levels. Direct access electricity usage was estimated in this way for 2005 and 2010, so direct access electricity emissions are accounted for across all four inventory years.

Natural Gas

When examining the available PG&E natural gas data for Pleasanton (obtained via PG&E's Green Communities portal) it was determined that large industrial natural gas users triggered the 15-15 rule in 2015. This prevented PG&E from reporting 2015 industrial natural gas activity data as a part of the data request for Pleasanton's energy data, which was listed as 'Fail-Dropped'. In other years, industrial natural gas emissions were included with commercial emissions.

To allow for accurate comparison of energy sector emissions between inventory years, industrial natural gas usage and emissions were estimated for 2015. This was done by calculating the ratio of commercial natural gas usage to residential natural gas usage in other reporting years (where industrial was included with commercial), and then the average ratio was applied to 2015 to estimate industrial natural gas usage in that year. The years 2013, 2014, 2016, and 2017 were used to calculate the average commercial/residential natural gas usage ratio, as these were the closest reporting years to 2015, and there was a clear upward trend in combined commercial and industrial natural gas usage after 2013. After applying this average to 2015, the estimated activity data for combined commercial and industrial natural gas usage was used to calculate emissions from the nonresidential natural gas sector in 2015 so industrial natural gas emissions are accounted for across all four EBEW inventory years.

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[29] ICLEI. 2013. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.1

[30] Direct access electricity is retail electric service where customers purchase electricity from a competitive provider called an Electric Service Provider (ESP), instead of from a regulated electric utility. An ESP is a non-utility entity that offers electric service to customers within the service territory of an electric utility. The utility delivers electricity that the customer purchases from the ESP to the customer over its distribution system.

[31] The 15/15 rule states no data can be provided if there are less than 15 users in any sector or if one user makes up more than 15 percent of the total usage. This applies to natural gas and electricity consumption.

[32] Average rate of direct access electricity in Alameda County, as cited in Appendix A of 2012 City of Pleasanton Climate Action Plan 1.0.

Water and Wastewater

The original EBEW inventories included activity data and emissions from the water and wastewater sectors, which are standard to include in accordance with the ICLEI U.S. Community Protocol. Emissions were calculated using the following ICLEI Community Protocol methods (determined based on facility information gathered by EBEW): WW.2, WW.8, and WW.12. A typological error referencing the wastewater activity data was uncovered during Rincon's review and was corrected. In addition, during a review of the EBEW inventory and Dublin San Ramone Services District (DSRSD) operations, it was determined that wastewater from the DSRSD discharges to the bay via a main pipeline. The original EBEW inventory was set as discharging into rivers and streams, which underreported electricity consumption used to pump wastewater over the pass and into the bay. Therefore, Rincon updated the calculation to reflect this additional pumping. Once these errors were resolved, emissions for water and wastewater were calculated properly with no other further issues. For more detail on water and wastewater sector calculations, see Section 3.3.

BART

The EBEW inventories originally included emissions from Bay Area Rapid Transit (BART). It was decided by City staff and Rincon to ultimately remove these emissions from the four EBEW inventory years (2005, 2010, 2015, and 2017), similar to the City of Dublin that recently made the decision to remove BART emissions from its CAP. This was due to a lack of emissions data available for years after 2013, which prevented emissions from being accurately calculated and forecasted. All four inventory years used the same emissions factor, calculated based off of 2013 data and leading to inaccurate estimation of emissions. Pleasanton ultimately does not have control over reducing these emissions, and BART already has its own GHG emissions reduction goals in place over the next decade. These emissions also represented a small percentage of Pleasanton's overall emissions (0.45 percent in 2017). For these reasons, these emissions were ultimately removed.

Summary of Previous Year Inventories Data

Table 4 and Table 5 include all of the activity data, emission factors, and total GHG emissions available for both the original previous year inventories (Table 4) and the updated previous year inventories (Table 5).

Table 4 Original EBEW 2017 GHG Inventory Data

	Original Activity Data	Original Emission Factor	Original (MT CO_2e)
Residential Electricity (kWh)	182,355,696	0.000096	17,571
Residential Gas (therms)	11,796,750	0.00531	62,647
Nonresidential Electricity (kWh)	320,791,579	0.000096	30,910
Nonresidential Gas (therms)	10,579,242	0.00531	56,181
Direct Access Electricity	52,782,630	.000203	10,700
On-road Transportation (VMT)	694,026,113	0.000852	329,615
Off-Road Transportation	N/A[1]	.0946[2]	48,634
BART (Passenger Miles)	13,634,519	.000093	1,265
Solid Waste (tons)	102,316	0.286	21,006
ADC Waste (tons)	367	0.246	2046
Wastewater	0	.000096	878
Water (mgy)	4,600	.000096	1700
Total			**590,841**

kWh: kilowatt hours; mgy: million gallons per year; N/A: not applicable; MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] Off-road emissions calculated as a proportion of total emissions in Alameda County based on changes in population and does not have activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

Table 5 Updated EBEW 2017 GHG Inventory Data

	Updated Activity Data	Updated Emission Factor	Updated (MT CO_2e)
Residential Electricity (kWh)	182,355,696	0.000096	17,571
Residential Gas (therms)	11,796,750	0.00531	62,647
Nonresidential Electricity (kWh)	320,791,579	0.000096	30,910
Nonresidential Gas (therms)	10,579,242	0.00531	56,181
Direct Access Electricity	52,782,630	.000203	10,700
On-road Transportation (VMT)	694,026,113	0.000852	329,615
Off-Road Transportation	N/A[1]	.0806[2]	48,634
BART (Passenger Miles)	Removed	Removed	Removed
Solid Waste (tons)	102,316	0.286	29,267
ADC Waste (tons)	367	0.246	90
Wastewater (mgy)	1,878	.000096	1,188
Water (mgy)	4,600	.000096	1,750
Total			**588,553**

kWh: kilowatt hours; mgy: million gallons per year; N/A: not applicable; MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] Off-road emissions calculated as a proportion of total emissions in Alameda County based on changes in population and does not have activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

3 2017 GHG Emissions Inventory

The methodologies, data sources, calculations, and results associated with the Pleasanton community-wide 2017 GHG emissions inventory update are included in this section. The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. In 2017, Pleasanton GHG emissions were estimated to be 588,553 metric tons (MT) of carbon dioxide equivalent (CO_2e). Data was originally gathered by EBEW and then reviewed and updated by Rincon for consistency with the latest methodology available in the Community Protocol[33] and California Supplement[34]. The updated 2005 GHG Inventory corrected a few typological errors in the water and wastewater inventory sectors and removed the Bay Area Rapid Transit (BART) emissions, because the City of Pleasanton does not have direct control over BART and is unable to reduce these emissions and because BART data was not available for the subsequent inventories. Information regarding updates to the original EBEW 2005, 2010, 2015, and 2017 inventories is included in Section 2.3, and information relating to the emissions forecast are located in Section 4 of this technical appendix.

The 2017 GHG inventory is structured based on emissions sectors. The ICLEI Community Protocol recommends local governments examine their emissions in the context of the sector responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures for climate action planning. The reporting sectors are made up of multiple subsectors to allow for easier identification of sources and targeting of reduction policies.

The 2017 inventory reports all Basic Emissions Generating Activities[35] required by the Community Protocol[36] by the following main sectors:

- Energy (electricity and natural gas)
- Transportation
- Water and Wastewater
- Solid Waste

The data used to complete this inventory and forecast came from multiple sources, as summarized in Table 6. Data for the 2017 inventory calculations were provided by the City via personal communication with Megan Campbell, Associate Planner.

[33] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: April 14, 2020.

[34] Association of Environmental Professionals. 2013. The California Supplement to the United States Communitywide GHG Protocol. Available: <https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf>. Accessed: April 14, 2020.

[35] Required emissions generating activities include use of electricity by the community, use of fuel in residential and commercial stationary combustion equipment, on-road passenger and freight motor vehicle travel, use of energy in potable water and wastewater treatment and distribution, and generation of solid waste by the community.

[36] ICLEI. 2012. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Section 2.2.

Table 6 Inventory and Forecast Data Sources

Sector	Activity Data	Unit	Source
Inventory			
Energy	Electricity Consumption Natural Gas Consumption	kWh Therms	Pacific Gas and Electric
Transportation	Annual Mileage	VMT	Metropolitan Transportation Commission Vehicle Miles Traveled Data Portal; EMFAC2017 Model; OFFROAD2007
Water	Water Pumping Electricity Usage	AF kWh	Zone 7 Water; City of Pleasanton; Dublin-San Ramon Services District; Livermore Municipal Water
Wastewater	Electricity Consumption Water Treated	kWh MGD	Community Protocol Estimates, Dublin-San Ramon Services District
Solid Waste	N/A	N/A	CalRecycle; California Air Resources Board Landfill Emissions Tool Version 1.3
Forecast Growth Indicators			
Population	Residents	Persons	California Department of Finance E4 and E5 demographic datasets; Association of Bay Area Governments Plan Bay Area Projections 2040
Commerce	Jobs	Number of Jobs	California Department of Finance E4 and E5 demographic datasets; Association of Bay Area Governments Plan Bay Area Projections 2040
Transportation	Annual Mileage, Emissions	N/A	EMFAC2017 Model; Metropolitan Transportation Commission Vehicle Miles Traveled Data Portal
Building Efficiency	Title 24 Efficiency Increases	Percent	California Energy Commission
Electricity Emissions	Renewable Portfolio Standard	Percent	Renewable Portfolio Standard; Senate Bill 100

kWh; kilowatt hours; VMT: vehicle miles traveled; AF: acre-foot; MGD: million gallons per day; N/A: not applicable;

3.1 Energy Emissions

The energy sector includes GHG emissions resulting from the consumption of electricity and natural gas. Both energy sources are used in residential and nonresidential (commercial and industrial) buildings and for other power needs throughout the City of Pleasanton. The following subsections describe the data sources, emission factors and calculation methodologies associated with electricity and natural gas.

Overall, residential energy emissions were about equal to non-residential (commercial and industrial) in their contribution to energy emissions in 2017, at approximately 45 percent and 49 percent respectively (Figure 3). Direct access electricity accounted for the remaining 6 percent. It should be noted that, due to data availability issues in reporting years after 2013, large industrial gas data was not provided by PG&E and was instead estimated for 2015 and 2017 to allow for more accurate comparisons between inventory. Additional information on why this change was made as well as the methodologies used to estimate 2017 commercial gas data are provided in Section 2.3.

Electricity

Emissions resulting from electricity consumption were estimated by multiplying annual electricity consumed by an emission factor representing the average emissions associated with generation of one megawatt hour (MWh) of electricity. Electricity is supplied to the City by PG&E. In its 2017 report to the verification body, The Climate Registry, PG&E reported an electricity carbon intensity factor of 210 pounds CO_2e per MWh.[37] PG&E also reported to the California Energy Commission, an average of 33 percent renewable energy in its portfolio in 2017.[38] From 2005, residential electricity use decreased by 27,275 MWh while nonresidential electricity decreased by 79,742 MWh for a total net decrease of 107,017 MWh. Therefore, the 87,686 MT CO_2e reduction in GHG emissions from electricity between 2005 and 2017 was due to a decrease in electricity usage and an approximately 57 percent reduction in the PG&E electricity emission factor.

In 2017, a total 48,481 $MTCO_2e$ was generated within the community due to residential and commercial electricity use. Figure 3 and Table 12 show the breakdown of emissions from electricity by both category (residential, nonresidential) and by source.

Direct access electricity was also calculated using the same methodology, but with a calculated emissions factor of 0.203 MT CO_2e/MWh. This is equivalent to the California State grid (CAMX) average carbon intensity of electricity (reported by the California Energy Commission), as direct access electricity is not provided by PG&E. [39] Direct access electricity accounted for 52,783 MWh of electricity use in 2017, which resulted in 10,700 MT CO_2e of emissions.

Natural Gas

In order to calculate emissions from natural gas consumption, the total therms consumed is multiplied by the PG&E reported emissions factor of .00531 MT CO_2/therm, which remained constant across inventory years. Residential natural gas usage decreased from 12.5 million therms in 2005 to 11.8 million therms in 2017, and nonresidential natural gas usage increased from 8.1 million therms to 10.6 million therms. Overall, this resulted in a 9,558 MT CO_2e increase in emissions from the natural gas sector in 2005 compared to 2017.

In 2017, the residential and nonresidential sectors consumed a total of 22,375,992 therms of natural gas, which, based on the emission factor of 0.00531 MT CO_2/therms, generated 118,828 $MTCO_2e$. A complete breakdown of natural gas use by category and sector is provided in Figure 1 and Table 7.

[37] The Climate Registry. 2019 Default Emissions Factors. Available: <https://www.theclimateregistry.org/wp-content/uploads/2019/05/The-Climate-Registry-2019-Default-Emission-Factor-Document.pdf>. Accessed: April 15, 2020

[38] California Energy Commission. Pacific Gas and Electric Company 2017 Power Content Label. Available: <https://ww2.energy.ca.gov/pcl/labels/2017_labels/PG_and_E_2017_PCL.pdf>. Accessed: April 15, 2020

[39] California Energy Commission. Total System Electric Generation. Available: <https://ww2.energy.ca.gov/almanac/electricity_data/system_power/2017_total_system_power.html>. Accessed: May 7, 2020.

Figure 1 Energy Emissions by Category for Year 2017

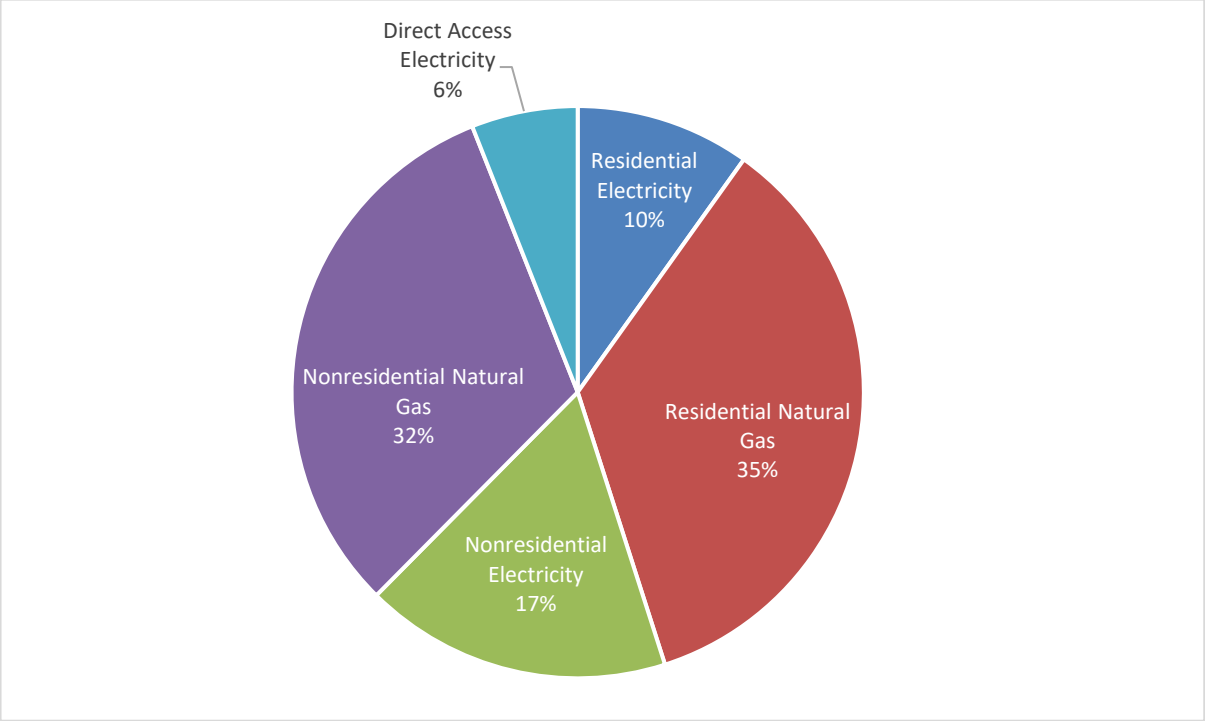

Table 7 Energy Emissions by Category for Year 2017

Source	Activity Data	Emission Factor	Total Emissions ($MTCO_2e$)
Residential			**80,218**
Natural Gas	11,796,750 therms	0.00531 MT CO_2e/therm	62,647
Electricity	182,356 MWh	0.09635 MT CO_2e/MWh	17,571
Nonresidential			**87,091**
Natural Gas	10,579,242 therms	0.00531 MT CO_2e/therm	56,181
Electricity	320,792 MWh	0.09635 MT CO_2e/MWh	30,910
Direct Access			**10,700**
Electricity	52,783 MWh	0.000203 MT CO_2e/MWh	10,700
Total			**178,009**

MWh: megawatt hours; MT CO_2e: metric tons of carbon dioxide equivalent

3.2 Transportation Emissions

On-Road

Transportation modeling for Passenger VMT attributed to the City of Pleasanton was obtained using the Bay Area Metropolitan Transportation Commission (MTC) VMT data model. The emissions associated with on-road transportation were then calculated by multiplying the estimated daily VMT and the average vehicle emissions rate established by CARB EMFAC2017 modeling for vehicles within the region. The MTC model does not directly provide VMT projections for 2017, so VMT was estimated by interpolating for years between 2015 and 2020 (for which VMT data is directly available from the MTC model). The MTC VMT modeling results allocate the total VMT derived from the activity-based model to using the Origin-Destination (O-D) method. The O-D VMT method is the preferred method recommended by the U.S Community Protocol in on-road methodology TR.1 and TR.2 to estimate miles traveled based on trip start and end locations. Under these recommendations, all trips that start and end within the City are attributed to the City. Additionally, one half of the trips that start internally and end externally and vice versa are attributed to the City, and no "pass through" trips are accounted for. Due to the MTC model not being able to provide VMT for unincorporated county areas, data was used from the Highway Performance Monitoring System,[40] which is published annually by Caltrans. This data provides VMT counts on local roads for each jurisdiction, as well as County-level VMT for all other roads (State highways, roads on land under State or federal jurisdiction such as military bases or State parks, etc.). This data includes all vehicle types and is allocated using the geographic boundary method.

Commercial VMT for heavy-duty vehicles is also provided by MTC, but separately from light-duty vehicles VMT.[41] Commercial VMT includes heavy-duty freight trucks, motor homes, public and private buses, and other commercial vehicles. Commercial VMT was assigned to individual communities by MTC using a method called "Longitudinal Employer-Household Dynamics" (LEHD). Under this method, MTC first models the county-wide VMT of heavy-duty vehicles using an approach called a geographical boundary method. In this method, all the heavy-duty VMT that occurs within a county's geographic limits is assigned to that county, regardless of where the trip begins or ends. MTC next looks at the number of jobs in specific economic sectors that generate heavy-duty vehicle trips (such as agriculture, construction, retail trade, and manufacturing) for the entire county and for each jurisdiction in the county. The US Census provides the number of jobs in these sectors through its online OnTheMap tool.[42] MTC sums the number of jobs in these sectors, and uses the percent of each community's share of jobs in these sectors, relative to the number of Alameda County jobs in the sectors, to allocate heavy-duty VMT. In 2017, Pleasanton was attributed 7.2 percent of the total commercial VMT in Alameda County, which was 3,553,565.

In 2017 on-road transportation in Pleasanton resulted in 329,615 MT CO_2e of emissions. This resulted in a 57,348 MT CO_2e reduction compared to 2005. During this time VMT increased by 2.6 percent or 17 million miles traveled and the emissions reductions in this sector were driven by an increase in average vehicle efficiency and adoption of electric vehicles. These changes drove the 17 percent decrease in average vehicles emissions per mile. A summary of the VMT results can be found in Table 8.

[40] Caltrans. 2019. Highway Performance Monitoring System. Available: <https://dot.ca.gov/programs/research-innovation-system-information/highway-performance-monitoring-system>. Accessed: May 25, 2020

[41] East Bay Energy Watch. 2019. Regional Greenhouse Gas Inventory Methodological Summary. Available: <https://static1.squarespace.com/static/53fe4fcfe4b070b8a2eb623b/t/5c36664b21c67c309508c0ff/1547069004776/EBEW-RegionalGHGTool-Methodological-Summary.pdf>. Accessed: May 25, 2020.

[42] United States Census Bureau. 2018. OnTheMap Version 6. Available: <https://onthemap.ces.census.gov/>. Accessed: April 2020.

Table 8 Estimated On-Road Transportation Emissions for 2017

Source	Activity Data (VMT)[2]	Emission Factor	Total Emissions ($MTCO_2e$)
Internal-Internal Daily VMT	217,216	0.000445 MT CO_2e per VMT	97
½ Internal-External Daily VMT	472,942	0.000445 MT CO_2e per VMT	210
½ External-Internal Daily VMT	1,032,616	0.000445 MT CO_2e per VMT	459
Total Passenger Daily VMT	1,722,744	0.000338 MT CO_2e per VMT	522
Total Adjusted Passenger Daily VMT[3]	1,732,827	0.000338 MT CO_2e per VMT	582
Total Commercial Daily VMT	255,776	0.001366 MT CO_2e per VMT	349
Total Adjusted Commercial Daily VMT[3]	267,248	0.001366 MT CO_2e per VMT	365
Yearly Passenger VMT[1]	**601,291,074**	**0.000338 MT CO_2e per VMT**	**202,946**
Yearly Commercial VMT[1]	**92,735,039**	**0.001366 MT CO_2e per VMT**	**126,668**
Yearly VMT[1]	**694,026,113**	**.000852 MT CO_2e per VMT**	**329,615**

MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] Weekday to annual conversion of 347 is used per CARB guidance on VMT modeling

[2] The origin-destination methodology for VMT calculation attributes 100 percent of internal to internal daily trips, 50 percent of internal-external and external-internal daily trips and excludes all pass-through trips. This sum is then multiplied by 347 to get an annual VMT number.

[3] Motorcycle, motor homes, and bus VMT not included in original data, and were estimated based on average prevalence of these vehicles in Alameda County, which is approximately 1 percent.

Transportation emissions are generated by the community of Pleasanton through on-road transportation, including passenger, commercial, and heavy machinery. Emissions factors are established using the latest CARB and EPA-approved emissions modeling software, 2017 State EMissions FACtors (EMFAC) Model. Carbon dioxide, nitrous oxide, and methane emissions from engine combustion are multiplied by their GWP to determine CO_2e per VMT. Emissions for both passenger and commercial vehicles were established using the EMFAC2017 GHG module and weighted by VMT to establish an average emissions factor per VMT for the City. Emissions from electricity used by charging of electric vehicles are captured under the electricity sector. In 2017, the average emissions factor for cars on the road in the County of Alameda was 0.000435 $MTCO_2e$ per VMT as calculated using the EMFAC2017 model.[43] Technical details on the EMFAC2017 modeling tool can be found on the EMFAC Mobile Source Emissions Inventory Technical Support Documentation Portal.[44]

[43] California Air Resources Board. 2017. EMFAC2017. Base year 2017, County of Alameda model run. Available: <https://www.arb.ca.gov/emfac/>. Accessed: April 5, 2020

[44] California Air Resources Board. 2017. EMFAC Software and Technical Support Documentation. Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-modeling-tools-emfac>. Accessed: April 5, 2020.

Off-Road

Off-road emissions were calculated using the California Air Resources Board's OFFROAD2007 modeling tool.[45] At the time of this inventory, the 2017 version of the tool was still not available. OFFROAD2007 was used to obtain emissions for Alameda County, shown below in Table 9. The proportion of emissions attributed to the City of Pleasanton was based on a ratio for effective change in service population, calculated to be 0.0806, using demographic data from the Department of Finance. The effective change in service population was calculated by taking the sum of new population and jobs in Pleasanton from 2016-2017 and dividing by the total sum of new jobs and population in Alameda County for 2016-2017. No change or decreases in a jurisdiction's demographic data were counted as zero. Demographic data used is shown below in Table 10. Total emissions from off-road transportation in 2017 was 58,852 MT CO_2e, shown in Table 11.

Table 9 Estimated Off-Road Emissions for Alameda County 2017

Source	CO_2/day	CH_4/day	N_2O/day	$MTCO_2e$/year
Agricultural Equipment	44.49	0.004043	0.000570	14,819.72
Airport Ground Support Equipment	52.53	0.005930	0.003753	17,777.87
Construction and Mining Equipment	1,181.69	0.101368	0.007014	392,841.72
Dredging	0.00	0.000000	0.000000	0.00
Entertainment Equipment	2.61	0.000115	0.000000	865.80
Industrial Equipment	292.98	0.088145	0.016153	99,248.92
Lawn and Garden Equipment	77.83	0.115765	0.050340	31,262.29
Light Commercial Equipment	159.90	0.041037	0.025518	55,567.60
Logging Equipment	0.00	0.000000	0.000000	0.00
Military Tactical Support Equip	0.00	0.000000	0.000000	0.00
Oil Drilling	2.11	0.000153	0.000000	698.51
Other Portable Equipment	0.04	0.000003	0.000000	13.94
Pleasure Craft	63.54	0.041389	0.013664	22,621.27
Railyard Operations	0.04	0.000002	0.000000	11.67
Recreational Equipment	11.18	0.096323	0.016988	6,087.09
Transport Refrigeration Units	182.23	0.014037	0.001260	60,581.77
Total	**2,071.17**	**0.508310**	**0.135259**	**702,398**

MT CO2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

[45] California Air Resources Board. 2007. OFFROAD2007. Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-archives>. Accessed: April 1, 2020.

Table 10 Department of Finance Demographic Data for Pleasanton 2016-2017

Source	Change in Population	Change in Jobs	Change in Service Population	Effective Change in Service Population
Pleasanton	910	947	1,857	1,857
Alameda County	16,667	4,305	20,972	23,036
Effective Change in Service Population Ratio for Pleasanton[1]	**–**	**–**	**–**	**0.0806**

Calculated: Pleasanton Effective Change in Service Population / Alameda County Effective Change in Service Population

Table 11 Estimated Off-Road Transportation Emissions for 2017

Source	Total Emissions 2017 (MT CO_2e)
Agricultural Equipment	69
Airport Ground Support Equipment	0
Construction and Mining Equipment	31,664
Dredging	0
Entertainment Equipment	40
Industrial Equipment	5,991
Lawn and Garden Equipment	1,447
Light Commercial Equipment	4,779
Logging Equipment	0
Military Tactical Support Equip	0
Oil Drilling	0
Pleasure Craft	1,055
Recreational Equipment	284
Transport Refrigeration Units	3,305
Total	**48,634**

MT CO_2e: metric tons of carbon dioxide equivalent

3.3 Water and Wastewater Emissions

Water

Water is primarily supplied to Pleasanton by Zone 7 Water Agency and local groundwater. Zone 7 supplies the City with about 80% of its water, which is mainly treated surface water from the State Water Project in the Central Valley blended with some local groundwater. The other 20% of Pleasanton's water comes from local groundwater, pumped from wells owned and operated by the City of Pleasanton.[46] In 2017, the City began using recycled water as well, from the City of Livermore and Dublin-San Ramon Services District (DSRSD).

Water supplied to the community contributes emissions through the use of energy to extract, convey, treat, and deliver water. The amount of energy required for community water usage was calculated using embodied energy data emission factors based on the processes used, taken from the California Energy Commission's 2007 Refining Estimates of Water-Related Energy Use in California report. It was determined that in 2017, Zone 7 provided water at an average of 4,037 kWh per million gallons, while City groundwater provides water at an average of 3,979 kWh per million gallons. Recycled water from the City of Pleasanton and DSRSD provided water at an average rate of 2,320 kWh per million gallons. This resulted in Zone 7 using 11,810 MWh to provide the City water in 2017, along with an additional 5,883 MWh from the City of Pleasanton, 402 MWh from DSRSD, and 51 MWh from the City of Livermore.

PG&E is the electricity provider for the City; therefore, PG&E's energy emissions factor of 210 pounds CO_2e/MWh was applied to the calculated electricity used for water consumption in the city. Energy consumption related to water use in the city of Pleasanton resulted in the generation of approximately 1,750 $MTCO_2e$ in 2017, or 60 percent of total water and wastewater emissions. In 2005, the City used 5,880 million gallons of water. In 2017, Pleasanton used 4,600 million gallons of water, or about 22 percent less overall. Emissions overall decreased by 3,380 MT CO_2e, due to this decrease in water usage as well as the reduction in PG&E's electricity emission factor.

Wastewater

The wastewater generated by community residents and businesses creates GHG emissions during the treatment processes, including process, stationary, and fugitive emissions. The sources and magnitude of emissions depend on the type of wastewater treatment plant and the treatment processes utilized.

Wastewater generated in the City of Pleasanton is collected in local sewer lines which ultimately discharge into the DSRSD Regional Wastewater Treatment Facility managed by DSRSD. The wastewater treatment plant treated 1,878 million gallons of sewage from Pleasanton in 2017, according to data obtained from the City. Emissions were calculated using Community Protocol Methodology WW.2, WW.8, and WW.12 based on processes used at the treatment facility, as shown in Figure 2. In 2017, a total of 3.07 MT N_2O and 2.29 MT CH_4 were emitted from the effluent discharge, process, and stationary sources at the treatment plant. The wastewater treatment plant also used 3,234,519 kWh of electricity to treat Pleasanton wastewater in 2017, which resulted in emissions of 310 MT CO2e. As shown in Table 12, the total process emissions and electricity usage for Pleasanton wastewater treatment and disposal resulted in emissions of 1,188 MT CO_2e per year, or 40 percent of the water and wastewater emissions.

[46] Pleasanton, City of. 2018 Annual Water Quality Report. Available: <http://www.cityofpleasantonca.gov/pdf/awqr18.pdf>. Accessed: April 26, 2020.

Table 12 Water and Wastewater Emissions for Year 2017

Source	Activity Data	Kilowatts per Million Gallons[1]	Kilowatt Hours	Emission Factor (MT CO_2e/MWh)	Total Emissions (MT CO_2e)
Water Use					**1,750**
Zone 7 Water Agency	2,925.82 MG	4,036.57	11,810,278	0.09635	1,138
City of Pleasanton	1,478.55 MG	3,978.75	5,882,769	0.09635	567
Dublin-San Ramon Services District	173.48 MG	2,320.00	402,481	0.09635	39
City of Livermore	21.89 MG	2,320.00	50,778	0.09635	5
Wastewater Generation					**1,188**
Dublin-San Ramon Services District[2]	1,878 MG	1,722	3,234,519	.09635	310
Process Nitrous Oxide Emissions	0.2574 MT N_2O	–	–	1 N_2O to 265 CO_2e	68
Stationary Methane Emissions	2.29 MT CH_4	–	–	1 CH_4 to 28 CO_2e	64
Effluent Discharge	2.814 MT N_2O	–	–	1 N_2O to 265 CO_2e	746
Total					**2,938**

MWh: megawatt hours; MT: metric tons; CO_2e: carbon dioxide equivalent; CH_4: methane; N_2O: nitrous oxide; MG: millions of gallons; kWh: kilowatt hours

[1] Calculated based off of the data regarding the processes used for water and wastewater generation. Water factors included: average depth of groundwater wells (575 ft), and sources of water (surface water, groundwater, State water project, recycled water). Wastewater factors included: type of wastewater treatment technology (activated sludge and digesters), use of pumps to dispose of wastewater, wastewater discharge into the San Francisco Bay, and number of septic tanks in Pleasanton (177 in 2017)

[2] Indirect emissions from electricity use during the wastewater generation process.

Figure 2 Wastewater Methodology

Box WW.2.(alt)	**Example Calculation of N_2OEmissions from Combustion when only Population Served by System is Known**	
A centralized wastewater facility serves a city with a population of 100,000 people. No other data is available. Based on this scenario the N_2O emissions from the combustion of digester biogas can be calculated as follows		
Description		Value
N_2O emissions	= Total N_2O emitted by combustion ($mtCO_2e$)	Result
P	= Population served by anaerobic digester	100,000
Digester gas	= Measured standard cubic feet of digester gas produced per person per day (std ft^3/person/day)	1.0
fCH_4	= Fraction of CH_4 in biogas	0.65
BTU_{CH4}	= Default BTU content of CH_4, higher heating value (BTU/ft^3)	1028
10^{-6}	= Conversion from BTU to 1 MMBTU	10^{-6}
EF_{N2O}	= N_2O emission factor (kg N_2O/MMBTU)	6.3 X 10^{-4} kg N_2O per MMBTU
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion from kg to mt (mt/kg)	10^{-3}
GWP_{N_2O}	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP[11]
Sample Calculation: *Annual N_2O emissions = $(100{,}000 \times 1 \times 0.65 \times 1028 \times 10^{-6} \times (6.3 \times 10^{-4}) \times 365.25 \times 10^{-3}) \times 310$ = 4.8 $mtCO_2e$*		

***Equation WW.8* N_2O Process Emissions from Wastewater Treatment Plants (or aeration basin) without nitrification or denitrification**		
Annual N_2O emissions = $((P \times F_{ind\text{-}com}) \times EF \times 10^{-6}) \times GWP$		
Where: Description		Value
Annual N_2O emissions	= Total annual N_2O emitted by WWTP processes ($mtCO_2e$)	Result
P	= Population served by the WWTP	User input
$F_{ind\text{-}com}$	= Factor for high nitrogen loading of industrial or commercial discharge	1.25
$F_{ind\text{-}com}$	= Factor for insignificant industrial or commercial discharge	1
$EF_{w/o\ nit/denit}$	= Emissions factor for a WWTP without nitrification or denitrification(g N_2O/ person / year)	3.2
10^{-6}	= Conversion from g to mt (mt/g)	10^{-6}
GWP_{N_2O}	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP[25]
Source: *As listed in LGO protocol Equation 10.7 from EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1890-2007, Chapter 8, 8-13 (2009)*		

Equation WW.12.(alt) **N_2O Emission from Effluent Conversion when only Population Served by Wastewater Treatment Plant is Known**		
Annual N_2O emissions = ((P × $F_{ind-com}$) × (Total N load - N uptake x BOD5 load) × EF effluent × 44/28 × (1 – Fplant nit/denite) × 365.25 × 10^{-3}) × GWP		
Where:		
Description		Value
N_2O emissions	= Total annual N_2O emitted by effluent (mtCO2e)	Result
P	= Population	User input
$F_{ind-com}$	= Factor for industrial or commercial discharge	1.25 (if applicable)
Total N-Load	= Average total nitrogen per day (kg N/person/day)	0.026[34]
N uptake	= Nitrogen uptake for cell growth in *aerobic* systems (kg N/kg BOD_5)	0.05
OR		
N uptake	= Nitrogen uptake for cell growth in *anaerobic or lagoon* systems(kg N/kg BOD_5)	0.005
BOD_5	= Amount of BOD_5 produced per person per day (kg BOD_5/person/day)	0.090
EF	= Emission factor (kg N_2O-N/kg sewage-N discharged)	0.005 for river or stream discharge, 0.0025 for direct ocean discharge[35]
44/28	= Molecular weight ratio of N_2O to N_2	1.57
Fplant nit/denit	= Fraction of nitrogen removed from the WWTP with nitrification/denitrification	0.7
OR		
Fplant	= Fraction of nitrogen removed from the WWTP without nitrification/denitrification	0.0
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion from kg to mt (mt/kg)	10^{-3}
GWP	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP[36]
Source: *As listed in LGO protocol Equation 10.10 from EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007, Chapter 8, 8-13 (2009); except Grady, C.P. L., Jr., G. T. Daigger, and H. C. Lim, Biological Wastewater Treatment p. 108-109, 644 2nd Edition (1999)*		

3.4 Solid Waste Emissions

GHG emissions result from management and decay of organic material solid waste. Community waste was calculated by determining lifetime methane emissions from solid waste generated by the community in the year of the inventory, using Community Protocol method SW.4[47]. This methodology attributes 100 percent of lifetime GHG emissions from the tonnage reported in the inventory year.

Waste from the City of Pleasanton went to 18 landfills in 2017 according to waste data obtained from CalRecycle. Data for the inventory was split between instate solid waste and alternative daily cover waste, 102,316 tons and 367 tons respectively. Waste data from one landfill site was not included in the inventory (Covanta Stanislaus, Inc.), because it only received a small quantity of 'transform waste', and there was no instate waste or alternative daily cover waste reported. Activity data for the waste sector of the GHG inventory is shown below in Table 13 by landfill destination.

Table 13 Summary of Solid Waste Activity Data by Landfill for Year 2017

Source	Solid Waste (tons)	ADC Waste (tons)
Landfills		
Altamont Landfill & Resource Recovery	2,173	143
Antelope Valley Public Landfill	1	0
Azusa Land Reclamation Co. Landfill	7	0
Corinda Los Trancos Landfill (Ox Mtn)	4	0
Fink Road Landfill	138	0
Foothill Sanitary Landfill	45	0
Forward Landfill, Inc.	1,158	0
Guadalupe Sanitary Landfill	6	0
Keller Canyon Landfill	232	135
Kirby Canyon Recycle. & Disp. Facility	5	0
Monterey Peninsula Landfill	258	0
Newby Island Sanitary Landfill	47	0
North County Landfill & Recycling Center	2	0
Potrero Hills Landfill	26	0
Recology Hay Road	713	0
Vasco Road Sanitary Landfill	97,492	79
Zanker Material Processing Facility	9	10
Total Tons of Waste Disposal	**102,316**	**367**

Communities are required to estimate the emissions resulting from waste disposed by the community (SW.4.1)[39], regardless of whether the receiving landfill(s) are located inside or outside of the community boundary. Community Protocol Method SW.4.1[39] is summarized in Figure 3, utilizing mass of waste being disposed, organic content of waste, methane capture ability of the landfill, oxidation rate, and methane GWP. The 2017 emissions factor for generated solid waste and ADC waste in

[47] ICLEI. 2012. US Community Protocol. Available: <https://icleiusa.org/publications/us-community-protocol/>. Accessed: May 1, 2020.

Pleasanton was derived from the California Air Resources Board California Landfill Emissions Tool Version 1.3, shown in Table 14 and Table 15 respectively.

Figure 3 Waste Generation Methodology

Equation SW.4.1 Methane Emissions

$$CH_4\ Emissions = GWP_{CH4} * (1 - CE) * (1 - OX) * M * \sum_i P_i * EF_i$$

Where:

Term	Description	Value
CH_4 emissions	= Community generated waste emissions from waste M ($mtCO_2e$)	Result
GWP_{CH4}	= CH_4 global warming potential	
M	= Total mass of waste entering landfill (wet short ton)	User Input
P_i	= Mass fraction of waste component i	User Input
EF_i	= Emission factor for material i ($mtCH_4$/wet short ton)	Table SW.5
CE	= Default LFG Collection Efficiency	No Collection, 0 Collection, 0.75
OX	= Oxidation rate	0.10

Source: As developed by ICLEI staff and Solid Waste Technical Advisory Committee. Emissions factors from U.S. EPA Municipal Solid Waste Publication (2008) available at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw2008data.pdf

In 2017, Pleasanton produced 102,316 tons of solid waste and 367 of ADC waste.[48] A CO_2e emissions factor for mixed-waste of 0.286 MT CO_2e/ton was established and multiplied by the total solid waste disposed of from the community to calculate emissions from waste generated in 2017 of 29,267 MT CO_2e. For ADC waste, a CO_2e emissions factor of 0.246 MT CO_2e/ton was established and multiplied by the total ADC waste disposed of from the community to calculate emissions from waste generated in 2017 of 90 MT CO_2e. These emissions factors include the expected lifetime emissions associated with the specified tonnage of waste sent to landfill. The emissions factors were developed using SW 4.1 as well as the relative waste stream percentages of different organic materials to establish a methane emissions factor. From 2005 to 2017 GHG emissions from community waste decreased by 6,139 MT of CO_2e. This was due to a combination of factors including a reduced solid waste emission factor as well as an overall reduction in waste generation of 18,370 tons. Total waste emissions for 2017 are summarized in Table 16.

48 CalRecycle. 2017. Local Government Information Center. Available: <https://www.calrecycle.ca.gov/LGCentral/MyLoGIC/>. Accessed: April 20, 2020.

Table 14 California Default Solid Waste Characterization[1]

Waste Type	WIPFRAC	TDOC	DANF	ANDOC	Weighted MT CO_2e/ton
Newspaper	1.44%	47.09%	15.05%	0.12%	0.279029616
Office Paper	0.73%	38.54%	87.03%	0.62%	1.320583313
Corrugated Boxes	3.13%	44.84%	44.25%	0.95%	0.781203158
Coated Paper	12.10%	33.03%	24.31%	0.72%	0.316139414
Food	18.12%	14.83%	86.52%	1.99%	0.505176074
Grass	1.84%	13.30%	47.36%	0.12%	0.247998153
Leaves	3.52%	29.13%	7.30%	0.07%	0.083723708
Branches	3.27%	44.24%	23.14%	0.20%	0.403054324
Lumber	11.91%	43.00%	23.26%	1.45%	0.393788725
Textiles	5.85%	24.00%	50.00%	0.66%	0.472461427
Diapers	4.29%	24.00%	50.00%	0.52%	0.472461427
Construction/Demolition	2.31%	4.00%	50.00%	0.11%	0.078743571
Medical Waste	0.11%	15.00%	50.00%	0.00%	0.295288392
Sludge/Manure	0.57%	5.00%	50.00%	0.00%	0.098429464
MSW Total				**7.52%**	**0.28604673**

[1]The static values here are from the California Landfill Emissions Tool Version 1.3

Table 15 Alternative Daily Cover Waste Characterization[1]

Waste Type	WIPFRAC	TDOC	DANF	ANDOC	Weighted MT CO_2e/ton
Newspaper	0.00%	47.09%	15.05%	0.12%	0.279029616
Office Paper	0.00%	38.54%	87.03%	0.62%	1.320583313
Corrugated Boxes	0.00%	44.84%	44.25%	0.95%	0.781203158
Coated Paper	0.00%	33.03%	24.31%	0.72%	0.316139414
Food	0.00%	14.83%	86.52%	1.99%	0.505176074
Grass	50.00%	13.30%	47.36%	0.12%	0.247998153
Leaves	25.00%	29.13%	7.30%	0.07%	0.083723708
Branches	25.00%	44.24%	23.14%	0.20%	0.403054324
Lumber	0.00%	43.00%	23.26%	1.45%	0.393788725
Textiles	0.00%	24.00%	50.00%	0.66%	0.472461427
Diapers	0.00%	24.00%	50.00%	0.52%	0.472461427
Construction/Demolition	0.00%	4.00%	50.00%	0.11%	0.078743571
Medical Waste	0.00%	15.00%	50.00%	0.00%	0.295288392
Sludge/Manure	0.00%	5.00%	50.00%	0.00%	0.098429464
MSW Total				**7.52%**	**0.245693584**

[1]The static values here are from the California Landfill Emissions Tool Version 1.3

Table 16 Summary of Solid Waste Activity Data for Year 2017

Source	Tons	Emission Factor (MT CO_2e/ton)	Total Emissions (MT CO_2e)
Solid Waste	102,316	0.286	29,267
ADC Waste	367	0.246	90
Total Waste Emissions	–	–	**29,358**

MT CO2e: metric tons of carbon dioxide equivalent

3.5 2017 GHG Emissions Inventory Results Summary

The 2017 Pleasanton GHG emissions inventory serves as the inventory to inform development of future GHG emissions forecasts that will assist the City in setting GHG emissions targets that are consistent with State-level goals and the Pleasanton General Plan 2005-2025. Overall emissions for the City of Pleasanton were estimated to be 588,553 MT CO_2e in 2017. The on-road transportation sector (passenger and commercial vehicles) was the largest emissions sector with 56 percent of total 2017 baseline inventory emissions, followed by natural gas use in the energy sector at 21 percent. Off-road transportation emissions were estimated to be 8 percent of emissions, and waste emissions accounted for 5 percent. The smallest emissions sector was water and wastewater, which combine to account for less than 1 percent of total 2017 emissions for the City of Pleasanton. Emissions are summarized in Figure 4 and Table 17 below.

Figure 4 2017 City of Pleasanton Community Emissions by Sector

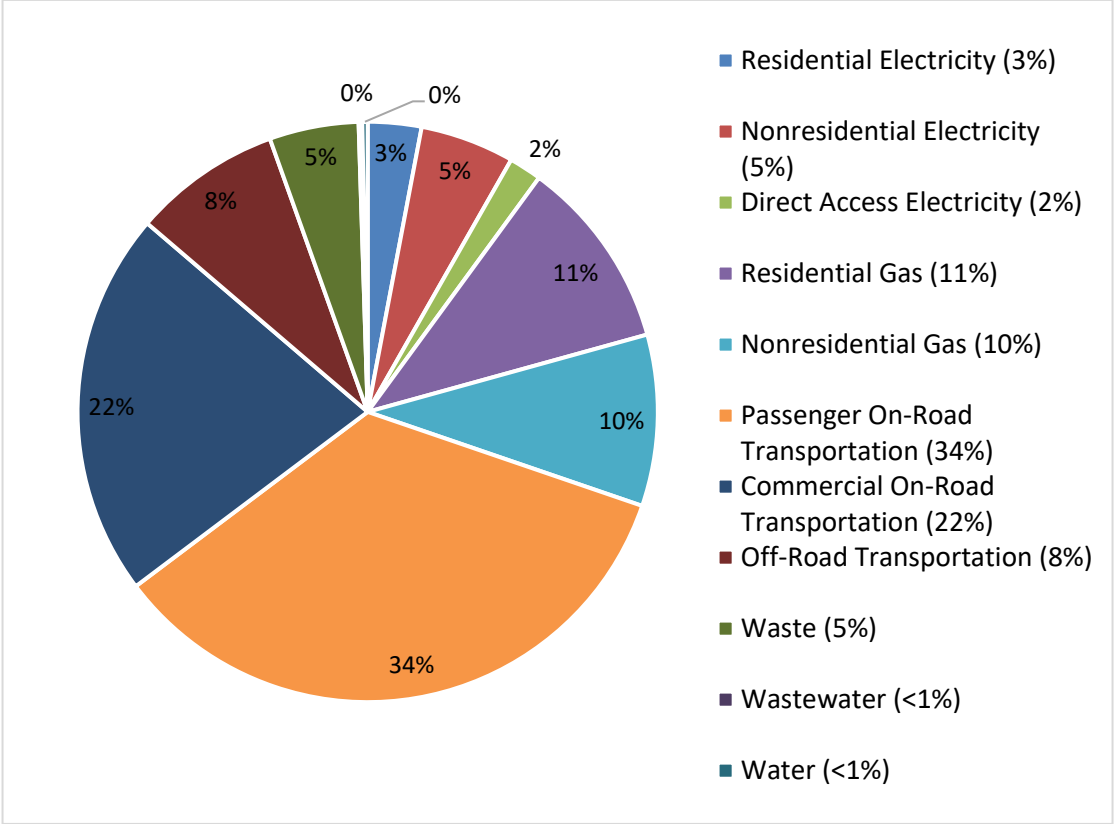

Table 17 2017 GHG Inventory

Sector	Activity Data	Emission Factors	Units	MT CO_2e
Residential Electricity (kWh)	182,355,696	0.0000963549	MT CO_2e/kWh	17,571
Nonresidential Electricity (kWh)	320,791,579	0.0000963549	MT CO_2e/kWh	30,910
Direct Access Electricity (kWh)	52,782,630	0.0002027	MT CO_2e/kWh	10,700
Residential Gas (therms)	11,796,750	0.00531	MT CO_2e/therms	62,647
Nonresidential Gas (therms)	10,579,242	0.00531	MT/CO_2e/therms	56,181
Passenger On-Road Transportation (VMT)	601,291,074	0.000338	MT CO_2e/mile	202,947
Commercial On-Road Transportation (VMT)	92,034,058	0.001366	MT CO_2e/mile	126,668
Off-Road Transportation (VMT)	N/A[1]	0.0806[2]	Effective Change in Service Population	48,634
Waste (tons)[4]	102,683	0.2860	MT CO_2e/Ton	29,357
Wastewater (kWh)	N/A[3]	N/A[3]	MT CO_2e/kWh	1,180
Water (kWh)	18,146,306	0.00009635	MT CO_2e/kWh	1,750
Total Emissions				**588,553**

MWh: megawatt hours; kWh: kilowatt hours; CO_2e: carbon dioxide equivalent; MT: metric tons; VMT: vehicle miles traveled; ADC: Alternative Daily Cover

[1] Off-road emissions calculated as proportion of total Alameda County emissions based on changes in population; doesn't have activity data.

[2] Effective change in service population was defined as on the sum of new population and jobs in Pleasanton divided by the total sum of new jobs and population in Alameda County for each inventory year.

[3] Wastewater is a combination of stationery and process emissions, further detail is Section 3.3.

[4] Includes a small quantity (367 tons) of Alternative Daily Cover Waste, for which a different emission factor was used (.246 MTCO_2e/ton). This emissions factor was calculated using data from CARB's California Landfill Emissions Tool Version 1.3.

Between 2005 and 2017, Pleasanton experienced a population increase of 15 percent but a per capita emissions reduction of 37 percent. This translates to a 28 percent reduction in total Pleasanton GHG emissions from 2005 to 2017, which exceeds the GHG emission target established in the 2012 CAP. Table 18 summarizes GHG emission changes in Pleasanton from 2005 to 2017, and Table 19 summarizes changes in activity data.[49] Between 2005 and 2017, Pleasanton reduced GHG emissions in every sector except for nonresidential gas, which may have increased due to growth in development of the commercial and industrial sectors within the City. Major GHG emissions reductions were achieved in the waste and wastewater sectors, although these sectors make up smaller proportions of overall Pleasanton emissions as shown in Figure 4. It is worth noting that large GHG emissions reductions from electricity usage were driven largely by PG&E's electricity fuel mix, which saw a significant decrease in carbon intensity[50] from 2005 to 2017. Although there was an increase in passenger vehicle miles traveled (VMT), GHG emissions associated with the passenger on-road transportation sector declined because of the increased fuel efficiency of vehicles as detailed in Tables 18 and 19.[18]

[49] Table 17, Table 18, Table 19, and Figure 4 may present data in different ways, but they are summarizing the same data. On-road transportation includes both passenger and commercial on-road transportation.

[50] Carbon intensity is the amount of carbon by weight emitted per unit of energy consumed. For example, as the percentage of renewable energy sources used to produce electricity increases, the carbon intensity of that electricity decreases.

Table 18 Summary of Pleasanton GHG Emissions Changes from 2005 to 2017

	2005 ($MT CO_2e$)	2017 ($MT CO_2e$)	Percent Change
Residential Electricity	46,782	17,571	-62%
Nonresidential Electricity	89,385	30,910	-65%
Direct Access Electricity	21,479[1]	10,700	N/A
Residential Gas	66,175	62,647	-5%
Nonresidential Gas	43,094	56,181	+30%
Waste	35,497	29,358	-17%
Water	5,130	1,750	-66%
Wastewater	1,559	1,180	-24%
On-Road Transportation	386,963	329,615	-15%
Off-Road Transportation	117,067	48,634	-58%
Total Emissions	**813,131**	**588,553**	**-28%**
Emissions Per Capita	**12.2**	**7.7**	**-37%**

MT CO_2e: metric tons of CO_2 equivalent

[1] PG&E did not report data for direct access electricity usage in Pleasanton for 2005 and 2010 due to the CPUC's 15-15 privacy rule. Direct access electricity usage was estimated for these years using the average rate of direct access electricity usage in Alameda County for 2005 (see Section 2.3 for more details on this calculation).

Table 19 summarizes GHG activity data changes in Pleasanton from 2005 to 2017.

Table 19 Summary of Pleasanton Activity Data Changes from 2005 to 2017

Raw Activity Data	2005 Activity Data	2017 Activity Data	Percent Change
Population	66,890	76,748	+15%
Residential Electricity (kWh)	209,630,848	182,355,696	-13%
Residential Gas (therms)	12,461,153	11,796,750	-5%
Direct Access Electricity (kWh)	55,674,114[1]	52,782,630	-5%
Nonresidential Electricity (kWh)	400,533,192	320,791,579	-20%
Nonresidential Gas (therms)	8,114,926	10,579,242	+30%
Wastewater (kWh)	4,546,080	3,671,304	-19%
Water (kWh)	20,975,856	15,344,462	-27%
Solid Waste (tons)	121,032	102,316	-15%
Average Daily Cover Waste (tons)	21.25	367	+1,627%
Passenger VMT	567,416,539	601,291,074	+6%
Commercial VMT	109,273,969	92,735,039	-15%
Passenger VMT Emission Factor (MT CO_2e/VMT)	0.000399	0.000338	-15%
Commercial VMT Emission Factor (MT CO_2e/VMT)	0.001470	0.001366	-7%
Off-Road Emission Factor (Effective Change in Service Population)	0.3149	0.0806	-74%
PG&E Elec Factor (MT CO_2e/MWh)	0.000223	0.000096	-57%

MT CO_2e: metric tons of CO_2 equivalent; kWh: thousand-watt hours; MWh: million-watt hours;

[1] PG&E did not report data for direct access electricity usage in Pleasanton for 2005 and 2010 due to the 15-15 privacy rule from the CPUC. Direct access electricity usage was estimated for these years using the average rate of direct access electricity usage in Alameda County for 2005 (see Section 2.3 for more details on this calculation).

4 Future GHG Emissions Forecasts

A GHG emissions inventory sets a reference point for a single year. However, annual emissions change over time due to factors such as population and job growth as well as new technologies and policies. A GHG emissions forecast accounts for projected growth and presents an estimate of GHG emissions in future years. Calculating the difference between the GHG emissions forecast and the GHG emissions reduction targets set by a jurisdiction determines the gap that needs to be closed through the jurisdiction's climate action plan policies. This section calculates an emissions forecast for the City of Pleasanton through 2050 in a *business-as-usual (BAU) forecast* scenario, and then quantifies the reduction impact that State regulations will have on the City of Pleasanton GHG emissions forecast and presents the results in an *adjusted forecast* scenario. The *adjusted scenario* incorporates the impact of State regulations which would reduce the City of Pleasanton's GHG emissions to provide a more accurate picture of future emissions growth and the responsibility of the City and community for GHG reductions once State regulations to reduce GHG emissions have been implemented.

Several indicator growth rates were developed and applied to the various emissions sectors to forecast emissions as shown in Table 16. The growth rates were applied to the most recent inventory year (2017) data to obtain projected activity data (e.g., energy use, waste production). Growth rates were developed from the Association of Bay Area Government's Plan Bay Area Projections 2040, EMFAC Modeling, OFFROAD2007 modeling, and California Department of Finance demographic estimates for the City of Pleasanton and Alameda County. Applicable State and federal regulatory requirements, including Corporate Average Fuel Economy standards, Advanced Clean Car Standards, Renewable Portfolio Standard, and Title 24 efficiencies were then incorporated to accurately reflect expected reductions from State programs.

Plan Bay Area Projections 2040 has demographic projections starting with 2010, and was the primary source for forecast projections.[51] In comparison with demographic data from the California Department of Finance E4 and E5 datasets[52] (which are updated year-to-year based on census data and jurisdictional data on population changes), however, Plan Bay Area Projections 2040 underestimates population and job growth in Pleasanton for 2015, 2020, and subsequent forecast years. For this reason, these forecast projections were adjusted using the calculated percent difference between the Plan Bay Area Projections 2040 and the Department of Finance data for 2015 and 2020. The result is a set of adjusted population and job projections through 2045 that reflect the greater increase in growth experienced by the City of Pleasanton between 2015 and 2020.

[51] Association of Bay Area Governments and Metropolitan Transportation Commission. 2018. Plan Bay Area Projections 2040. Available: <http://projections.planbayarea.org/>. Accessed: April 10, 2020.

[52] California Department of Finance. 2020. Available: <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/>. Accessed: April 16, 2020.

4.1 Business-as-Usual Forecast Scenario

The City of Pleasanton business-as-usual scenario forecast provides an estimate of how GHG emissions would change in the forecast years if consumption trends continue as in 2017, absent any new regulations which would reduce local emissions. Several indicator growth rates were developed from 2017 activity levels and applied to the various emissions sectors to project future year emissions. Table 20 contains a list of growth factors used to develop the business-as-usual scenario forecast, with a summary of the results in Table 19. The BAU growth factors were then multiplied by the population or service person growth rates to develop the BAU emissions forecast.

Table 20 Business-as-Usual Forecast Scenario Growth Factors

Sector	Activity Data
Emissions per capita (MT CO2e/capita)	7.7
Residential electricity per capita (kWh/capita)	2,376.0
Commercial electricity use per job (kWh/employment)	4,909.4
Direct Access electricity per capita (kWh/capita)	687.7
Residential gas per capita (therms/capita)	153.7
Commercial gas use per job (therms/job)	161.9
Solid Waste per service person (tons/SP)	0.7
ADC Waste per service person (tons/SP)	0.0026
Wastewater Process GHG per service population (MT CO2e/SP)	0.0062
CO2e per ton solid waste (MT CO2e/ton)	0.3
CO2e per ton ADC waste (MT CO2e/ton)	0.2
Water electricity per service person (kWh/SP)	127.7
Wastewater electricity per service person (kWh/SP)	22.8
Total VMT per service person (VMT/SP)	4,884.41

kWh: kilowatt hour; SP: service person (sum of population and employment) MT CO_2e: metric tons of carbon dioxide equivalent; VMT: vehicle miles traveled

Under the business-as-usual forecast scenario, Pleasanton GHG emissions are projected to continue increasing through 2050 as shown in Table 21. This increase is led primarily by a strong commercial and residential development trend. After the current General Plan horizon year of 2025, major increases in in emissions are largely attributed to the increased population and vehicular traffic from the greater Alameda County Area traveling into the city. By 2050, the City is expected to produce 169,689 MT CO_2e more emissions under the business-as-usual projections, an increase of 29 percent over 2017 emissions.

Table 21 Business-as-usual Forecast Scenario Summary by Sector by Target Year

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	18,206	18,496	19,005	20,116	21,229	22,404	23,644
Nonresidential Electricity	30,910	30,984	31,107	31,808	34,315	35,682	37,104	38,583
Direct Access Electricity	10,700	11,087	11,263	11,574	12,250	12,928	13,643	14,399
Residential Gas	62,647	64,913	65,945	67,762	71,719	75,689	79,879	84,301
Nonresidential Gas	56,181	56,315	56,539	57,813	62,369	64,855	67,440	70,128
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,785	1,803	1,849	1,974	2,069	2,169	2,275
Wastewater	1,190	1,214	1,227	1,258	1,343	1,408	1,476	1,548
On-Road Passenger Transportation	202,947	207,680	217,227	226,775	230,882	234,989	239,095	243,202
On-Road Commercial Transportation	126,668	126,797	131,035	135,273	140,210	145,147	150,084	155,021
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**600,774**	**622,079**	**646,644**	**676,918**	**703,457**	**730,555**	**758,242**
Emissions Per Capita	**7.67**	**7.55**	**7.70**	**7.79**	**7.70**	**7.59**	**7.47**	**7.34**

MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

Note: VMT data are provided by the MTC traffic demand model that are based on a variety of factors besides only projected demographic changes.

4.2 Adjusted Forecast Scenario

Adjustments Due to State Legislation

The adjusted scenario estimates future City of Pleasanton emissions under codified GHG reduction strategies currently being implemented at the State and federal level. The 2017 Scoping Plan Update

identified several existing State programs and targets, or known commitments required by statute which can be assumed to achieve GHG reductions without City action, such as increased fuel efficiency standards of mobile vehicles. The following known commitments are factored into the adjusted scenario projection and a summary of the programs can be found in Table 22.

State programs will lead to a reduction of 233,683 MT CO_2e in GHG emissions by 2050 in Pleasanton. The increasing decarbonization of the electricity supply due to SB 100 and the Renewable Portfolio Standard (RPS) will lead to GHG emissions reductions in Pleasanton and avoid over 72,991 MT CO_2e by 2050. The transportation sector will experience the largest GHG reductions, with over 151,996 MT CO_2e reduced by 2050 through State and federal fuel efficiency and tailpipe emissions standards assuming no change to current legislation.

Table 22 Summary of Legislative Reductions Legislation

	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Senate Bill 100	6,596	17,692	29,208	42,522	56,198	70,720	72,991
Title 24	217	548	1,338	3,477	5,133	1,883	2,381
Transportation (Pavley, etc.)	22,973	67,430	103,931	126,264	139,416	146,985	151,996
Total	**29,786**	**85,670**	**134,477**	**172,262**	**200,746**	**224,576**	**233,683**

MT CO_2e: metric tons of carbon dioxide equivalent

Transportation Legislation

The CARB EMFAC2017 transportation modeling program incorporates legislative requirements and regulations including Advanced Clean Cars program (Low Emissions Vehicles III, Zero Emissions Vehicles program, etc.), and Phase 2 federal GHG Standards. Signed into law in 2002, AB 1493 (Pavley Standards) required vehicle manufactures to reduce GHG emissions from new passenger vehicles and light trucks from 2009 through 2016, with a target of 30 percent reductions by 2016, while simultaneously improving fuel efficiency and reducing motorists' costs.[53]

Prior to 2012, mobile emissions regulations were implemented on a case-by-case basis for GHG and criteria pollutant emissions separately. In January 2012, CARB approved a new emissions-control program (the Advanced Clean Cars program) combining the control of smog, soot causing pollutants, and GHG emissions into a single coordinated package of requirements for passenger cars and light trucks model years 2017 through 2025. The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles, Zero Emissions Vehicles, and Clean Fuels Outlet programs. However, in 2019 the federal government issued a final action entitled the One National Program on Federal Preemption of State Fuel Economy Standards Rule, which finalized Part I of the Safer, Affordable, Fuel-Efficient (SAFE) Vehicles Rule and stated that federal law preempts state and local tailpipe GHG emissions standards as well as zero emission vehicle mandates. While still in flux, under the SAFE Rule discussed above, fuel economy and GHG emission standards for new vehicles may not improve beyond model year 2020. According to CARB, the federal rollback proposal of the remaining Advanced Clean Cars

[53] California Air Resources Board. 2013.Clean Car Standards – Pavley, Assembly Bill 1493.

Program standards would increase global warming emissions by 14 million metric tons per year by 2025.[54]

Reductions in GHG emissions from the above referenced standards were calculated using the CARB EMFAC2017 model for Alameda County. The EMFAC2017 model integrates the estimated reductions into the mobile source emissions portion of the model.[55]

Note: As of the time of this writing, the federal Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part 2 has been posted in the Federal Register but will not take effect until June 29, 2020. This new rule rolls back California fuel efficiency standards for on-road passenger vehicles, so that cars and trucks will now only achieve a 40.4 mpg industry average by 2026 compared to the 46.7 mpg projected requirement under the previous California Advanced Clean Car Program/federal Corporate Average Fuel Economy (CAFE) standards. No methodology currently exists for extracting or altering the on-road passenger vehicles fuel efficiency standard aspect of the Emissions Factors (EMFAC) model[56] used to calculate forecasted vehicle GHG emissions. In addition, the California Climate Change Scoping Plan does not yet address or provide guidance related to this pending change in fuel efficiency standards with regard to GHG emissions determination. Furthermore, California is currently challenging this new rule in the court system. Therefore, the Pleasanton adjusted forecasts have not been modified to reflect the new SAFE Rule Part 2.

Title 24

Although it was not originally intended to reduce GHG emissions, California Code of Regulations Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was adopted in 1978 in response to a legislative mandate to reduce California's energy consumption, which in turn reduces fossil fuel consumption and associated GHG emissions. The standards are updated triennially to allow consideration and possible incorporation of new energy-efficient technologies and methods. Starting in 2020, new residential developments will include on-site solar generation and near-zero net energy use. For projects implemented after January 1, 2020, the California Energy Commission estimates the 2019 standards will reduce consumption by seven percent for residential buildings and 30 percent for commercial buildings, relative to the 2016 standards. These percentage savings relate to heating, cooling, lighting, and water heating only and do not include other appliances, outdoor lighting not attached to buildings, plug loads, or other energy uses. The calculations and GHG emissions forecast assume all growth in the residential and commercial/industrial sectors is from new construction.

The 2017 Scoping Plan Update calls for the continuation of ongoing triennial updates to Title 24 which will yield regular increases in the mandatory energy and water savings for new construction. Future updates to Title 24 standards for residential and non-residential alterations past 2023 are not taken into consideration due to lack of data and certainty about the magnitude of energy savings realized with each subsequent update.

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54 California Air Resources Board. 2018. California moves to ensure vehicles meet existing state greenhouse gas emissions standards. Available: <https://ww2.arb.ca.gov/news/california-moves-ensure-vehicles-meet-existing-state-greenhouse-gas-emissions-standards-0>. Accessed: April 17, 2020.

55 Additional details are provided in the EMFAC2017 Technical Documentation, July 2018. Available: <https://www.arb.ca.gov/msei/downloads/emfac2017-volume-iii-technical-documentation.pdf>. Accessed: April 15, 2020. The Low Carbon Fuel Standard (LCFS) regulation is excluded from EMFAC2017 because most of the emissions benefits due to the LCFS come from the production cycle (upstream emissions) of the fuel rather than the combustion cycle (tailpipe). As a result, LCFS is assumed to not have a significant impact on CO_2 emissions from EMFAC's tailpipe emissions estimates.

56 The EMFAC model is developed and used by CARB to assess emissions from on-road vehicles including cars, trucks, and buses in California and to support CARB regulatory and planning efforts to meet Federal Highway Administration transportation planning requirements.

Renewables Portfolio Standard & Senate Bill 100

Established in 2002 under SB 1078, enhanced in 2015 by SB 350, and accelerated in 2018 under SB 100, the California RPS is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, publicly owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 50 percent of total procurement by 2026 and 60 percent of total procurement by 2030. The RPS program further requires these entities to increase procurement from GHG-free sources to 100 percent of total procurement by 2045.

PG&E provides the majority of electricity in Pleasanton and is subject to RPS requirements. PG&E forecast emissions factors include reductions based on compliance with RPS requirements through 2045. In 2017, PG&E reported an emissions factor of 210 pounds CO_2e per MWh.

Direct access electricity accounted for 9.5 percent of total electricity usage in 2017, which is provided by third party electricity providers instead of traditional energy utilities. Emissions factors for the carbon intensity of direct access electricity was assumed to be equal to the State average, calculated to equal .203 MT CO_2e/MWh in 2017. RPS requirements were used to adjust this emissions factor for forecasted emissions through 2050.

Assembly Bill 939 & Assembly Bill 341

In 2011, AB 341 set the target of 75 percent recycling, composting, or source reduction of solid waste by 2020 calling for the California Department of Resources Recycling and Recovery (also known as CalRecycle) to take a Statewide approach to decreasing California's reliance on landfills. This target was an update to the former target of 50 percent waste diversion set by AB 939.

As actions under AB 341 are not assigned to specific local jurisdictions, actions beyond the projected waste diversion target of 5.9 pounds per person per day set under AB 939 for the City of Pleasanton will be quantified and credited to the City during the Climate Action Plan measure development process. As of 2017, Pleasanton is meeting both the 5.9 pounds per person per day and 9.5 pounds per job per day diversion targets set by CalRecycle under AB 341.

Senate Bill 1383

SB 1383 established a methane emissions reduction target for short-lived climate pollutants in various sectors of the economy, including waste. Specifically, SB 1383 establishes targets to achieve a 50 percent reduction in the level of the Statewide disposal of organic waste from the 2014 level by 2020 and a 75 percent reduction by 2025.[57] Additionally, SB 1383 requires a 20 percent reduction in "current" edible food disposal by 2025. Although SB 1383 has been signed into law, compliance at the jurisdiction-level has proven difficult. For example, Santa Clara County suggests the 75 percent reduction in organics is not likely achievable under the current structure; standardized bin colors are impractical; and the general requirement is too prescriptive.[58] As such, SB 1383 is not included as part of the adjusted forecast. Instead measures addressing compliance with SB 1383 will be addressed through newly identified GHG reduction measures included in the Climate Action Plan.

[57] CalRecycle. 2019. Short-Lived Climate Pollutants (SLCP): Organic Waste Methane Emissions Reductions (General Information). Available: <https://www.calrecycle.ca.gov/climate/slcp>. Accessed: April 16, 2020.

[58] Santa Clara County. 2018. SB 1383 Rulemaking Overview. Available: <https://www.sccgov.org/sites/rwr/rwrc/Documents/SB%201383%20PowerPoint.pdf>. Accessed: April 16, 2020.

Adjusted Forecast Results

The adjusted scenario is based on the same information as the business-as-usual scenario but also includes the legislative actions and associated emissions reductions occurring at the State and federal levels. These actions include regulatory requirements to increase vehicle fuel efficiency or standards to reduce the carbon intensity of electricity. The difference between the emissions projected in the adjusted scenario and the GHG reduction targets established for each horizon year is the amount of GHG reductions which are the responsibility of Pleasanton. This "gap analysis" provides Pleasanton with the total GHG emissions reduction required as well as information on the emissions sectors and sources which have the most GHG reduction opportunities.

The electricity and water sectors all experience a strong downward trend, approaching near-zero in 2045 due to extremely stringent RPS from SB 100. Natural gas emissions are expected to continue an upward trajectory until 2050 due to strong population growth projections in the city. This trend is partially offset due to the increasingly stringent efficiency requirements for new homes in the upcoming Title 24 code cycles. Commercial growth will also lead commercial natural gas emissions on a similar trajectory. Transportation emissions are expected to decrease significantly in the next 10 to 15 years due to existing fuel efficiency requirements and fleet turnover rates. As most current regulations expire in 2025 or 2030, emissions standards will experience diminishing returns while VMT continues to increase, leading to lower rates of emissions reduction in the transportation sector.

A summary of Pleasanton's projected emissions by sector and year through 2050 can be found in

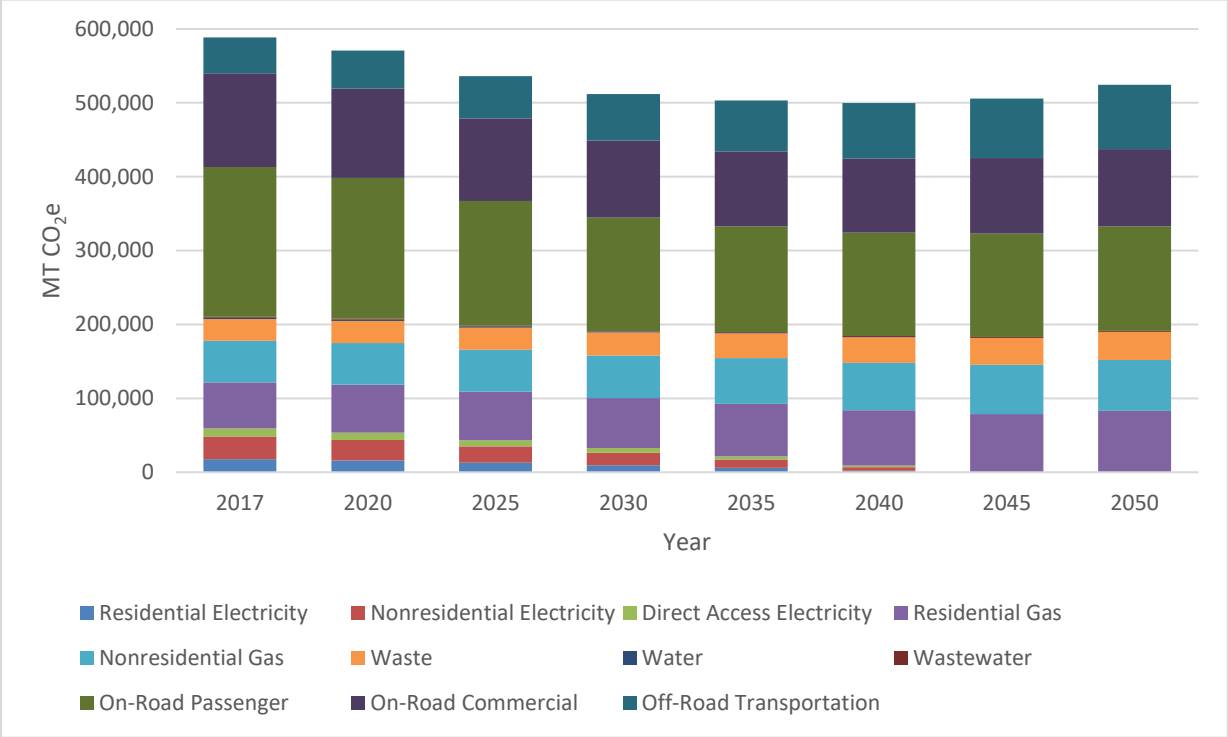
Table 23 and Figure 5. Further details on the growth rates and emissions for each sector can be found in the corresponding discussion sections.

Table 23 Adjusted Forecast Scenario Summary by Sector by Target Year

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	16,154	13,021	9,894	6,782	3,485	0	0
Nonresidential Electricity	30,910	27,657	22,187	16,903	11,896	6,119	0	0
Direct Access Electricity	10,700	9,935	8,170	6,416	4,455	2,317	0	0
Residential Gas	62,647	64,859	65,820	67,509	71,190	74,882	78,778	82,890
Nonresidential Gas	56,181	56,312	56,520	57,705	61,943	64,254	66,658	69,158
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,593	1,288	991	705	370	0	0
Wastewater	1,190	1,180	1,135	1,105	1,117	1,105	1,089	1,142
On-Road Passenger Transportation	202,947	190,764	168,825	153,381	143,608	140,208	140,267	141,752
On-Road Commercial Transportation	126,668	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**570,988**	**536,409**	**512,167**	**504,656**	**502,711**	**505,979**	**524,559**
Emissions Per Capita	**7.67**	**7.18**	**6.64**	**6.17**	**5.74**	**5.42**	**5.17**	**5.08**

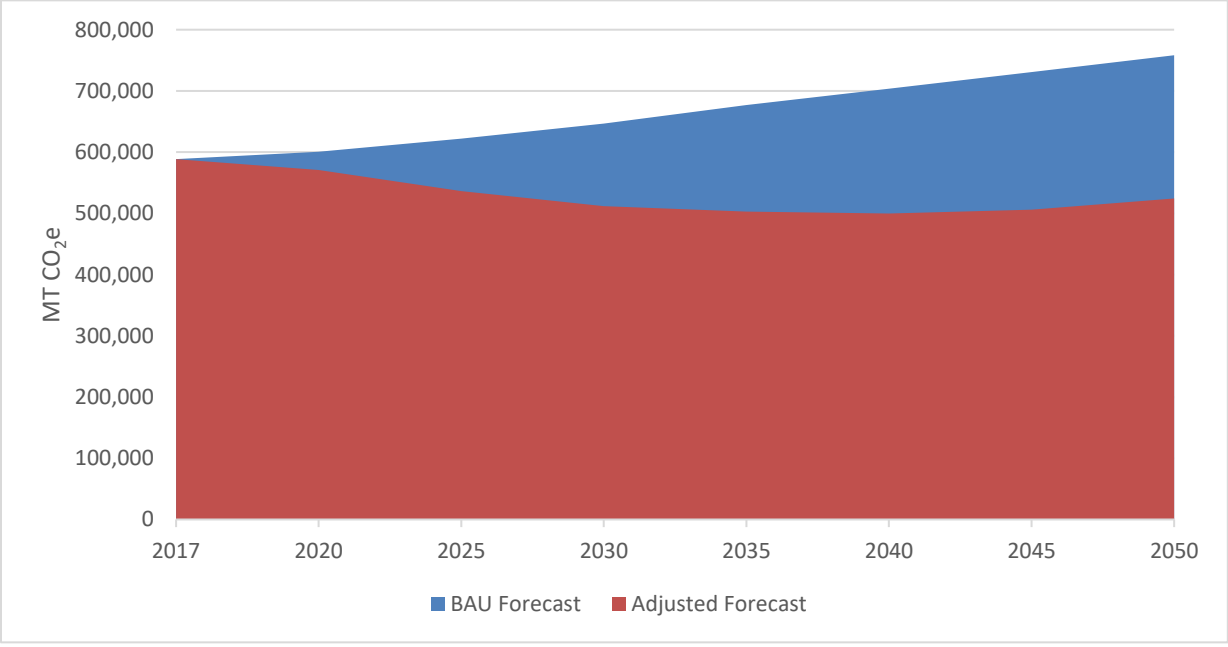
MT CO_2e: metric tons of carbon dioxide equivalent

Figure 5 Summary of Adjusted Forecast Scenario by Sector by Year



As shown in Figure 6, without legislative reductions, Pleasanton emissions would increase proportionally with population and economic growth. In reality, several existing legislative reductions would limit Pleasanton's emissions growth, causing projected emissions to decrease. This scenario is depicted by the Adjusted Forecast. The legislative reductions for each sector and scaling methods used to project emissions are discussed in detail below.

Figure 6 BAU and Adjusted Forecast Scenarios



Electricity Emissions

Between 2017 and 2045, electricity emissions from residential and nonresidential buildings in Pleasanton are assumed to decrease from 59,181 MT CO2e to 0 MT CO_2e in 2045 despite steady growth in Pleasanton's population and employment levels due to the adoption of SB 100 and the renewable portfolio standard. Electricity emissions are expected to stay at 0 MT CO2e in 2050 as well. It is currently not clear if PG&E's current plan to reach carbon neutral electricity by 2045 includes the use of offsets. Future work will need to be done if so to ensure no double counting occurs between PG&E and Pleasanton's efforts to reach carbon neutral emissions.

Emissions from future electricity use were forecasted by projecting anticipated growth in residential and commercial sectors and multiplying by expected electricity emission factors. Anticipated growth in the residential sector was projected as a function of population growth within Pleasanton while commercial sector electricity use was projected as a function of employment projections. Legislative adjustments included in the electricity sector forecast include RPS of 60 percent by 2030 and 100 percent GHG-free by 2045. Additionally, Title 24 building code efficiency increases for the 2019 code cycle were applied to all new growth within the city. The methodologies for the electricity sector which were forecasted in the adjusted scenario are summarized in Table 24 and Table 25.

Table 24 Electricity Sector Adjusted Forecast Scenario Methodology

Source Category	Forecasted Activity Data (Scaling Factor)	Emission Factor	Applied Legislative Reductions
Residential Electricity	Population growth in Pleasanton	Assumes an electricity mix of 44 percent, 60 percent, and 100 percent GHG-free by 2025, 2030, and 2045, respectively, for PG&E emission factors per RPS requirements.	Title 24 standards for new construction in 2019 (53 percent residential, 30 percent commercial), RPS requirements
Commercial & Industrial Electricity	Employment growth in Pleasanton		

RPS: Renewable Portfolio Standard; GHG: greenhouse gas; PG&E: Pacific Gas and Electric

Table 25 Electricity Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Residential Electricity							
Population	79,524	80,789	83,014	87,863	92,727	97,859	103,276
BAU total kWh	188,952,105	191,957,699	197,244,416	208,765,114	220,321,160	232,516,883	245,387,692
BAU per capita kWh	2,376	2,376	2,376	2,376	2,376	2,376	2,376
Adjusted kWh (Title 24)	187,772,909	189,185,538	191,670,295	197,085,023	202,516,365	208,248,355	214,297,635
Adjusted per capita kWh (Title 24)	2,361	2,342	2,309	2,243	2,184	2,128	2,075
Adjusted SB 100 emissions factor (MT CO_2e/MWH)	0.08603	0.06882	0.05162	0.03441	0.01721	0	0
MT CO_2e	**16,154**	**13,021**	**9,894**	**6,782**	**3,485**	**0**	**0**
Nonresidential Electricity							
Employment	65,498	65,759	67,240	72,539	75,431	78,437	81,563
BAU total kWh	321,556,852	322,836,365	330,111,107	356,126,435	370,320,613	385,080,531	400,428,736
BAU per job kWh	4,909	4,909	4,909	4,909	4,909	4,909	4,909
Adjusted kWh (Title 24)	321,480,263	322,375,923	327,468,243	345,678,972	355,614,897	365,946,839	376,690,583
Adjusted per job kWh	4908	4902	4870	4765	4714	4665	4,618
Adjusted SB 100 emissions factor (MT CO_2e/MWh)	0.08603	0.06882	0.05162	0.03441	0.01721	0	0
MT CO_2e	**27,657**	**22,187**	**16,903**	**11,896**	**6,119**	**0**	**0**
Direct Access Electricity							
Population	79,524	80,789	83,014	87,863	92,727	97,859	103,276
BAU total kWh	54,691,953	55,561,918	57,092,151	60,426,803	63,771,686	67,301,723	71,027,163
BAU per capita kWh	687	687	687	687	687	687	687
Adjusted kWh (Title 24)	54,498,754	55,107,730	56,178,894	58,513,150	60,854,568	63,325,594	65,933,402
Adjusted per capita kWh	685	682	677	656	631	647	638
Adjusted SB 100 State Grid emissions factor (MT CO_2e/MWh)	0.1823	0.1483	0.1142	0.07614	0.03807	0	0
MT CO_2e	**9,935**	**8,170**	**6,416**	**4,455**	**2,317**	**0**	**0**

MT CO_2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour; MWh: megawatt hour; BAU: business-as-usual

Natural Gas Emissions

Emissions from projected natural gas use were forecast using a similar methodology to the electricity sector. Anticipated natural gas use was projected for the residential and commercial sectors separately using population change and employment increase as growth indicators respectively. These results were multiplied by a natural gas emission factor of 0.00531 MT CO_2e per therms of natural gas.[59] Unlike electricity, the natural gas emission factor is based on the quality of the gas and remains relatively constant over time. This analysis did not consider any shift to renewable gas which may become more common over time and the use of which may affect future natural gas emission factors. The methodologies and data used to calculate natural gas emissions over time are summarized in Table 26 and Table 27.

Legislative adjustments applied for the natural gas sector include efficiency increases from Title 24 building code updates for new construction after the 2019 code cycle begins. Specific efficiency increases for new buildings over the previous triennial cycle are discussed in Section 4.2.

Table 26 Natural Gas Adjusted Forecast Scenario Methodology

Source Category	Forecasted Activity Data (Scaling Factor)	Emission Factor	Applied Legislative Reductions
Residential Natural Gas	Population growth in Pleasanton	0.00531 MT CO_2e/therms	Title 24 standards for efficiency in new construction in 2019 (7 percent residential, 30 percent commercial over 2016 Title 24)
Commercial & District Natural Gas	Employment growth in Pleasanton		

MT CO_2e: metric ton of carbon dioxide equivalent

Table 27 Natural Gas Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Residential Gas							
BAU therms	12,223,478	12,417,912	12,759,914	13,505,198	14,252,769	15,041,721	15,874,345
Title 24 adjusted therms	12,213,402	12,394,226	12,712,289	13,405,403	14,100,644	14,834,369	15,608,709
Emissions factor (MT CO_2e/therms)	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531
MT CO_2e	**64,859**	**65,820**	**67,509**	**71,190**	**74,882**	**78,778**	**82,890**
Nonresidential Gas							
BAU therms	10,604,480	10,646,676	10,886,587	11,744,534	12,212,638	12,699,399	13,205,560
Title 24 adjusted therms	10,603,890	10,643,133	10,866,250	11,664,141	12,099,477	12,552,165	13,022,895
Emissions factor (MT CO_2e/therms)	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531	0.00531
MT CO_2e	**56,312**	**56,520**	**57,705**	**61,943**	**64,254**	**66,658**	**69,158**

MT CO_2e: metric ton of carbon dioxide equivalent; BAU: business-as-usual

[59] The Climate Registry. 2019. Default Emissions Factors. Available: <https://www.theclimateregistry.org/wp-content/uploads/2019/05/The-Climate-Registry-2019-Default-Emission-Factor-Document.pdf>. Accessed: April 15, 2020

Waste Emissions

The forecast used a baseline emissions rate of 0.7201 tons of solid waste per service population and 0.0026 tons of ADC waste per service population along with projected growth in Pleasanton service population to establish the estimated tonnage of waste being disposed yearly through 2050. A 2017 solid waste emissions factor of 0.286 MT CO_2e and a 2017 ADC waste emissions factor of 0.246 MT CO_2e was used to project emissions consistent with service population growth. Emissions from the waste sector will likely be less than the projected totals due to decreasing rates of organic material in the waste stream and recent legislation such as SB 1383 discussed in previous sections. At this time, no mandate exists for individual cities and the waste reductions from these bills are incorporated into the Climate Action Plan through Pleasanton reduction measures to avoid double counting. A summary of the methodologies and data used to model waste emission over time are provided in Tables 28 and 29.

Table 28 Solid Waste Adjusted Forecast Scenario Methodology

Source Category	Forecasted Activity Data (Scaling Factor)	Emission Factor	Applied Legislative Reductions
Solid Waste	Service population growth	0.7201 tons solid waste per service person, 0.286 MT CO_2e/ton of solid waste	N/A
ADC Waste	Service population growth	0.0026 tons ADC waste per service person, 0.246 ADC MT CO_2e/ton ADC waste	N/A

MT CO_2e: metric ton of carbon dioxide equivalent; N/A: not applicable

Table 29 Waste Emissions Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Service Population	145,022	146,548	150,255	160,402	168,157	176,296	184,840
Ton Solid Waste per Service Population	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Ton ADC Waste per Service Population	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
Total Tons Solid Waste	104,428	105,526	108,195	115,503	121,087	126,948	133,099
Solid Waste Factor (MT CO_2e/ton)	0.286	0.286	0.286	0.286	0.286	0.286	0.286
Total Tons ADC Waste	375	379	389	415	435	456	478
ADC Waste Factor (MT CO_2e/ton)	0.246	0.246	0.246	0.246	0.246	0.246	0.246
MT CO_2e	**29,963**	**30,279**	**31,044**	**33,141**	**34,743**	**36,425**	**38,190**

MT CO_2e: metric ton of carbon dioxide equivalent

Transportation Emissions

Transportation emissions forecasts were developed consistent with the inventory methodology, through the determination of on-road annual VMT multiplied by a year-specific weighted emissions factor for emissions per mile travelled. VMT forecasts for Pleasanton were obtained from the MTC VMT data portal.[60] The MTC Traffic Demand Model was used to model VMT through 2050. Emissions factors were established for each year through the use of the EMFAC2017 GHG module, which established VMT and total emissions for each vehicle type in Alameda County. These emissions factors were applied in each year to establish transportation emissions forecasts as shown in Tables 30 and 31.

Table 30 Transportation Adjusted Forecast Scenario Methodology

Source Category	Forecasted Scaling Factor	Emissions Factor	Applied Legislative Reductions
On-road Transportation	MTC VMT Modeling[1]	EMFAC2017 model analyzing light duty (LDA, LDT1, LDT2, MDV, MCY) and heavy duty (LHD, T6, T7, PTO, MH, SBUS, UBUS, OBUS, Motor Coach, All Other Buses) vehicles.	EMFAC emission factors account for legislative reductions from Advanced Clean Cars, Pavley Clean Car Standards, Tractor-Trailer Greenhouse Gas Regulation, and adopted fuel efficiency standards for medium- and heavy-duty vehicles.
Off-Road Transportation	OFFROAD2007 Model[2]	OFFROAD2007 Model	N/A

MT CO_2e: metric ton of carbon dioxide equivalent; VMT: vehicle miles traveled

[1] MTC VMT data portal incorporates data from the MTC's large-scale simulation model of daily travel behavior, used for its regional planning efforts and in Plan Bay Area. More information can be found on the MTC VMT Data Portal website at <http://capvmt.us-west-2.elasticbeanstalk.com/about>. Accessed: April 28, 2020.

[2] California Air Resources Board. 2007. OFFROAD2007. Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-archives>. Accessed: April 1, 2020.

[60] MTC. 2020. MTC VMT Model. Available: <http://capvmt.us-west-2.elasticbeanstalk.com/data>. Accessed: April 2020.

Table 31 Transportation Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Population	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Passenger VMT	615,314,349	643,601,315	671,888,281	684,056,020	696,223,759	708,391,498	720,559,237
Commercial VMT	92,829,236	95,931,969	99,034,703	102,649,181	106,263,658	109,878,136	113,492,613
Passenger EMFAC Emission Factor (g CO_2e/mile)	310	262	228	210	201	198	197
Commercial EMFAC Emission Factor (g CO_2e/mile)	1,301	1,168	1,058	986	946	928	921
Passenger MT CO_2e	190,764	168,825	153,381	143,608	140,208	140,267	141,752
Commercial MT CO_2e	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road MT CO_2e	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total MT CO_2e	**363,334**	**337,989**	**320,600**	**313,428**	**315,437**	**323,029**	**333,178**

MT CO_2e: metric ton of carbon dioxide equivalent; VMT: vehicle miles traveled

Water and Wastewater Emissions

Due to the increased use of the water system attributed to increases in job and population growth in Pleasanton, service population was used as a scaling metric to determine water and wastewater service emissions through 2050. Projections for water used a baseline activity factor of 127.7 kWh per service population per year. This emissions factor was multiplied by service population growth through 2050 to find total kWh usage. The RPS for electricity generation was then applied to water emissions, as described in the Legislative Adjustment Section, to determine final MT CO_2e emissions as shown in Tables 32 and 33.

Table 32 Water and Wastewater Adjusted Forecast Scenario Methodology

Forecasted Activity Data (Scaling Factor)	Emissions Factor	Applied Legislative Reductions
Water, Service population (population and employment growth)	PG&E electricity emissions factors, 127.7 kWh per service population per year	Assumes an electricity mix of 44 percent, 60 percent, and 100 percent GHG-free by 2025, 2030, and 2045 respectively for PG&E emission factors per RPS requirements.
Wastewater, Service population (population and employment growth)	0.00618 MT CO_2e per service person per year for wastewater	N/A

MT CO_2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour; PG&E: Pacific Gas and Electric; N/A: not applicable

Table 33 Water Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Service Population	145,022	146,548	150,255	160,402	168,157	176,296	184,840
kwh/Service Person	127.7	127.7	127.7	127.7	127.7	127.7	127.7
Total kWh	18,520,765	18,715,598	19,188,995	20,484,966	21,475,331	22,514,795	23,605,848
RPS Electricity Factor (MTCO_2e/ MWh)	0.08603	0.06882	0.05162	0.03441	0.01721	0	0
MT CO_2e	**1,593**	**1,288**	**991**	**705**	**370**	**0**	**0**

MT CO2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour; RPS: renewable portfolio standard

As wastewater emissions are calculated from both methane as well as stationary and process nitrous oxide emissions, wastewater projections used an emissions factor of 0.00618 MT CO_2e per service population per year and a growth indicator of service population to determine future wastewater emissions, as shown in Table 34.

Table 34 Wastewater Adjusted Forecast Scenario Results by Target Year

Activity Data	2020	2025	2030	2035	2040	2045	2050
Service Population	145,022	146,548	150,255	160,402	168,157	176,296	184,840
Total kWh	3,301,265	3,335,993	3,420,375	3,651,377	3,827,907	4,013,188	4,207,664
MT CO_2e/ Service Population	0.00618	0.00618	0.00618	0.00618	0.00618	0.00618	0.00618
MT CO_2e	**1,180**	**1,135**	**1,105**	**1,117**	**1,105**	**1,089**	**1,142**

MT CO_2e: metric ton of carbon dioxide equivalent; kWh: kilowatt hour;

4.3 Future GHG Emissions Forecasts Results Summary

A BAU future GHG emissions forecast provides a forecast of how GHG emissions would change over time if consumption and activity trends were to continue as they did in 2017 and if growth were to occur as projected in the City 2005-2025 General Plan and Association of Bay Government future demographic forecasts. This does not include GHG emission reductions from any regulations that would reduce local emissions. BAU future GHG emissions forecast results for 2020, 2025, 2030, 2040, 2045, and 2050 are provided within Table 35.

Table 35 Summary of Pleasanton Business-as-Usual Future GHG Emissions Forecasts by Sector

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	18,206	18,496	19,005	20,116	21,229	22,404	23,644
Nonresidential Electricity	30,910	30,984	31,107	31,808	34,315	35,682	37,104	38,583
Direct Access Electricity	10,700	11,087	11,263	11,574	12,250	12,928	13,643	14,399
Residential Gas	62,647	64,913	65,945	67,762	71,719	75,689	79,879	84,301
Nonresidential Gas	56,181	56,315	56,539	57,813	62,369	64,855	67,440	70,128
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,785	1,803	1,849	1,974	2,069	2,169	2,275
Wastewater	1,190	1,214	1,227	1,258	1,343	1,408	1,476	1,548
On-Road Passenger Transportation	202,947	207,680	217,227	226,775	230,882	234,989	239,095	243,202
On-Road Commercial Transportation	126,668	126,797	131,035	135,273	140,210	145,147	150,084	155,021
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**600,774**	**622,079**	**646,644**	**676,918**	**703,457**	**730,555**	**758,242**
Emissions Per Capita	**7.67**	**7.55**	**7.70**	**7.79**	**7.70**	**7.59**	**7.47**	**7.34**

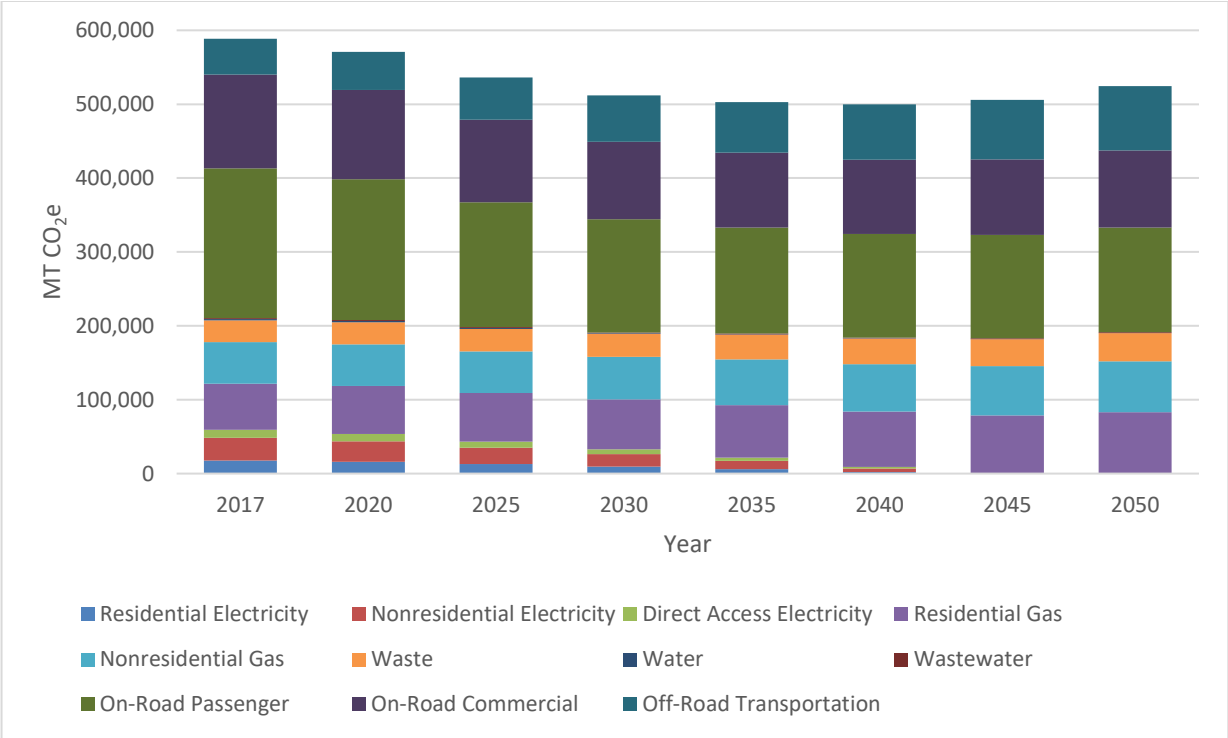
MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

Note: VMT data are provided by MTC traffic demand model and are based on a variety of factors besides projected demographic changes.

California has enacted multiple regulations that will reduce future local emissions. The impact of these regulations on GHG emissions have been incorporated into an *adjusted forecast*, which provides a more accurate picture of future emissions growth and the emission reduction the City and community will be responsible for after State regulations have been implemented. These State regulations include but are not limited to SB 100 (which sets a goal for reaching 100 percent electricity from renewable energy and zero-carbon sources by 2045) and California Air Resources Board (CARB) tailpipe emissions standards (Pavley Standards, Advanced Clean Cars Program).[61]

Calculating the difference between the adjusted forecast and the reduction targets set by the City determines the gap to be closed through City CAP policy implementation. Evaluating the percent change in the adjusted forecast from 2017 levels shows that Pleasanton's GHG emissions will decrease approximately 13 percent (76,386 metric tons) by 2030. Emissions will continue to decrease through 2040 but at a slower rate. Between 2030 and 2040 emissions will only decrease by an additional 2 percent, resulting in emissions being approximately 15 percent (85,842 metric tons) below 2017 levels in 2040. This is due to expected reductions from current legislation reaching the end of their effective lifetimes around 2030, particularly Title 24 and California's vehicle efficiency standards. Emissions will then begin to increase again after 2040, with expected population and job growth beginning to outpace the GHG emissions reductions resulting from the SB 100 zero-carbon electricity goal in 2045. This will lead to emissions being approximately 11 percent (63,994 metric tons) lower than 2017 levels in 2050. Future State regulation may help offset this increase, but no long-term legislation has been adopted at the time of this writing. The summary results of the adjusted future GHG emissions forecast are shown in Figure 7 and provided within Table 36.

Figure 7 Pleasanton Adjusted Future GHG Emissions Forecasts by Sector



61 Refer to Section 4.2 of this Technical Appendix for the full list of State and federal legislation that was taken into account within the forecasting model.

Table 36 Summary of Pleasanton Adjusted Future GHG Emissions Forecasts by Sector

	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Population	76,748	79,524	80,789	83,014	87,863	92,727	97,859	103,276
Jobs	65,342	65,498	65,759	67,240	72,539	75,431	78,437	81,563
Residential Electricity	17,571	16,154	13,021	9,894	6,782	3,485	0	0
Nonresidential Electricity	30,910	27,657	22,187	16,903	11,896	6,119	0	0
Direct Access Electricity	10,700	9,935	8,170	6,416	4,455	2,317	0	0
Residential Gas	62,647	64,859	65,820	67,509	71,190	74,882	78,778	82,890
Nonresidential Gas	56,181	56,312	56,520	57,705	61,943	64,254	66,658	69,158
Waste	29,358	29,963	30,279	31,044	33,141	34,743	36,425	38,190
Water	1,748	1,593	1,288	991	705	370	0	0
Waste-water	1,190	1,180	1,135	1,105	1,117	1,105	1,089	1,142
On-Road Passenger Transportation	202,947	190,764	168,825	153,381	143,608	140,208	140,267	141,752
On-Road Commercial Transportation	126,668	120,739	112,007	104,736	101,220	100,512	101,927	104,475
Off-Road Transportation	48,634	51,830	57,156	62,483	68,600	74,717	80,834	86,951
Total Emissions	**588,553**	**570,988**	**536,409**	**512,167**	**504,656**	**502,711**	**505,979**	**524,559**
Emissions Per Capita	**7.67**	**7.18**	**6.64**	**6.17**	**5.74**	**5.42**	**5.17**	**5.08**

MT CO_2e: metric tons of carbon dioxide equivalent; T&D: Transmission and Distribution; Per capita based on population projections

5 GHG Emissions Reduction Targets

5.1 Provisional GHG Emissions Targets – 2030, 2045, 2050

California currently has established goals for reducing GHG emissions by 40 percent compared to 1990 levels by 2030 (SB 32), achieving carbon neutrality by 2045 (EO B-55-18), and the previous executive order (S-03-05) that called for an 80 percent reduction from 1990 levels by 2050 . It is recommended that Pleasanton establish GHG emissions targets for the years 2025 (interim target), 2030 (SB 32 target year), 2040 (interim target), and 2045 (EO B-55-18 target year) - or if desired 2050 (EO S-3-05 target year) - to show compliance with these multiple-year State goals.

The City of Pleasanton has the ability to set GHG emissions reduction targets that suit its needs. However, to be considered a "Qualified GHG Reduction Plan" that can be used for California Environmental Quality Act (CEQA) GHG emissions analyses streamlining purposes pursuant to CEQA Guidelines Section 15183.8, the City should adopt a GHG emissions target that is at least as stringent as the State targets described above. Specifically, the City should target emission reductions of at least 40 percent below 1990 levels by 2030 and adopt a longer-term target of carbon neutrality by 2045 consistent with EO B-55-18 or 80 percent below 1990 levels by 2050 consistent with S-03-05. Currently both EOs remain in place; however, it appears that EO B-55-18 will likely be codified. The carbon neutrality target has been adopted by many other California cities in their CAP updates, and some jurisdictions, such as the Sacramento Metropolitan Air Management District, have adopted carbon neutrality as a CEQA GHG emissions significance threshold.[62]

The following discussion outlines the minimum GHG reduction targets required for CEQA GHG emissions analyses streamlining. However, Pleasanton can choose to adopt other GHG emissions reduction pathways that exceed these reductions and still maintain status as a Qualified GHG Reduction Plan under CEQA. Any target pathway that reduces less emissions by 2030 would not be considered consistent with the State goals. While more aggressive targets will initially require additional effort, a more stringent short-term goal (2030) may make it easier to reach longer-term goals like carbon neutrality.

There are several different methodologies for calculating these minimum GHG emissions reductions. The City could choose to adopt mass emission, per capita, or per service person targets. The Pleasanton 2012 CAP includes only mass emissions targets. Mass emission targets describe emissions in terms of total MT CO_2e without any adjustment for population growth. The most recent State Climate Change Scoping Plan (2017) includes guidance that details the methodology and benefits of developing per capita and per service person targets. Generally, per capita targets are suggested unless circumstances such as a skewed jobs-to-residents ratio is identified. The key benefit of a per capita target is that it corrects for population growth. This means that the target does not become more difficult to reach if the City grows faster than projected. Per capita emissions targets are developed by dividing the emissions in each target year by the forecasted population. Emission targets in both mass emissions and per capita emissions are discussed below.

[62] Sacramento Metropolitan Air Management District. 2020. Guide to Air Quality Assessment in Sacramento County. Available: <http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools>. Accessed: May 31, 2020.

Mass Emissions Pathways

The first proposed methodology for setting GHG emissions reduction target pathways is based on a total GHG emissions basis (i.e., mass emissions). This is the traditional methodology for establishing emissions targets as a part of CAP and was employed by the City for development of the 2020 target. The two pathways that meet CEQA Guidelines include:

1. **The SB 32/B-55-18 Mass Emissions Pathway.** This target pathway meets the minimum requirements for CEQA GHG emissions analyses streamlining. The pathway sets a 40 percent reduction from 1990 levels by 2030 and then carbon neutrality by 2045 consistent with EO B-55-18.
2. **The SB 32/S-03-05 Mass Emissions Pathway**. This target pathway meets the minimum requirements for SB 32. The pathway sets a 40 percent reduction from 1990 levels by 2030 but then adopts an 80 percent reduction by 2050 consistent with EO S-03-05.

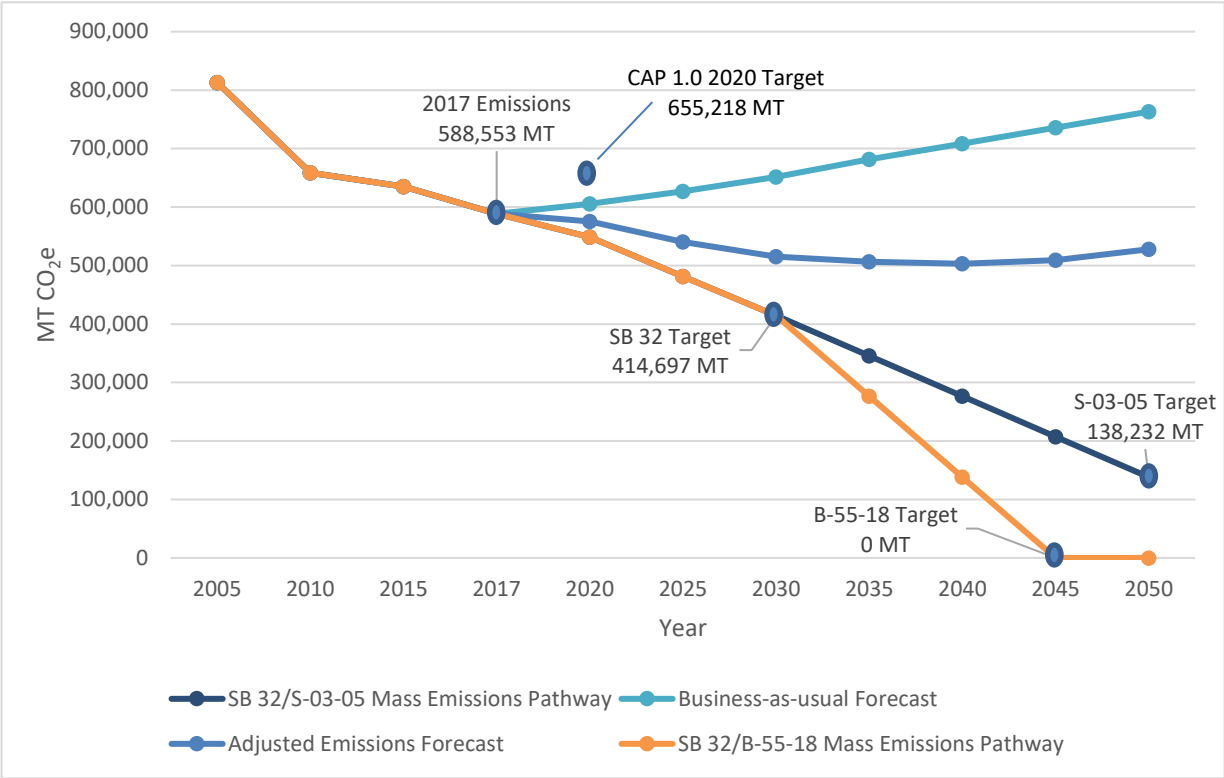
Table 37 provides GHG emissions targets for 2025, 2030, 2035, 2040, 2045, and 2050 for Pleasanton based on each of the SB 32/S-03-05 and SB 32/B-55-18 GHG mass emissions reduction target pathways. Figure 8 details the reduction necessary to achieve the mass emission targets in relation to the baseline inventory, business-as-usual forecast, and adjusted forecast. Forecasted emissions for 2020 are based off the 2017 inventory year, which already exceeds the original AB 32 target.

Table 37 Summary of Pleasanton Future GHG Emissions Forecasts by Mass Reduction Target Pathway

Emissions Forecast	2017 (MT CO2e)	2020 (MT CO2e)	2025 (MT CO2e)	2030 (MT CO2e)	2035 (MT CO2e)	2040 (MT CO2e)	2045 (MT CO2e)	2050 (MT CO2e)
Business-as-Usual Emissions Forecast	588,553	600,774	622,079	646,644	676,918	703,457	730,555	758,242
Adjusted Emissions Forecast	588,553	570,988	536,409	512,167	504,656	502,711	505,979	524,559
2045 SB 32 Mass Emissions Pathway	588,553	548,433	481,565	414,697	276,465	138,232	0	0
2050 SB 32 Mass Emissions Pathway	588,553	548,433	481,565	414,697	345,581	276,465	207,348	138,232

MT CO_2e: metric tons of carbon dioxide equivalent

Figure 8 Minimum Required Reduction Pathways for CEQA Streamlining (Mass Emissions)



Per Capita Emissions Pathways

Each of the above mass emission targets can also be expressed on a per capita basis (the second proposed methodology for setting GHG emissions reduction target pathways). Per capita targets are derived by dividing the mass emissions by the forecasted population in each target year. The benefit of per capita targets is primarily the ability to control for population growth over time. By adopting a per capita target, Pleasanton can continue to grow without sacrificing the ability to reach its GHG reduction goals.

1. **The SB 32/B-55-18 Per Capita Pathway**. This pathway translates the emissions targets referenced above under the mass emissions pathway into a per capita target by dividing each target year by the forecasted population. This pathway achieves a 40 percent reduction below 1990 levels by 2030 and then carbon neutrality by 2045.
2. **The SB 32/S-03-05 Per Capita Pathway.** This pathway translates the emissions targets referenced above under the mass emissions pathway into a per capita target by dividing each target year by the forecasted population. This pathway achieves a 40 percent reduction below 1990 levels by 2030 and then an 80 percent reduction below 1990 levels by 2050.

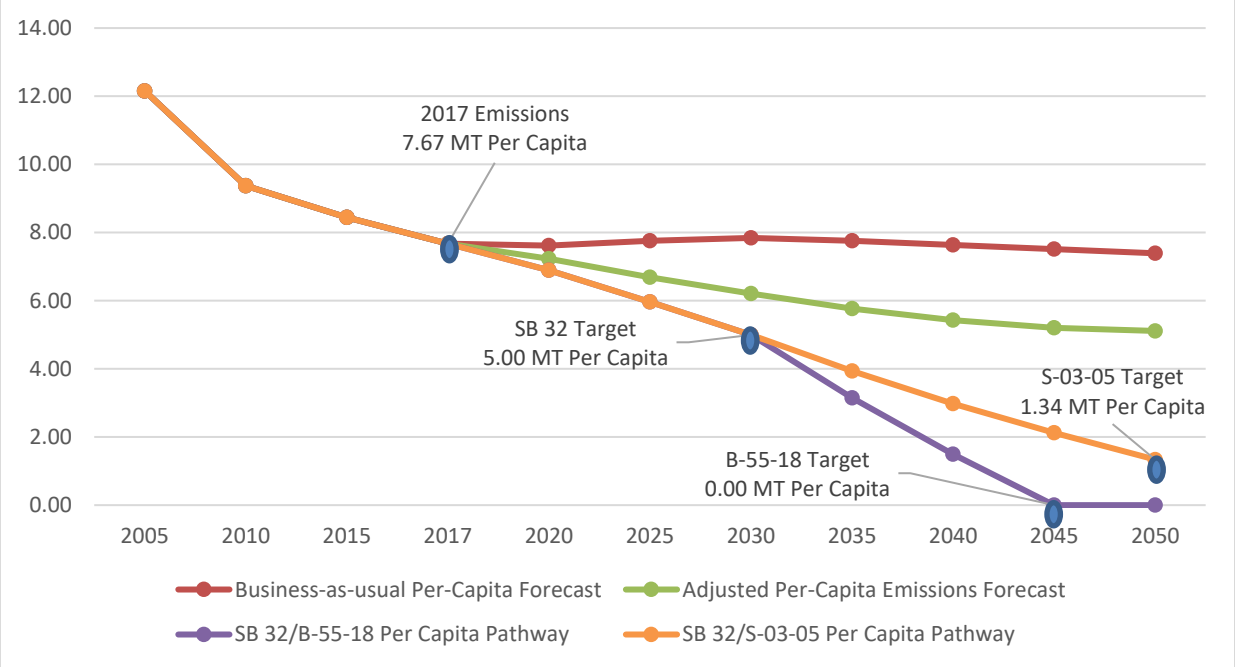
Table 38 provides per capita GHG emissions targets for 2025, 2030, 2035, 2040, 2045, and 2050 for Pleasanton based on the SB 32/S-03-05 and SB 32/B-55-18 GHG mass emissions reduction target pathways. Figure 9 details the GHG emission reduction necessary to achieve the per capita emission targets, in relation to the baseline inventory, business-as-usual forecast, and adjusted forecast.

Table 38 Summary of Pleasanton Forecasts by Per Capita Efficiency Reduction Target Pathway

Emissions Forecast	2017 (MT CO_2e)	2020 (MT CO_2e)	2025 (MT CO_2e)	2030 (MT CO_2e)	2035 (MT CO_2e)	2040 (MT CO_2e)	2045 (MT CO_2e)	2050 (MT CO_2e)
Business-as-Usual Per Capita Emissions Forecast	7.67	7.55	7.70	7.79	7.70	7.59	7.47	7.34
Adjusted Per Capita Emissions Forecast	7.67	7.18	6.64	6.17	5.74	5.42	5.17	5.08
SB 32/ B-55-18 Per Capita Pathway	7.67	6.90	5.96	5.00	3.15	1.49	0.00	0.00
SB 32/S-03-05 Per Capita Pathway	7.67	6.90	5.96	5.00	3.93	2.98	2.12	1.34

MT CO_2e: metric tons of carbon dioxide equivalent

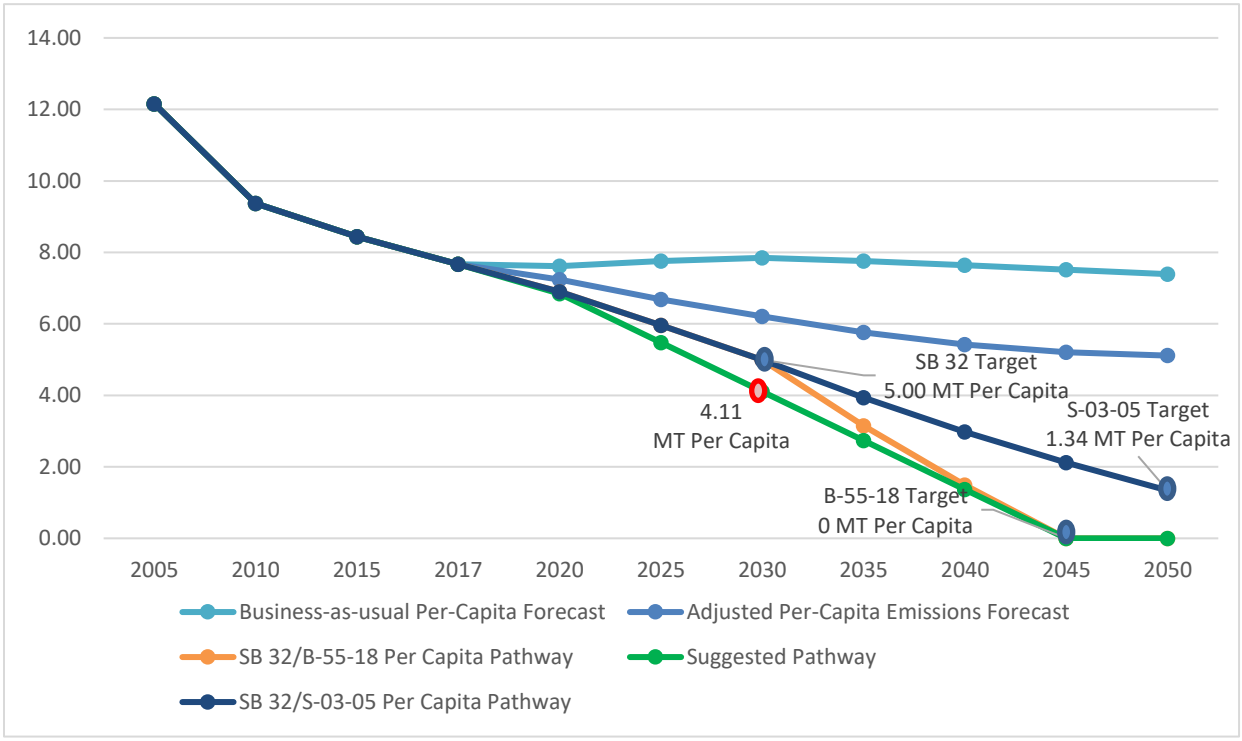
Figure 9 Minimum Required Reduction Pathways for CEQA Streamlining (Per Capita Emissions)



Suggested GHG Emissions Reduction Pathway

Pleasanton could adopt any of the GHG emissions target reduction targets discussed above for the CAP Update, as all of these pathways would comply with State emissions reduction goals and requirements for a CEQA Qualified GHG Reduction Strategy. However, the City could also choose to adopt a 2030 target on a straight-line trajectory from 2020 to 2045 that would provide a more stringent GHG reduction target than what has been established for SB32, as detailed in Figure 10. This target may be more ambitious in the short term but could spur the upfront actions required to reach the longer-term State goal of carbon neutrality. The adoption of a per capita target is also suggested, due to the increased flexibility associated with controlling for population growth. Figure 10 shows the suggested GHG emissions reduction pathways compared to pathways that are minimally compliant with CEQA.

Figure 10 Suggested GHG Emissions Reduction Pathway Compared to Minimum CEQA-compliant Pathways (Per Capita Emissions)



Although this suggested pathway is more stringent than State goals, it offers the following key benefits:

- The per capita target is more flexible and allows for population growth over time;
- More stringent short-term targets could spur the adoption of significant actions and smooth the transition to carbon neutrality in the longer term; and
- A target of carbon neutrality by 2045 will ensure CAP targets are consistent with longer-term future State targets.

5.2 Meeting the GHG Emissions Targets

The GHG emissions targets identified above will be achieved through implementation of local GHG emissions reduction measures that are to be identified within the Pleasanton CAP Update. Local measures will be identified through a comprehensive assessment of existing local and regional policies, programs, and actions and by assessing gaps and identifying additional opportunities. Additional measures will be developed from best practices worldwide and of other similar and neighboring jurisdictions, as well as those recommended by organizations and agencies, such as the California Air Pollution Control Officers Association (CAPCOA), Attorney General's office, and Air Resources Board. Measures will be vetted by City staff and the community and will be quantified to identify their overall contribution to meeting the Pleasanton GHG reduction targets. Although measures in the Pleasanton CAP Update will continue to achieve emissions reductions after 2030 and establish a trajectory for reaching longer-term goals, another phase of climate action planning and the realization of additional technological advances and State measures will be needed to meet the longer-term targets. This next phase will build on CAP Update measures, informed by monitoring and adaptive management, and take advantage of new technologies and climate protection science that will be available in the future.

GHG Reduction Strategies Quantification and Evidence

For Pleasanton CAP 2.0 | January 6, 2022 – REVISED September 1, 2022

Contents

Executive Summary

This document summarizes findings from a quantitative assessment of draft Pleasanton CAP 2.0 actions. The quantitative assessment provides high-level estimates of the **costs** and **emission reductions** associated with each action to provide a defensible plan for meeting the City's emission reduction goals. Key findings of the analyses include:

- Modeling suggests that implementation of proposed primary CAP 2.0 measures could **exceed the City's proposed 2030 target** (4.11 MTCO2e per capita) and SB-32 required reductions, resulting in emissions that drop from 13.6 $MTCO_2e$ per capita in 1990 to **4.0905 $MTCO_2e$ per capita in 2030**. The following CAP strategies and actions are the highest contributors of GHG emission reductions through 2030:
  - ~~Carbon sequestration (Urban Forest Master Plan)~~
  - Vehicle decarbonization (ZEV Infrastructure Plan)
  - Renewable electricity (Zero emissions as default EBCE choice)
  - Organic waste prevention and management (SB 1383 implementation)
  - Community small engine electrification
  - Existing Building Electrification Plan
  - ~~Vehicle decarbonization (ZEV Infrastructure Plan)~~
  - Comprehensive climate awareness, education, and outreach
- Modeling suggests that the total net present value (NPV) City cost over the next ten years through 2031 of implementing all the primary CAP 2.0 actions will be **$2.8 million**—equivalent to around **$276,000 per year**.[1]
- The estimated NPV cost to the community over the next ten years through 2031 of implementing all the actions in the shortlist is a **net savings of $5.9 million**—equivalent to around **$587,000 in savings per year**. Much of these savings to the community are in the form of rebates/incentives and fuel cost savings.
- Implementing all the actions in the shortlist will require staff time, ranging from an estimated **1.6 FTE per year through 2031.** These FTE may be absorbed into existing staff duties or new staff may be hired. The following actions have the highest total FTE estimated from 2022-2031:
  - Wildfire preparation, prevention, and education
  - Increase transit ridership
  - ZEV Infrastructure Plan
  - VMT reduction for K-12 activities
  - Urban Forest Master Plan

This document is organized as follows:

- The **Overview** introduces the approach and key assumptions that drove the analysis.
- The **Findings Summary** provides the emissions reductions, City staff time, NPV, and cost-effectiveness for proposed CAP 2.0 actions.
- The remaining sections detail emissions reduction and cost results by sector**:**
  - **Buildings & Energy**
  - **Materials & Consumption**
  - **Natural Systems**
  - **Water Resources**
  - **Transportation & Land Use**
  - **Community Resilience & Wellbeing**

[1] Does not include City labor costs.

- A detailed **References** list documents the sources used to conduct the analyses.

Overview

This document summarizes findings from a quantitative assessment of the prioritized shortlist of actions for inclusion in the draft Pleasanton CAP 2.0. The quantitative assessment provides high-level estimates of the **costs** and **emission reductions** associated with each action (detailed below), to provide a defensible plan for meeting the City's emission reduction goals.

Some actions in the CAP are directly **quantifiable**, while others are not. Many of the actions in the prioritized shortlist may not be readily quantifiable, may result in inconsequential GHG reductions, or may have indirect benefits that do not result in emissions reductions as calculated in the City's inventory. These actions, often defined as "**supportive**," may be critical for implementation success even if they are not quantified. For example, actions to enhance energy battery storage are crucial for large-scale implementation of renewable energy and electrification, but do not themselves reduce GHG emissions. Another example is education and incentive programs, which can encourage reductions but do not necessarily result in significant reductions, depending on the reach, efficacy, and permanence of the implemented changes. In contrast, an ordinance to require all-electric new construction is a quantifiable action that carries a very high and defensible likelihood of significant and measurable emissions reductions.

Some proposed CAP 2.0 actions are focused on improving community resiliency to climate change impacts rather than reducing GHG emissions. While the resilience benefits of these **"climate adaptation" actions** were not quantified, taking action to build climate resiliency and preparedness are nonetheless critical for addressing climate change in the Pleasanton community and should be considered as an important part of Pleasanton's climate action strategy.

The project team took an action quantification approach like that taken by the City of Dublin for their recent CAP, which provided quantitative estimates for CAP measures (see table on the following page). The approach of quantifying actions ensures that the package of measures in the Pleasanton CAP 2.0 will result in sufficient emissions reductions needed to meet short-term goals and establish a strong foundation for meeting long-term goals.

Action impact was explicitly modelled based on **available information** and **case studies**, including data on historic and projected energy usage, population and development trends, and technology and policy impact. The consultant drew from literature and expert opinion—including studies done by the U.S. Department of Energy and California Air Resources Board—as well as from available City data and staff input.

Actions were analyzed based on predetermined implementation **timeframes**, which were categorized as follows:

- Near-term (1-3 years); 2022 to end of 2024
- Mid-term (4-7 years); 2025 to end of 2028
- Long-term (8-10 years); 2029 to end of 2031

Actions were further divided into the following categories:

- **Existing actions**: Actions that are already underway, planned, and/or budgeted for implementation and will result in future GHG emissions reductions.
- **Primary CAP actions**: Actions to be implemented as part of CAP 2.0 implementation.
- **Secondary CAP actions**: Actions to be implemented as time and resources allow.

Cost Estimation

Action implementation costs were estimated for both costs to the City and community:

- **Community costs** estimate how much it will cost an average resident, business, or developer to implement the measure as compared to a business-as-usual scenario.
- **City costs** estimate costs related to consultant services and procurement.

Like the impact analysis, the consultant estimated costs for all measures in the prioritized shortlist. The estimated cost was based on consultant experience, available literature, consultation with peer cities, and City staff input, and included the following cost elements:

- **Initial start-up costs**, in the form of consultant and capital expenses.
- **Ongoing costs** through 2031 over a 10-year timeframe, including continued labor expenses, maintenance, and monitoring/evaluation of resource needs.

City staff time required for action implementation was evaluated separately and is not included in the cost estimations as some of the anticipated staff time may be absorbed into existing City staff.

City staff reviewed the cost estimations—especially the City cost element (e.g., estimated FTE requirements). To the extent possible, the consultant provided citations for consulted literature and case studies, although information on climate action costs is very limited at this time.

Where known, the analysis includes consideration of partnerships. However, the analysis does not include potential grants and other funding sources, so estimates here may be conservative representations of the City's final cost. A more detailed funding plan will be provided in future stages of the plan.

Emission Reduction Estimation

The consultant explicitly modelled emissions reductions associated with proposed CAP 2.0 actions. Modeling built from the emissions forecast and considered interacting actions to avoid double counting, such as impacts of EV vehicle use on community electricity consumption. All assumptions are provided for transparency and City/stakeholder review and outcomes are visualized in both table and graphical format.

Findings Summary

Results from the cost and impact analysis are summarized in the table below. The "Summary At-a-Glance" table on the subsequent page includes the following information associated with each proposed CAP 2.0 action:

- **Net Present Value (NPV) cost to the City and community:** The anticipated net cost of the action for the City government and Pleasanton community, considering current and future costs and cost savings benefits (through 2031). Negative NPV values represent cost savings.
- **GHG savings:** Estimated cumulative GHG emission reduction benefits resulting from action implementation (through 2030).
- **Cost effectiveness:** Estimated cost effectiveness of the action (cost per unit GHG emission reduction achieved).
- **Co-benefits:** Benefits that would result from the action in addition to direct climate benefits, including resilience, equity, job creation, public health, ecosystem and habitat health, and mobility and transport safety. In addition to the co-benefits highlighted, many actions—including many not quantified for GHG savings—also present an opportunity for City leadership, are foundational to overall sustainability or to ensure the success of more directly impactful actions, or support youth engagement and capacity for climate action

The Summary At-a-Glance table is followed by the following additional summary sections:

- **GHG Reductions** highlights the combined impact of all strategies and actions in reaching Pleasanton's overall and per capita emissions reduction targets. It also summarizes which strategies and actions contribute most to emissions reduction.
- **Cost** details the estimated city staff time, in FTE, required to implement CAP 2.0. It also includes the NPV cost by strategy and by action, organized by sector.
- **Cost effectiveness** includes the overall cost-effectiveness of CAP 2.0 implementation for the City and community, highlights the most cost-effective actions, and summarizes cost effectiveness for every action.

Summary At-a-Glance

Co-Benefits Key					
Resilience		Public health		Ecosystem and habitat health	
Equity		Job creation		Mobility & transport safety	

Acronym/Abbreviation Key		
Comm.	Community	
NPV	Net present value	Net current value of all current and future cash flows associated with the project; considers both costs and cost savings (i.e., benefits). Negative values are a net cost savings.
GHG	Greenhouse gas	Methane, carbon dioxide, and nitrous oxides that contribute to climate change
$MTCO_2e$	Metric tons carbon dioxide equivalent	Common unit for quantifying GHG emissions
	Denotes actions with notable direct or indirect GHG savings that were not quantified due to measurement constraints.	

			NPV Costs ($)		GHG savings (MTCO2e)	Cost Effectiveness ($/MTCO2e)		Co-benefits
Sector	ID	Action	NPV Costs to City	NPV Costs to Community	Cumulative Savings - to 2030	City	Comm-unity	
BE	P1	All-electric reach code	$49,020	($2,784,572)	10,136	$5	($275)	
BE	P2	Existing Building Electrification Plan	$138,455	$137,032	~~16,511~~49,533	$~~38~~	$~~38~~	
BE	S1	Refrigerant management in new construction	$42,675	($262,307)		N/A	N/A	
BE	P3	Modify Municipal Code definition of covered projects	$0	$287,074	1,290	$0	$223	
BE	S2	Community energy efficiency upgrades	$958,041	($1,959,201)	8,260~~7,450~~	$116~~29~~	($237~~63~~)	
BE	S3	Energy Benchmarking and City Facility Retrofits	($3,103,111)	$0	351	($8,833)	$0	
BE	E2	Zero emissions energy as default EBCE choice	N/A	N/A	~~2~~269,609~~55,712~~	N/A	N/A	
BE	P4	Solar and storage on new construction	$0	$0	2,341	$0	$0	
TLU	P5	ZEV Infrastructure Plan	$217,582	($31,005)	~~118,182~~315,283	$~~12~~	$0	
TLU	P6	Small-engine and off-road equipment electrification - municipal	$0	$0		N/A	N/A	
TLU	P7	Small-engine electrification - community	$0	($2,448,960)	~~6,250~~76,247	$0	($323~~92~~)	

			NPV Costs ($)		GHG savings (MTCO2e)	Cost Effectiveness ($/MTCO2e)		Co-benefits
Sector	ID	Action	NPV Costs to City	NPV Costs to Community	Cumulative Savings - to 2030	City	Comm-unity	
TLU	E3	Bicycle, pedestrian, and trails network expansion	N/A	N/A	5,883~~6,409~~	N/A	N/A	
TLU	P8	Bicycle amenities	$0	$2,492,542	1,753~~909~~	$0	$1,422~~3~~ ~~05~~	
TLU	P9	Bicycle rack incentive program	$7,562	($777,244)	1,650~~823~~	$5~~4~~	($472~~26~~)	
TLU	P10	Increase transit ridership	$75,384	($585,351)	4,601~~5,072~~	$1~~65~~	($127~~15~~)	
TLU	S4	VMT reduction for K-12 activities	$571,058	($6,358,627)	~~12,695~~11,663	$4~~95~~	($546~~01~~)	
TLU	E6	Housing Element	N/A	N/A	17,257~~8,781~~	N/A	N/A	
TLU	P11	Promote LEED Neighborhood Development	$910	($849,750)	15,331~~6,595~~	$0	($5~~5~~1)	
MC	E10	Textile recovery	N/A	N/A		N/A	N/A	
MC	P12	Single use plastic reduction	$0	$0		N/A	N/A	
MC	S6	Embodied carbon reduction plan	$0	($88,625)		N/A	N/A	
MC	S5	Environmentally preferable purchasing policy	$0	$0		N/A	N/A	
NS	P13	Urban Forest Master Plan	$486,089	$469,585	~~366,263~~1,195	$4~~07~~1	$3~~93~~1	
NS	P14	Soil management carbon sequestration projects	$34,711	$2,868,511	3,890	$9	$737	
NS	S7	Carbon sequestration research and tracking	$0	$0		N/A	N/A	
WR	P15	Water efficiency programs including water fixture retrofits	$1,634,626	($4,650,298)		N/A	N/A	
WR	S8	Green Stormwater Infrastructure Plan	$0	$0		N/A	N/A	
WR	E17	On-site stormwater management	N/A	N/A		N/A	N/A	
CRW	E21	Community gardens	N/A	N/A		N/A	N/A	
CRW	S9	Wildfire preparation, prevention, and education	$0	$0		N/A	N/A	
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	$118,522	$0	~~27,382~~26,254	$5~~4~~	$0	
		TOTAL	**$1,231,524**	**($14,541,197)**	**~~872,633~~822,527**	**$1**	**-$1~~87~~**	

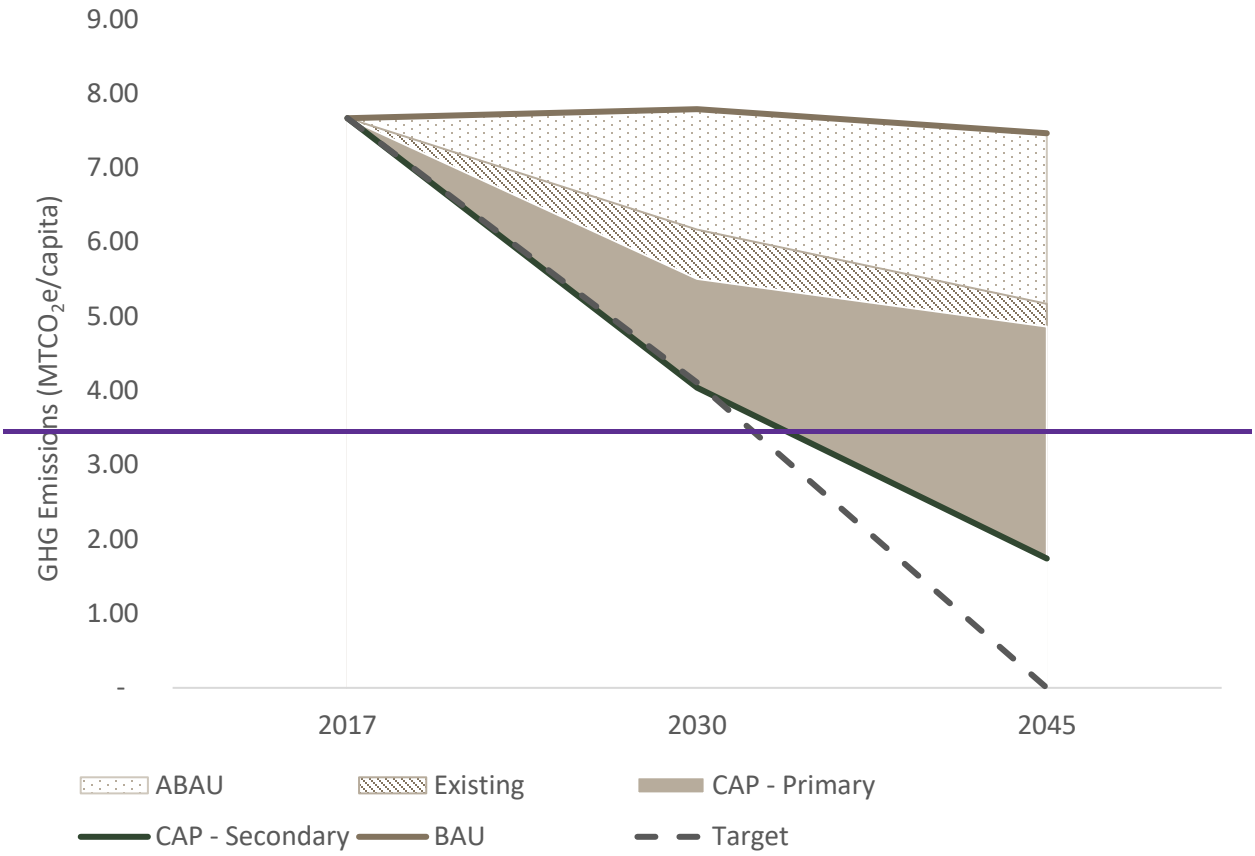
**Blank cells were not quantified.*

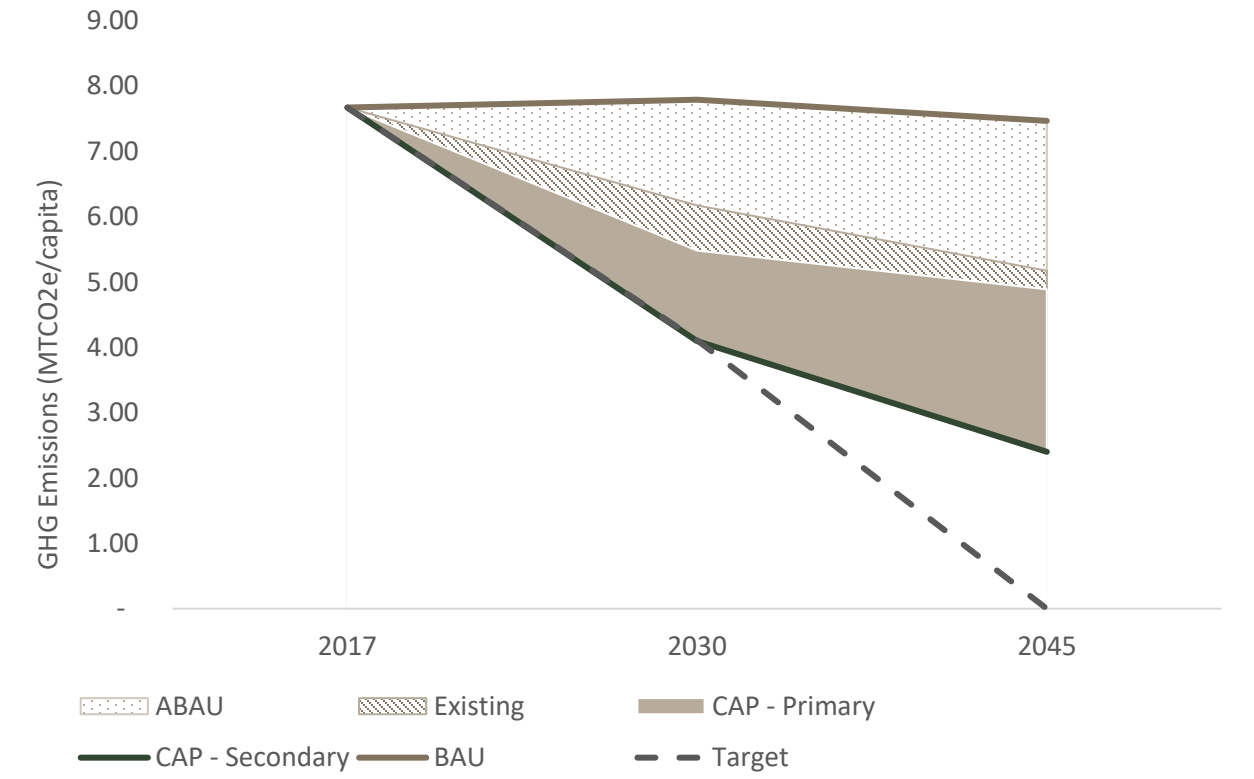
GHG Reductions

Modeling suggests that proposed CAP 2.0 primary measures result in the City achieving its 2030 emission goal (4.11 $MTCO_2e$ per capita) and SB 32 requirements. Specifically, modeling indicates the City could surpass this goal—reducing emissions to 4.0~~9~~5 $MTCO_2e$ per capita in 2030. The following CAP strategies and actions are the highest contributors of GHG emission reductions through 2030:

- Vehicle decarbonization (ZEV Infrastructure Plan)
- Renewable electricity (Zero emissions as default EBCE choice)
- Organic waste prevention and management (SB 1383 implementation)
- Community small engine electrification
- Existing Building Electrification Plan
- Comprehensive climate awareness, education, and outreach

Figure 1. Aggregated pre-capita GHG emissions.


9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
-
GHG Emissions (MTCO2e/capita)
2017
2030
2045
ABAU
Existing
CAP - Primary
CAP - Secondary
BAU
Target


9.00
8.00
7.00
6.00
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4.00
3.00
2.00
1.00
-
GHG Emissions (MTCO2e/capita)
2017
2030
2045
ABAU
Existing
CAP - Primary
CAP - Secondary
BAU
Target

Acronym Key:

ABAU: adjusted business-as-usual; emission reductions resulting from external federal and state policies.
Existing: emission reductions resulting from continuation of existing City actions.
CAP - Primary: Emission reductions resulting from primary CAP 2.0 action implementation.
CAP - Secondary: Emission reductions resulting from secondary CAP 2.0 action implementation.
BAU: business-as-usual; emissions trajectory assuming no climate action.
Target: Target emissions trajectory

Table 1. GHG emission reductions associated with state and federal legislation adjustments, all potential CAP 2.0 strategies and actions, and existing City actions (in MTCO2e). Unless otherwise indicated, reductions are isolated to those achieved within the indicated year compared to the BAU scenario. Cumulative values are through 2030.

			MTCO2e Reductions (mass)			MTCO2e Reductions (per capita)		
Sector	**Strategy**	**Type**	**Cumulative to 2030**	**2030**	**2045**	**Cumulative to 2030**	**2030**	**2045**
All	ABAU reduction		947,836 ~~3,980,004~~	134,477	224,576	11.42 ~~47.94~~	1.62	2.29
BE	Decarbonization of buildings	Existing	271,838 ~~257,942~~	29,649 ~~26,619~~	(0)	3.27 ~~3.11~~	0.36 ~~0.32~~	(0.00)
BE	Decarbonization of buildings	Primary	59,668 ~~26,647~~	15,698 ~~6,985~~	41,059 ~~28,992~~	0.72 ~~0.32~~	0.19 ~~0.08~~	0.42 ~~0.30~~
BE	Decarbonization of buildings	Secondary	-	-	-	-	-	-
BE	Energy efficiency & consumption	Existing	-	-	-	-	-	-
BE	Energy efficiency & consumption	Primary	1,290	279	65	0.02	0.00	0.00
BE	Energy efficiency & consumption	Secondary	8,611 ~~7,802~~	1,335 ~~1,148~~	0	0.10 ~~0.09~~	0.02 ~~0.01~~	0.00
BE	Renewable energy generation & storage	Existing	-	-	-	-	-	-
BE	Renewable energy generation & storage	Primary	2,341	726	(0)	0.03	0.01	(0.00)
BE	Renewable energy generation & storage	Secondary	-	-	-	-	-	-
TLU	Active, shared transport	Existing	11,722 ~~12,698~~	1,839 ~~2,102~~	427 ~~1,112~~	0.14 ~~0.15~~	0.02 ~~0.03~~	0.00 ~~0.01~~
TLU	Active, shared transport	Primary	19,666 ~~21,500~~	4,220 ~~4,819~~	1,452 ~~3,783~~	0.24 ~~0.26~~	0.05 ~~0.06~~	0.01 ~~0.04~~
TLU	Active, shared transport	Secondary	-	-	-	-	-	-
TLU	Sustainable land use	Existing	17,257 ~~18,781~~	3,251 ~~3,712~~	865 ~~2,254~~	0.21 ~~0.23~~	0.04	0.01 ~~0.02~~
TLU	Sustainable land use	Primary	15,331 ~~16,595~~	1,577 ~~1,800~~	372 ~~968~~	0.18 ~~0.20~~	0.02	0.00 ~~0.01~~
TLU	Sustainable land use	Secondary	-	-	-	-	-	-
TLU	Vehicle decarbonization	Existing	-	-	-	-	-	-
TLU	Vehicle decarbonization	Primary	391,530 ~~124,432~~	85,195 ~~26,798~~	209,826 ~~73,039~~	4.72 ~~1.50~~	1.03 ~~0.32~~	2.14 ~~0.75~~
TLU	Vehicle decarbonization	Secondary	-	-	-	-	-	-
MC	Waste diversion	Existing	135,118	22,585	26,499	1.63	0.27	0.27
MC	Waste diversion	Primary	-	-	-	-	-	-
MC	Waste diversion	Secondary	-	-	-	-	-	-
MC	Sustainable consumption	Existing	-	-	-	-	-	-
MC	Sustainable consumption	Primary	-	-	-	-	-	-
MC	Sustainable consumption	Secondary	-	-	-	-	-	-
NS	Carbon sequestration & ecosystem resilience	Existing	-	-	-	-	-	-
NS	Carbon sequestration & ecosystem resilience	Primary	5,085 ~~370,153~~	860 ~~73,874~~	1,259 ~~195,961~~	0.06 ~~4.46~~	0.01 ~~0.89~~	0.01 ~~2.00~~
NS	Carbon sequestration & ecosystem resilience	Secondary	-	-	-	-	-	-
WR	Supply & conservation	Existing	-	-	-	-	-	-
WR	Supply & conservation	Primary	-	-	-	-	-	-

WR	Supply & conservation	Secondary	-	-	-	-	-	-
WR	Stormwater resilience	Existing	-	-	-	-	-	-
WR	Stormwater resilience	Primary	-	-	-	-	-	-
WR	Stormwater resilience	Secondary	-	-	-	-	-	-
CRW	Community resilience & vulnerability	Existing	-	-	-	-	-	-
CRW	Community resilience & vulnerability	Primary	26,254 ~~27,382~~	5,133 ~~5,471~~	1,829 ~~2,966~~	0.32 ~~0.33~~	0.06 ~~0.07~~	0.02 ~~0.03~~
CRW	Community resilience & vulnerability	Secondary	-	-	-	-	-	-
	Total Reduction		1,913,547 ~~5,002,682~~	306,823 ~~311,394~~	508,227 ~~560,215~~	23.05 ~~60.26~~	3.70 ~~3.75~~	5.19 ~~5.72~~
	Resulting Emissions		6,128,331 ~~14,161,216~~	339,821 ~~335,250~~	222,328 ~~170,341~~	N/A	4.09 ~~4.04~~	2.27 ~~1.74~~

Table 2. Top 10 actions for reducing GHG emissions through 2030.

			MTCO2e Reductions (mass), by year		MTCO2e Reductions (mass), cumulative	
	ID	Action	2030	2045	Cumulative - to 2030	Cumulative - to 2045
1	P5P13	ZEV Infrastructure PlanUrban Forest Master Plan	67,550 73,253	186,998195, 340	315,283366, 263	2,263,229 2,441,753
2	E2	Zero emissions energy as default EBCE choice	29,457 26,427	(0)0	269,609 255,712	485,837 450,820
3	E7	SB 1383 Implementation	22,585	26,499	135,118	506,627
4	P7P5	Small-engine electrification - communityZEV Infrastructure Plan	17,646 25,352	22,828 71,168	76,247118,1 82	382,395 855,919
5	P2P16	Existing Building Electrification PlanComprehensive climate awareness, education, and outreach	13,070 5,471	18,101 2,966	49,533 27,382	285,836 88,397
6	P16E6	Comp. climate awareness, education, and outreach Housing Element	5,133 3,712	1,829 2,254	26,254 18,781	75,906 64,737
7	E6P11	Housing ElementPromote LEED Neighborhood Development	3,251 1,800	865 968	17,257 16,595	48,585 36,331
8	P11P2	Promote LEED Neighborhood DevelopmentExisting Building Electrification Plan - VOLUNTARY	1,577 4,357	372 6,034	15,331 16,511	28,784 95,279
9	S4	VMT reduction for K-12 activities	2,211 2,525	523 1,363	11,663 12,695	30,606 40,484
10	P1	All-electric reach code	2,628	22,959	10,136	204,985

Table 3. Emissions trajectories under examined scenarios.

	MTCO2e Emissions (mass emissions)		MTCO2e Emissions (per capita)	
	In 2030	In 2045	In 2030	In 2045
BAU	646,644	730,555	7.79	7.47
ABAU	512,167	505,979	6.17	5.17
Existing	454,844 457,150	478,189 476,114	5.48 5.51	4.89 4.87
CAP - Primary	341,155 336,398	222,328 170,341	4.11 4.05	2.27 1.74
CAP - Secondary	339,821 335,250	222,328 170,341	4.09 4.04	2.27 1.74
% CAP Reduction (compared to 1990 baseline)	51%	68%75%	70%	83%87%
Target	341,188	-	4.11	-
Gap	(33) (4,791)	222,328 170,341	(0.00)(0.06)	2.27 1.74

Cost

City Staff Time

The consultant examined anticipated City staff resources required for CAP implementation, detailed by action below. City staff time are presented in full-time equivalencies (FTE). City staff FTE are a required City resource—the FTE requirements may become part of existing staff duties and assigned to various divisions, or new staff may be required.

Sector	ID	Action	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
B&E	P1	All-electric reach code	0.00	0.00									**0.00**
B&E	P2	Existing Building Electrification Plan					0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
B&E	S1	Refrigerant management in new construction								0.00	0.00	0.00	**0.00**
B&E	P3	Modify Municipal Code definition of covered projects	0.02										**0.02**
B&E	S2	Community energy efficiency upgrades				0.25	0.10	0.10	0.10	0.10	0.10	0.10	**0.85**
B&E	S3	Energy Benchmarking and City Facility Retrofits	0.25	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	**0.97**
B&E	E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice											**0.00**
B&E	P4	Solar and storage on new construction	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.11**
T&LU	P5	ZEV Infrastructure Plan			1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	**4.50**
T&LU	P6	Small-engine and off-road equipment electrification - municipal				0.05	0.05	0.05	0.05	0.05	0.05	0.05	**0.35**
T&LU	P7	Small-engine electrification - community	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	**0.23**
T&LU	E3	Bicycle, pedestrian, and trails network expansion											**0.00**
T&LU	P8	Bicycle amenities including required bike parking at MF/Comm developments	0.02										**0.02**
T&LU	P9	Bicycle rack incentive program				0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.07**
T&LU	P10	Increase transit ridership								0.59	0.59	0.59	**1.76**
T&LU	S4	VMT reduction for K-12 activities	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			**4.00**
T&LU	E6	Housing Element											**0.00**
T&LU	P11	Promote LEED Neighborhood Development								0.02	0.01	0.01	**0.04**
M&C	E10	Textile recovery		0.01									**0.01**
M&C	P12	Single use plastic reduction	0.07	0.07	0.07	0.07							**0.27**
M&C	S6	Embodied carbon reduction plan								0.05	0.08	0.08	**0.21**
M&C	S5	Environmentally preferable purchasing policy	0.02										**0.02**
NS	P13	Urban Forest Master Plan	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	**4.00**
NS	P14	Soil management carbon sequestration projects	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	**2.50**

Sector	ID	Action	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
NS	S7	Carbon sequestration research and tracking				0.02	0.02	0.02	0.02	0.02	0.02	0.02	**0.13**
WR	P15	Water efficiency programs including water fixture retrofits	0.06	0.06	0.06	0.06	0.06						**0.30**
WR	S8	Green Stormwater Infrastructure Plan								0.10	0.10	0.10	**0.30**
WR	E17	On-site stormwater management											**0.00**
CRW	E21	Community gardens											**0.00**
CRW	S9	Wildfire preparation, prevention, and education	1.50	1.50	1.50	1.50	1.50						**7.50**
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	0.36	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	**1.80**
		TOTAL	**3.52**	**3.06**	**4.05**	**3.88**	**3.66**	**2.10**	**2.10**	**2.86**	**2.37**	**2.37**	**29.97**

Other Costs

Modeling suggests that the total net present value (NPV) City cost through 2031 of implementing all primary CAP 2.0 actions will be $2.8 million—equivalent to around $276,000 per year.[2] The estimated cost to the community through 2031 is a net savings of $5.9 million—equivalent to around $587,000 per year. Much of these savings to the community are in the form of rebates/incentives and fuel cost savings.

Table 4. Net costs associated with proposed CAP 2.0 strategies and actions therein (negative values are net cost savings).

			Net Cost to City	Net Cost to Community
Sector	**Strategy**		**NPV to 2030**	**NPV to 2030**
BE	Decarbonization of buildings	Primary	$187,475	($2,647,540)
BE	Decarbonization of buildings	Secondary	$42,675	($262,307)
BE	Energy efficiency & consumption	Primary	$0	$287,074
BE	Energy efficiency & consumption	Secondary	($2,145,070)	($1,959,201)
BE	Renewable energy generation & storage	Primary	$0	$0
BE	Renewable energy generation & storage	Secondary	$0	$0
TLU	Active, shared transport	Primary	$82,946	($1,319,014)
TLU	Active, shared transport	Secondary	$571,058	($6,358,627)
TLU	Sustainable land use	Primary	$910	($849,750)
TLU	Sustainable land use	Secondary	$0	$0
TLU	Vehicle decarbonization	Primary	$217,582	($31,005)
TLU	Vehicle decarbonization	Secondary	$0	$0
MC	Waste diversion	Primary	$0	$0
MC	Waste diversion	Secondary	$0	$0
MC	Sustainable consumption	Primary	$0	$0
MC	Sustainable consumption	Secondary	$0	($88,625)
NS	Carbon sequestration & ecosystem resilience	Primary	$520,801	$3,338,096
NS	Carbon sequestration & ecosystem resilience	Secondary	$0	$0
NS	Ecosystem resilience	Primary	$0	$0
NS	Ecosystem resilience	Secondary	$0	$0
WR	Supply & conservation	Primary	$1,634,626	($4,650,298)
WR	Supply & conservation	Secondary	$0	$0
WR	Stormwater resilience	Primary	$0	$0
WR	Stormwater resilience	Secondary	$0	$0
CRW	Community resilience & vulnerability	Primary	$118,522	$0
CRW	Community resilience & vulnerability	Secondary	$0	$0
	TOTAL		**$1,231,524**	**($14,541,197)**
	AVG PER YEAR		**$123,152**	**($1,454,120)**
	AVG PER CAPITA-YEAR		**$2**	**($18)**
	TOTAL (PRIMARY ONLY)		**$2,762,861**	**($5,872,437)**
	AVG PER YEAR (PRIMARY ONLY)		**$276,286**	**($587,244)**

[2] Does not include costs associated with City staff time or potential funding sources (e.g., grants).

Sector	Strategy		Net Cost to City NPV to 2030	Net Cost to Community NPV to 2030
	AVG PER CAPITA-YEAR (PRIMARY ONLY)		$1,940	($4,125)
	TOTAL (SECONDARY ONLY)		($1,531,337)	($8,668,760)
	AVG PER YEAR (SECONDARY ONLY)		($153,134)	($866,876)
	AVG PER CAPITA-YEAR (SECONDARY ONLY)		($20)	($113)

*Using average projected population over the implementation period (2022 through end of 2031).

Table 5. Net present value (NPV) net cost estimates for CAP 2.0 action implementation (through 2031).

Sector	ID	Action	NPV Costs to City	NPV Costs to Community
B&E	P1	All-electric reach code	$49,020	($2,784,572)
B&E	P2	Existing Building Electrification Plan	$138,455	$137,032
B&E	S1	Refrigerant management in new construction	$42,675	($262,307)
B&E	P3	Modify Municipal Code definition of covered projects	$0	$287,074
B&E	S2	Community energy efficiency upgrades	$958,041	($1,959,201)
B&E	S3	Energy Benchmarking and City Facility Retrofits	($3,103,111)	$0
B&E	E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice		
B&E	P4	Solar and storage on new construction	$0	$0
T&LU	P5	ZEV Infrastructure Plan	$217,582	($31,005)
T&LU	P6	Small-engine and off-road equipment electrification - municipal	$0	$0
T&LU	P7	Small-engine electrification - community	$0	($2,448,960)
T&LU	E3	Bicycle, pedestrian, and trails network expansion		
T&LU	P8	Bicycle amenities including required bike parking at MF/Comm developments	$0	$2,492,542
T&LU	P9	Bicycle rack incentive program	$7,562	($777,244)
T&LU	P10	Increase transit ridership	$75,384	($585,351)
T&LU	S4	VMT reduction for K-12 activities	$571,058	($6,358,627)
T&LU	E6	Housing Element		
T&LU	P11	Promote LEED Neighborhood Development	$910	($849,750)
M&C	E10	Textile recovery		
M&C	P12	Single use plastic reduction	$0	$0
M&C	S6	Embodied carbon reduction plan	$0	($88,625)
M&C	S5	Environmentally preferable purchasing policy	$0	$0
NS	P13	Urban Forest Master Plan	$486,089	$469,585
NS	P14	Soil management carbon sequestration projects	$34,711	$2,868,511
NS	S7	Carbon sequestration research and tracking	$0	$0
WR	P15	Water efficiency programs including water fixture retrofits	$1,634,626	($4,650,298)
WR	S8	Green Stormwater Infrastructure Plan	$0	$0
WR	E17	On-site stormwater management		
CRW	E21	Community gardens		
CRW	S9	Wildfire preparation, prevention, and education	$0	$0
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	$118,522	$0
		TOTAL	**$1,231,524**	**-$14,541,197**

Cost Effectiveness

On average, modeling suggests that implementing all the actions on the shortlist will cost the City $2~~6~~ per $MTCO_2e$ reduced and will save the community about $18~~1~~ per $MTCO_2e$ reduced. Highly cost-effective actions include:

- All-electric reach code
- Existing Building Electrification Plan
- ZEV Infrastructure Plan
- Bicycle rack incentive program
- Required bike parking at MF/Comm developments
- LEED Neighborhood development
- ~~Urban Forest Master Plan~~
- Housing Element of General Plan
- Community climate outreach

Table 6. Cost effectiveness of proposed draft CAP 2.0 actions. Actions marked as "N/A" were not quantified for GHG emission reductions.[3]

			Cost Effectiveness ($/MTCO2e)	
Sector	ID	Action	City	Community
BE	P1	All-electric reach code	$5	($275)
BE	P2	Existing Building Electrification Plan	$3 ~~$8~~	$3 ~~$8~~
BE	S1	Refrigerant management in new construction	N/A	N/A
BE	P3	Modify Municipal Code definition of covered projects	$0	$223
BE	S2	Community energy efficiency upgrades	$116 ~~$129~~	($237)~~($263)~~
BE	S3	Energy Benchmarking and City Facility Retrofits	($8,833)	$0
BE	E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice	N/A	N/A
BE	P4	Solar and storage on new construction	$0	$0
TLU	P5	ZEV Infrastructure Plan	$1 ~~$2~~	($0)
TLU	P6	Small-engine and off-road equipment electrification - municipal	N/A	N/A
TLU	P7	Small-engine electrification - community	$0	($32)~~($392)~~
TLU	E3	Bicycle, pedestrian, and trails network expansion	N/A	N/A
TLU	P8	Bicycle amenities including required bike parking at MF/Comm developments	$0	$1,422 ~~$1,305)~~
TLU	P9	Bicycle rack incentive program	$5 ~~$4~~	($472)~~($426)~~
TLU	P10	Increase transit ridership	$16 ~~$15~~	($127)~~($115)~~
TLU	S4	VMT reduction for K-12 activities	$49 ~~$45~~	($546)~~($501)~~
TLU	E6	Housing Element	N/A	N/A
TLU	P11	Promote LEED Neighborhood Development	$0	($55) ~~$51~~
MC	E10	Textile recovery	N/A	N/A
MC	P12	Single use plastic reduction	N/A	N/A
MC	S6	Embodied carbon reduction plan	N/A	N/A
MC	S5	Environmentally preferable purchasing policy	N/A	N/A
NS	P13	Urban Forest Master Plan	$407 ~~$1~~	$393 ~~$1~~
NS	P14	Soil management carbon sequestration projects	$9	$737
NS	S7	Carbon sequestration research and tracking	N/A	N/A
WR	P15	Water efficiency programs including water fixture retrofits	N/A	N/A
WR	S8	Green Stormwater Infrastructure Plan	N/A	N/A

[3] Table presents costs over implementation timeframe (2022 to 2031) divided by cumulative $MTCO_2e$ reductions through target year (2030).

			Cost Effectiveness ($/MTCO2e)	
Sector	ID	Action	City	Community
WR	E17	On-site stormwater management	N/A	N/A
CRW	E21	Community gardens	N/A	N/A
CRW	S9	Wildfire preparation, prevention, and education	N/A	N/A
CRW	P16	Comprehensive climate awareness, education, recognition, and outreach	$5 ~~$4~~	$0
		TOTAL	**$2 ~~$1~~**	**($17)**

Buildings & Energy

GHG Reductions

GHG analysis assumptions and outcomes for the buildings & energy sector are summarized below. Blank "MTCO2e savings" cells indicate that the action was identified as supportive and not quantified.

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/ Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
P1	All-electric reach code	Yes	Direct	Near-term (0-3 years)	- 90% of natural gas switch to electricity for all new construction (assumes some exceptions).	N/A	337,817	204,985	10,136
P2	Existing Building Electrification Plan - VOLUNTARY	Yes	Direct	Mid-term (4-7 years)	- 15% switch to electric by 2030. - Replace 30% of space/water heating equipment by 2030	Dublin CAP estimated 22% retrofits to all-electric (Appendix C, p.12) given heating energy use trends and equipment life spans	~~183,603~~550,810	~~95,279~~285,836	49,533~~16,511~~
S1	Refrigerant management in new construction	Yes	Supportive	Long-term (8-10 years)	N/A		-	-	-
P3	Modify Municipal Code definition of covered projects	Yes	Direct	Near-term (0-3 years)	- Covered buildings are 25% more efficient than previously.	US Green Building Council	15,945	7,748	1,290
S2	Community energy efficiency upgrades	Yes	Direct	Mid-term (4-7 years)	- 2025 start date. - 15% reduction in energy use as a result of program. (Assume slightly more savings than source due to inclusion of incentives.)	Dublin CAP identifies a meta-analysis that found that education-only campaigns can produce 10-12% energy savings.	43,479 ~~38,520~~	17,907 ~~15,795~~	8,260 ~~7,450~~
S3	Energy Benchmarking and City Facility Retrofits	Yes	Direct	Near-term (0-3 years)	- 20% reduction in City facility energy use by 2025, steady thereafter.	ACEEE 2018	1,517	590	351

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/ Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice	Yes	Direct	Near-term (0-3 years)	- Zero electricity EF for residential/commercial starting in 2023. - Assume 5% opt-out rate.	California Public Utilities Commission (as referenced in Dublin CAP Appendix C, p. 5); EBCE	485,837 ~~1,097,221~~	485,837 ~~431,792~~	269,609 ~~244,964~~
P4	Solar and storage on new construction	Yes	Direct	Near-term (0-3 years)	- 90% of new construction will have on-site solar by 2030, with continuing trend thereafter.	Consistent with voluntary participation rate cited in Action 1176.	36,981	18,135	2,341
P15	Water efficiency and retrofits	Both	Supportive	Mid-term (4-7 years)	- 3% reduction in activity data by 2030 (energy consumption, solid waste disposal); ramping up starting in 2022; steady thereafter.	Consultant estimate	33,421 ~~31,234~~	14,190 ~~13,241~~	5,642 ~~5,327~~
E1	Maintain the highest renewable energy choice as the default for all municipal facilities, including opportunities to secure Power Purchase Agreements with other EBCE jurisdictions.	Yes	Direct	Ongoing	- All electricity use is zero emissions in 2022 and beyond.	Consultant estimate	9,306	3,577	2,230

Cost

Cost assumptions and outcomes for the buildings & energy sector are summarized below:

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P1	All-electric reach code	$49,020	($2,784,572)	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies; Dublin CAP - Appx C p. 8	Staff time required for cost effectiveness evaluation plus community outreach, reach code development, drafting an ordinance for City Council consideration, and initial implementation of the new ordinance. Reach code takes two years to get into place.	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies; Dublin CAP - Appx C p. 7; Electrification Cost Effectiveness Memo_Update_Final	All-electric buildings are generally cheaper to build and cheaper to operate over time when compared to traditional buildings with both gas and electricity - Assume $95/yr in net utility savings per single-family household, $21/yr for multi-family homes, $24,300/yr for businesses (blend of retail and office buildings). Assumes new construction reflected by anticipated increases in households and businesses.
P2	Existing Building Electrification Plan	$138,455	$137,032	ACEEE Electrifying Commercial Buildings 2020 p. v; Dublin CAP - Appx C p. 13	One-time costs are to develop the plan and electrify municipal buildings. FTE is for ongoing implementation.	E3 report p. xi, 66 & 81; ACEEE Electrifying Commercial Buildings 2020 p. v; Dublin CAP - Appx C p. 13	According to E3, 84% of single-family households and 8% of multifamily households would achieve net lifecycle cost savings by completing a retrofit of the HVAC and hot water heater. An additional 16% of single-family homes and 39% of multifamily homes would see lifecycle costs of less than $100 a year. (The remaining 53% of multifamily households could see up to $200/yr added costs.) ACEEE's 2020 study found that 27% of commercial floor space heated with fossil fuel systems can be electrified today with a simple payback of less than 10 years and without any rebates or carbon pricing. To achieve a 10% overall reduction in natural gas use by 2030, retrofits on 20% of multi-family homes (8% with net savings, 12% with $100/yr lifecycle costs) are assumed to begin mid-way into the implementation period to allow for program ramp-up.

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
S1	Refrigerant management in new construction	$42,675	($262,307)	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies. Like action 1001 (Dublin CAP - Appx C p. 8) but forging new ground; good background info: https://www.cmsmechanical.com/the-path-to-a-safe-refrigerant-transition/	Staff time required for community outreach, standards/code development, and implementation. Standards/code takes three years to get into place.	https://explorer.localenergycodes.com/pleasanton-city/forecast/12-PGE/studies/1,2,3	While low GWP refrigerants impact consumer up-front costs, high efficiency appliances are cheaper to operate over time - Assume $150 in net annual savings per single family household.
P3	Modify Municipal Code definition of covered projects	$0	$287,074	CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies. Like action 1001 (Dublin CAP - Appx C p. 8) but no need for cost-effectiveness study; requires more community outreach and education than amending energy code: https://localenergycodes.com/content/reach-codes/building-efficiency-renewables	Staff time required for community outreach, code development, and implementation. Assumes 1 year for code update to get into place.	https://explorer.localenergycodes.com/pleasanton-city/forecast/12-PGE/studies/2,3?exclude_package_types=13,19,55,1,4,6,20,15&show_only_cost_effectiveness=	Expanding electrification requirements to cover new multi-family housing and commercial buildings may increase annual costs ($168 per multi-family household), however including energy efficiency and high efficiency appliance requirements will likely result in substantial net savings ($1,389 per retail building).

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
S2	Community energy efficiency upgrades	$958,041	($1,959,201)	EPA Energy Star Portfolio Manager p. 10; Ann Arbor CAP 3.0 - p. 52-55; Dublin CAP - Appx C p. 10	Assumes staff time for program implementation and annual funding for energy audits (300 per year averaging $500 each); one-time cost to develop and set up incentives and annual cost to partner with organizations and offer rebates to enable low-income residents to benefit from energy efficiency improvements. Assumes rebates averaging $10k covering half of Pleasanton households with under $50k annual incomes during the 10-year period.	EPA Energy Star Portfolio Manager p. 10; Dublin CAP - Appx C p. 10	Annual savings for City-funded energy audits (300 per year averaging $500 each) plus net energy savings related to undertaking energy efficiency and renewable energy improvements.
1167	LEED certification for new construction			CA Energy Codes & Standards Cost-Effectiveness Explorer 2019 Pleasanton studies. Similar to action 1001 (Dublin CAP - Appx C p. 8) but may require analysis beyond existing studies: https://localenergycodes.com/content/reach-codes/building-efficiency-renewables	One-time required for initial analysis to ensure effort will result in desired energy/GHG savings plus community outreach, code development, drafting an ordinance for City Council consideration, and implementation of the new ordinance. Code revision takes 1 year to get into place.	US GBC policy brief 2018; LEEDv4 in SF 2017; Browne 2020 p. 8	LEED Silver typically can be achieved with no additional costs; improves the quality, efficiency, and comfort of new buildings at no additional net cost to building owners and occupants. Achieving desired energy and GHG savings will also result in net utility savings for new construction, assumes 20% as seen in DC.

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
S3	Energy Benchmarking and City Facility Retrofits	($3,103,111)	$0	Corte Madera CAP p. 43-44; https://www.energysage.com/local-data/solar-panel-cost/ca/alameda-county/pleasanton/; https://www.energysage.com/local-data/energy-storage-cost/ca/alameda-county/pleasanton/	Assume staff and consultant time for benchmarking + performance monitoring; energy efficiency measures selected achieving 12-year simple payback shown as annual savings starting in year 3, including lighting and upgrades totaling $560k plus installing solar+storage at 20 city facilities averaging 60 kW of PV each (averaging 14% capacity factor) and 52 kWh of batteries.	n/a - city facilities	n/a - city facilities
E2	Zero emissions energy as default East Bay Community Energy (EBCE) choice			EBCE Power Mix & Compare Plans; Dublin CAP - Appx C p. 24	Staff time for cost effectiveness analysis, supporting decision-making, and supporting education/outreach.	EBCE Power Mix & Compare Plans; Community Power Coalition; Dublin CAP - Appx C p. 5	Opting-up communitywide accounts to EBCE's Renewable 100 power portfolio will increase rates by 2%; assumes a 5% opt out rate.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P4	Solar and storage on new construction	$0	$0	CA Energy Codes & Standards Cost-Effectiveness Explorer; CA SGIP; Dublin CAP p. 1-7; Appx C p. 7 & 11	California Green building Code requires solar on new residential construction (other than for homes damaged or destroyed by disaster); assumes staff time to develop, administer and conduct outreach - 40 hours of one-time staff costs to update checklist and develop promo materials, and 20 hours per year for ongoing outreach and implementation. Dublin CAP: "City cost associated with battery storage permit streamlining are anticipated to be between $7,000 and $10,000. Anticipated costs will be from staff time for review and possible updating of the battery storage permit application. Future staff time may be saved due to potential application streamlining."	CA SGIP; Dublin CAP - Appx C p. 11	n/a - voluntary & variable

Materials & Consumption

GHG Reductions

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
E10	Textile recovery	Yes	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A
P12	Single use plastic reduction	Yes	Supportive	Mid-term (4-7 years)	N/A	N/A	N/A	N/A	N/A
S5	Environmentally preferable purchasing policy	Yes	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A
S6	Embodied carbon reduction plan	Yes	Supportive	Long-term (8-10 years)	N/A	N/A	N/A	N/A	N/A
P15	Water efficiency and retrofits	Both	Supportive	Mid-term (4-7 years)	- 3% reduction in activity data (energy consumption, solid waste disposal).	Consultant estimate	25,086	19,464	4,144
E9	Local purchasing	Yes	Supportive	Ongoing	N/A	N/A	N/A	N/A	N/A
E7	SB 1383 Implementation	Yes	Direct	Ongoing	- 75% reduction in organics, applied in 2025 and continued through 2030 (and thereafter)	SB 1383 (consistent with Dublin CAP - Appendix C, p22)	642,951	506,627	135,118
E8	Outreach and Education	Yes	Supportive	Ongoing	N/A	N/A	N/A	N/A	N/A

Cost

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
E10	Textile recovery			Redmond ESAP Action Costs - MWM Tab	No City costs other than FTE. Based on Redmond action to increase opportunities for sort and drop-off of reuse and recyclable materials.		No direct community costs as action is led by City -- however, haulers may choose to pass on some costs to customers.
P12	Single use plastic reduction	$0	$0	Ann Arbor CAP (pg. 62-63); Dublin CAP - Appendix C (pg. 23, 27)	Ideally the staff time needed to develop code will be built into existing processes. Costs for staff time is estimated between $10,000 and $15,000 (~0.1 FTE). The estimated cost range is based on the average cost to develop a new policy and/or code for the City of Dublin. (e.g., EPP, Low-Carbon Concrete, Life Cycle Emissions Code). Assumes nominal costs for partnership w/StopWaste.		There are no anticipated costs to the community.
S5	Environmentally preferable purchasing policy	$0	$0	Redmond ESAP Action Costs - MWM Tab (FTE Assumption) Dublin CAP - Appendix C (pg. 27) (Cost Assumptions)	Initial costs for developing the policy are estimated to be between $5,000 to $10,000 in staff time (~0.02-0.05 FTE). Assumes a lower-end estimate given the existing resources from Alameda County. Assumes it will take less than 1 year to develop and approve EPP. Assumes costs for environmentally friendly purchases are cost neutral to traditional products -- however, prices will vary by product.		No costs to the community as this action is focused on municipal operations.
S6	Embodied carbon reduction plan	$0	($88,625)	Marin County Code Amendment Toolkit; Dublin CAP - Appendix C (pgs. 6.4-5 & 23)	A regional plan, so City costs would just include staff time. One-time costs for staff time to conduct outreach and work with partners to develop a plan will range from $8,000- $15,000 (~0.1 FTE). Assumes that additional ongoing FTE required will be comparable to the $8,000 - $17,000 range, or ~0.1 FTE for plan implementation. Inspired by the average costs associated with developing comparable plans in the Dublin CAP (i.e., Renewable Resource Buildout Plan, Bike/Ped Plan, Parking Management Plan, TDM Plan).	USFS Life-Cycle Assessments Can Help You Make Sustainable Choices	Costs to the community were based on a U.S. Forest Service sample analysis. Conducting the LCA was ~$10,000 but had an average cost-savings ratio of 3.87 (i.e., $38,700).

Natural Systems

GHG Reductions

Action Information							MTCO2e Savings	
ID	Action	Mitigation Action?	Direct/ Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - through 2050	Cumulative - through 2045	Cumulative - through 2030
1150	Urban Forest Master Plan	Yes	Direct	Near-term (1-3 years)	- 200 trees planted per year. - Annual sequestration assumes average 10" DBH of representative tree species.	Pleasanton CAP 1.0 EC4-3	11,554 ~~3,540,542~~	7,968 ~~2,441,753~~	1,195 ~~366,263~~
1219	Soil management carbon sequestration projects	Yes	Direct	Near-term (1-3 years)	- All City managed acres under improved soil management by 2023. - 20% of community acres under improved soil management by 2030; steady thereafter. - Net sequestration at a rate of 0.2 MTCO2e/acre.	i-Tree Planting Calculator; City Parks Dept; De Gryze et al. 2009	16,314	13,208	3,890
1220	Carbon sequestration research and tracking	Yes	Supportive	Mid-term (4-7 years)	N/A	N/A	-	-	-
1145	Climate adapted plantings	Both	Supportive	Long-term (8-10 years)	N/A	N/A	-	-	-
1099	Restore and conserve native grassland, rangeland, and riparian habitats	No	N/A	Long-term (8-10 years)	N/A	N/A	-	-	-
1204	Community conservation programs	No	N/A	Mid-term (4-7 years)	N/A	N/A	-	-	-
NS1	Pesticide Posting Program	No	N/A	Ongoing	N/A	N/A	-	-	-
NS2	Municipal Landscape Management Practice	Both	N/A	Ongoing	N/A	N/A	-	-	-
NS3	Sustainable land management education	Both	Supportive	Ongoing	N/A	N/A	-	-	-

Cost

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
P13	Urban Forest Master Plan	$486,089	$469,585	Redmond ESAP Action Costs, Pleasanton CAP 1.0	See Redmond ESAP N1.89, N1.90, and N5.495. Assume same budget proposal for tree planting in public open space ($305,000). $150,000 one-time cost for developing the Urban Forest Master Plan. Combined staff cost for evaluating tree canopy and developing tree canopy plans for neighborhoods. Assume 200 trees planted per year with $50 in tree planting materials per tree. Assume $10,000 in annual incentives towards community planting (see Pleasanton CAP 1.0 EC4-3).	City of Oceanside - CAP Benefit Cost Report (pg. 17) El Cajon CAP_BenefitCostAnalysis (pg. 27)	Assume cost of $3.06 per MTCO2e reduced, with an average annual MTCO2e savings of 20,348 per year (see impact analysis). The City of Oceanside CBA mentions that they can achieve an annual reduction of ~176 MTCO2e reductions a year from trees at a cost of ~$315. This has been adapted to Pleasanton to assume a cost of $539 (average of Oceanside and El Cajon CBAs). The community is anticipated to incur costs associated with the purchase, planting, and maintenance of trees within the urban forest. The price is estimated as the average costs outlined in the City of Oceanside and El Cajon CBA's. Overall costs to the community may be reduced based on the number of incentives the City provides. While there are other external benefits associated with tree planting (e.g., reduced energy costs), these benefits are difficult to estimate with confidence and are therefore not included in this analysis. Assumes $10k a year in incentives from City.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P14	Soil management carbon sequestration projects	$34,711	$2,868,511	Pleasanton CAP 1.0, Redmond ESAP Action Costs	Pleasanton CAP 1.0 says that the cost for implementing the community zero-waste plan and encouraging composting, recycling, and waste reduction would be 1/4 FTE (See SW2-2, SW2-6, SW2-7, SW2-16). Assume similar costs for implementing carbon sequestration projects and encouraging composting. Assume subsidy is equal to that of climate-adapted planting subsidy in Redmond ESAP (See N2.2.46). In Redmond, the initial cost is $30,000 in startup costs with initial incentives and $5000 in additional annual subsidies. Assume 50% of these costs are already covered through SB1383 activities.	CalRecycle_Estimated Costs of SB1383 (pg. 14)	Average cost per business would be approximately $662 annually and assumes 5% of businesses participate each year. Average increased cost per household of $17 per year and assumes that 5% of residents participate each year. Costs include the direct costs of expanding organic waste management infrastructure, expanding organic waste collection, and impacts from education, enforcement, and monitoring of soil projects.
S7	Carbon sequestration research and tracking	$0	$0	Redmond ESAP Action Costs	Assuming 40 hours of staff time dedicated towards research and mapping of carbon sequestration projects. This is based off of similar action of tracking trend changes from COVID.		No direct or significant financial cost change to community.

Water Resources

GHG Reductions

No actions in this sector were quantified for GHG impact because they were either classified as "supportive" or climate adaptation actions.

Cost

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
P15	Water efficiency programs including water fixture retrofits	$1,634,626	($4,650,298)	Redwood City's water conservation programs; http://www.cityofpleasantonca.gov/gov/depts/os/env/water/rebates.asp	If using Redwood City's programs as an example, I estimated free home water savings kit at $55, smart irrigation meter at $170. The cost to the city is $225.00 per 1000 residents- $225x 1000= $225,000. I estimated .25 FTE to work with Zone 7, schedule retrofit upgrades and perform water conservation evaluations. However, Pleasanton already has programs, and this is an expansion that can easily be done without adding much, so reduced to 0.03 FTE. Current incentives residential $.25 per sf and $.50 per sf to Irrigation Meter Customers who replace lawn for Bay-friendly landscape. Garden By Number Program offers $50 to transform the front lawn. Per the Policy Institute of California, on page 9 Table 2, average lawn for the Bay Area is estimated at 6300sf. If using current Pleasanton incentives, that would max out the $1,000 cap per resident. Assume 1,000 residents participate at the max rebate ($1,000) over 5 years (200/year). Assume 100 business participate at the max rebate ($5,000) over 5 years (20/year). Again, this is an expansion that can easily be done without adding much, so reduced to 0.03 FTE.	Redwood City's water conservation programs; City of Pleasanton water rebates and Public Policy Institute of California lawns and water demand	Cost savings of $225 per resident who uses incentive ($55 + $170) estimated that 1,000 residents use this incentive. Annual savings of 50% on outdoor water use and 35% on monthly water usage per resident who uses the total of this incentive (smart irrigation meter, upgrades fixtures and has a home evaluation done by a water technician per the Redwood City's estimates). Assume average monthly bill is $100. Current incentives residential $.25 per sf and $.50 per sf to Irrigation Meter Customers who replace lawn for Bay-friendly landscape. Garden By Number Program offers $50 to transform the front lawn. Per the Policy Institute of California, on page 9 Table 2, average lawn for the Bay Area is estimated at 6300sf. If using current Pleasanton incentives, that would max out the $1,000 cap per resident. Assume 1,000 residents participate at max rebate of $1,000 and 100 business participate at the max rebate of $5,000.
S8	Green Stormwater Infrastructure Plan	$0	$0	City of Dublin Green Stormwater Infrastructure Plan Appendix A pg 35	- .1 FTE to work with partners.		No direct or significant financial cost change to community.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
E17	On-site stormwater management			Pleasanton CAP 1.0	Pleasanton CAP 1.0 estimates 25 hours of work for municipal code update.		No direct or significant financial cost change to community.

Transportation & Land Use

GHG Reductions

Action Information							MTCO2e Savings		
ID	**Action**	**Mitigation Action?**	**Direct/ Supportive**	**Timeframe**	**Key Assumptions**	**Key Sources**	**Cumulative - to 2050**	**Cumulative - to 2045**	**Cumulative - to 2030**
P5	ZEV Infrastructure Plan	Yes	Direct	Mid-term (4-7 years)	~~- 20% increase in EV chargers,.~~ - ~~2~~30% of passenger vehicle VMT from EVs by 2030. - 25% of commercial vehicle VMT from EVs by 2030 (including installation of sufficient charging stations for heavy-duty vehicles). - ZEV Infrastructure Plan will identify quantity of chargers needed to achieve target EV transition above. - Start ramping up beginning in 2023.	CARB (infrastructure needs); California Energy Commission (EV counts for Alameda County); N-79-20 (projected EV sales); similar assumptions were used for Dublin CAP; assume adoption of EV Charger & Parking Ordinance; the draft Advanced Clean Fleets regulation is working to accelerate the market for zero-emission trucks and buses by requiring fleets to transition to ZEVs, where feasible. Proposed requirements include a requirement that fleets purchase only ZEVs beginning in 2024 and remove ICE vehicles at end of their useful life OR ~30-50% of fleet is ZEV by 2030.[4]	3,333,735 ~~1,263,718~~	2,263,229~~855,919~~	315,283~~118,182~~
P6	Small-engine and off-road equipment electrification - municipal	Yes	Supportive	Mid-term (4-7 years)	N/A	N/A	0 ~~0~~	0 ~~0~~	0 ~~0~~

[4] https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets/advanced-clean-fleets-fact-sheets

Action Information							MTCO2e Savings		
ID	**Action**	**Mitigation Action?**	**Direct/ Supportive**	**Timeframe**	**Key Assumptions**	**Key Sources**	**Cumulative - to 2050**	**Cumulative - to 2045**	**Cumulative - to 2030**
P7	Small-engine electrification - community	Yes	Direct	Near-term (0-3 years)	- 9550% reduction in lawn & garden equipment emissions by 2030; ramping up in 2022. Assumes ban on gas/diesel-powered lawn/garden equipment by 2030. Steady thereafter. - 25% reduction in emissions from other nonroad equipment (with focus on construction) by 2030, steady thereafter.[5] Would require that half of all construction equipment used in City is zero emissions by 2030.[6]	EO N-79-20[6] ; McKinsey & Company (2019)[7]; Pleasanton is currently drafting policy that would ban gas/diesel-powered leaf blowers	501,720 ~~41,127~~	382,395~~31,346~~	76,247~~6,250~~
P8	Bicycle amenities	Yes	Direct	Near-term (0-3 years)	- Commuting is 30% of passenger VMT. - Bicycling commuting doubles by 2030. - 0.3% VMT reduction by 2030.	CAPCOA 2010 (p. 202); Alameda County VMT reduction tool	4,768 ~~6,980~~	4,603 ~~6,095~~	1,753 ~~1,909~~
P9	Bicycle rack incentive program	Yes	Direct	Mid-term (4-7 years)	- 0.5% reduction in passenger VMT by 2030, steady thereafter.	CAPCOA 2010 (p. 202); Alameda County VMT reduction tool	6,217 ~~9,481~~	5,969 ~~8,152~~	1,650 ~~1,823~~

[5] With an emphasis on construction equipment, which comprises 50% of projected offroad GHG emissions.

[6] EO N-79-20 directs CARB to achieve 100% zero emissions for off-road vehicles and equipment operations by 2035, where feasible. As part of effort, CARB has been working to introduce regulations and programs, such as the Zero-Emission forklifts program and zero-emission airport ground support equipment program. CARB is also currently developing proposed amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation to further reduce emissions beyond current regulations (https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation/proposed-amendments-use-road-diesel). Also, there is an increasing list of zero-emission off-road equipment cases currently available or under demonstration stages, including several electric construction equipment examples (https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road-1).

[7] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/harnessing-momentum-for-electrification-in-heavy-machinery-and-equipment

Action Information							MTCO2e Savings		
ID	**Action**	**Mitigation Action?**	**Direct/ Supportive**	**Timeframe**	**Key Assumptions**	**Key Sources**	**Cumulative - to 2050**	**Cumulative - to 2045**	**Cumulative - to 2030**
P10	Increase transit ridership	Yes	Direct	Long-term (8-10 years)	- 3% reduction in passenger VMT by 2040, steady thereafter.	Pleasanton CAP 1.0; Fehr & Peers 2019; Alameda County VMT reduction tool	25,776 ~~43,582~~	24,241 ~~35,359~~	4,601 ~~5,072~~
S4	VMT reduction for K-12 activities	Yes	Direct	Near-term (0-3 years)	- 2% reduction in passenger VMT by 2030, steady thereafter.	Fehr & Peers 2019; Alameda County VMT reduction tool	31,703 ~~46,361~~	30,606 ~~40,484~~	11,663 ~~12,695~~
E6	Housing Element	Yes	Direct	Near-term (0-3 years)	- 3% reduction in passenger vehicle VMT annually by 2030. -10% improvement in jobs within 4 mi of residence by 2030 and continuing trend thereafter. - 0.3% VMT reduction per 1% improvement. - Start ramping up in 2023.	Impact of Jobs-Housing Balance on Passenger Vehicle Use and Greenhouse Gas Emissions. CARB. 2014.	50,399 ~~74,456~~	48,585 ~~64,737~~	17,257 ~~18,781~~
P11	Promote LEED Neighborhood Development	Yes	Direct	Near-term (0-3 years)	- 1.5% reduction in passenger VMT by 2030, steady thereafter. ~~- Assumed to have the same impact as the Housing element action (1230).~~	Impact of Jobs-Housing Balance on Passenger Vehicle Use and Greenhouse Gas Emissions. CARB. 2014. Alameda County VMT reduction tool	29,564 ~~40,504~~	28,784 ~~36,331~~	15,331 ~~16,595~~
P16	Comprehensive climate awareness, education, and outreach	Both	Direct	Near-term (0-3 years)	- 3% reduction in activity data (energy consumption, solid waste disposal).	Consultant estimate	43,734 ~~63,627~~	42,252 ~~55,691~~	16,467 ~~17,911~~
E3	Bicycle & Pedestrian Master Plan and Trails Master Plan	Yes	Direct	Near-term (0-3 years)	-50 miles of new bike lanes by 2030. - 1% passenger VMT reduction by 2030; steady thereafter.	-50 miles of new bike lanes by 2030. - 1% passenger VMT reduction by 2030; steady thereafter.	16,035 ~~23,480~~	15,479 ~~20,500~~	5,883 ~~6,409~~
E4	Regional transit support	Yes	Direct	Ongoing	- 11,000 VMT reduced per day - Start in 2025.	Mike Tassano (City Traffic Engineer)	10,756 ~~15,133~~	10,443 ~~13,460~~	4,837 ~~5,253~~
E5	Complete Streets Implementation	Yes	Direct	Ongoing	- 0.5% VMT reduction annually.	Consultant estimate	1,443 ~~1,775~~	1,419 ~~1,647~~	1,002 ~~1,036~~

Cost

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P5	ZEV Infrastructure Plan	$217,582	($31,005)	Alternative Fuels Data Center: California Laws and Incentives; Dublin CAP	One time cost to develop an EV infrastructure plan is anticipated to be $150,000 and 40 hours of staff labor towards municipal ordinances. Costs to the City to install and maintain publicly available charging stations are anticipated to be in excess of $100,000. Assume 50% of these costs are ongoing maintenance costs that will be covered by EBCE. Assume that 75% of the total project costs are covered by the Peninsula-Silicon Valley Project. Assume 1/2-time staff dedicated towards implementing this plan and another 1/2 staff towards outreach and engagement efforts.	Pleasanton Impact Analysis (ZEV Projection Model), Zero Emission Vehicle and Infrastructure Statistics, Cost-effectiveness Explorer, Pleasanton Housing Design Guidelines, Pleasanton Municipal Code, Dublin CAP	-Assume 4-year waiting period for implementation to start. - Assume 296 new multi-family units built by 2030 (30/year); 1.75 parking spaces/unit. - EV Infrastructure requirements will increase construction costs by $400 or more per parking space. - Savings come from retrofit estimates of $2,700 per parking space (cheaper to build new than retrofit). -Assume 20% of new MF units must have EV charging.
P6	Small-engine and off-road equipment electrification - municipal	$0	$0	Redmond ESAP Action Costs (See T1.3.0).	Estimate 0.05 FTE to implement this action (fleet evaluation, replacement support and coordination). Assume no cost or savings as electric and gasoline off-road equipment usually break-even in costs in 5-10 years.		No direct or significant financial cost change to community.
P7	Small-engine electrification - community	$0	($2,448,960)	Yountville Gas Leaf blower Ban	Incentive program with $30,000 budget funded by TVAQCA or BAAQMD to residents on a first-come, first-serve basis. Assume that the City costs are all staff time.	Consumer Reports: Leaf Blower Buying Guide, Consumer Reports: Electric Lawn Mowers That Rival Gas Models, Consumer Reports: Chainsaw Face-off, Home Depot: Pre-mixed Fuel Pack, Power Outdoor Equipment Global Market	Voluntary measure so assumption of $0 cost to community. Electric maintenance equipment can be slightly more expensive up-front but have similar overall costs as gasoline versions within 5-10 years with fuel cost-savings considered. The one exception is leaf blowers which have cheaper upfront and maintenance costs. Outdoor equipment sales were equal to 113 million units, which is roughly 34% of the U.S. population (332,643,210) in 2020. Assume 3% of Pleasanton households switches out their leaf blowers each year (because this is incentive-based). The cost difference between a gasoline vs electric leaf blower is $480 - $220 = $260. The cost of a 6 pack of pre-mixed fuel is $34.41.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
E3	Bicycle, pedestrian, and trails network expansion			Pleasanton Bike/Ped Plan, CAP 1.0, Pleasanton Trails Master Plan	Costs reflect costs associated with Bike/Ped Master Plan and Trails Master Plan implementation: - Assume 1/2-time staff position for Transit, Pedestrian and Bicycle Facilities Coordinator. - Assume 75 initial staff hours towards municipal code revisions and competitive grant applications and progress reporting indicators (see Pleasanton CAP 1.0 NM1-1, 1-2, 1-11). - $400,000 in annual maintenance costs according to the PBMP (included in the ongoing FTE cost). - Assume doubling of Area 6 trails maintenance crew which is currently 3 crew members who spend 15% of their time on trails maintenance (0.15 FTE*3 crew members = 0.45 FTE) (see Trails Master Plan p.130). - Trails Master Plan construction, amenities, and trail road crossing costs total to $63,846,398 in 2018 dollars (Table 5-5 in TMP). - Bike and Pedestrian Plan costs total to $69,945,000 total in 2016 dollars (Table 7-2 in PBMP). - Assumes that city covers 20% match of capital infrastructure costs according to Pleasanton Bike/Ped Plan Funding sources notes in Appendix D (p. 164). - Assumes that 50% of costs attributed to existing, planned Trails Master Plan and Bike/Ped Plan implementation (consistent with impact analysis).	Pleasanton Impact Analysis	Assume average annual passenger VMT reduction of ~3 million by 2030 (see impact analysis - ~1% VMT reduction by 2030). Estimated reduced gasoline costs for switching from car travel to bike/ped travel. Assumes displaced VMT are from gasoline-powered vehicles.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P8	Bicycle amenities incl uding required bike parking at MF/Comm developments	$0	$2,492,542	Pleasanton CAP 1.0	Pleasanton CAP 1.0 Cost Benefit Analysis (CBA) estimates 25 hours of staff time per municipal code update.	Madrax: How to Affordably Park Multiple Bicycles, Recreation Management: Fundamental Considerations in Locker Room Design and Maintenance, City of Pleasanton Major Development Projects; Key Assumptions (Cost Effectiveness Explorer)	Assume 3 new commercial developments per year. Assume each new commercial development builds 24 secure bike parking spaces with a cost of $290 per bike. Assume each building has 640 square feet of locker room for each gender with a cost of $700 per square foot (70% of high-end gym locker room cost per square foot). Average passenger VMT reduction of 0.2% per year (925,731 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles. Assume 259 (4% of 6,470 multi-family units) new multi-family units built each year. Assume large multi-family developments build bike storage for 10% of its units with a cost of $290 per bike.
P9	Bicycle rack incentive program	$7,562	($777,244)	Orlando Bicycle Rack Request Program	In 2019 dollars. Assume $700 annual budget for bike rack installations. Assumes 40 hrs of staff time to set up the program. Assume 20 hours of annual staff time towards maintaining the inventory and corresponding with businesses and residents. Orlando has an annual budget of $5000 to $7000 for bike rack installations. With an installation price of $100-350 per bike rack (we assume the upper end of $350 per bike rack). Pleasanton is 10x smaller in land area than Orlando, so we assume $700 budget with $350 per bike rack which is 2 bike rack installations per year.		Average passenger VMT reduction of 0.2% per year (903,589 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.

Action Information		Outputs		City Inputs		Community References	
ID	**Action**	**NPV Costs to City**	**NPV Costs to Community**	**City Cost Source(s)**	**City Cost Assumptions/Comments**	**Community Cost Source(s)**	**Community Cost Assumptions/Comments**
P10	Increase transit ridership	$75,384	($585,351)	Pleasanton CAP 1.0	Combined Pleasanton CAP 1.0 Cost Benefit Analysis estimates for TR1-2 through TR1-5 (100 hours upfront cost in staff time and 180 hours annually in staff costs= 0.087 FTE). Also included annual cost estimates for 0.5 FTE of a Transit, Pedestrian, and Bicycle Facilities Coordinator and 75k in capital improvements converted from 2012 dollars to 2021 dollars (See NM1-12).	Pleasanton Impact Analysis	Average passenger VMT reduction of 0.5% per year (2,504,481 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.
S4	VMT reduction for K-12 activities	$571,058	($6,358,627)	Pleasanton CAP 1.0, Redmond ESAP Action Costs	Based on NM1-8 in Pleasanton CAP 1.0 CBA and Redmond's ESAP actions-T1.1.13. Added the costs from these actions.	Pleasanton Impact Analysis	Average passenger VMT reduction of 1.1% per year (6,154291 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.
E6	Housing Element			Pleasanton CAP 1.0, Redmond ESAP Action Costs	Based on Pleasanton CAP 1.0 CBA staff research and municipal code revision cost and time estimates for measures LU1-1 through LU1-7 and LU2-1-LU2-7.	Pleasanton Impact Analysis	Average passenger VMT reduction of 1.7% per year (9,102,419 VMT - from impact analysis). Savings from fuel cost reductions. Assumes displaced VMT are from gasoline-powered vehicles.

Community Resilience & Wellbeing

GHG Reductions

Action Information							MTCO2e Savings		
ID	Action	Mitigation Action?	Direct/Supportive	Timeframe	Key Assumptions	Key Sources	Cumulative - to 2050	Cumulative - to 2045	Cumulative - to 2030
S9	Wildfire preparation, prevention, and education	Both	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A
P16	Comprehensive climate awareness, education, and outreach	Yes	Direct	Near-term (0-3 years)	- 3% reduction in activity data (energy consumption, solid waste disposal).	Consultant estimate	83,116 ~~102,118~~	75,869 ~~88,397~~	26,242 ~~27,382~~
E18	School climate action planning	Yes	Supportive	Ongoing	N/A	N/A	N/A	N/A	N/A
E19	Access to green spaces	No	0	Ongoing	N/A	N/A	N/A	N/A	N/A
E20	Community cooling centers	No	0	Ongoing	N/A	N/A	N/A	N/A	N/A
E21	Community gardens	Both	Supportive	Near-term (0-3 years)	N/A	N/A	N/A	N/A	N/A

Cost

Action Information		Outputs		City Inputs		Community References	
ID	Action	NPV Costs to City	NPV Costs to Community	City Cost Source(s)	City Cost Assumptions/Comments	Community Cost Source(s)	Community Cost Assumptions/Comments
E21	Community gardens			Local Government Commission	The city provides administrative, office and staff support and in-kind equipment contributions. It oversees eight community gardens at a total annual cost of $40,000. FTE breakdown based on Alameda's community garden in Sweeney Park in conjunction with Alameda Food Bank. Does not reflect one time startup cost.	Oakland Parks and Rec	If partnered with a nonprofit, no additional cost to low-income communities.
S9	Wildfire preparation, prevention, and education	$0	$0	Saratoga Community Wildfire Protection Plan	Funding could be from FEMA and grants from state and federal agencies to offset costs. Used FTE from Fire, Public Works and Sustainability Departments to accomplish this measure. Ex. Funding offsets - $3,465,000 for CFIP cost share grants		There is no direct or significant financial cost change to the community.
P16	Comprehensive climate awareness, education, recognition, and outreach	$118,522	$0	Ann Arbor CAP 3.0 p. 62-63 & 94-95 ($1MM total over 10 years)	Staff time to develop plan, develop and implement calculator and webpages including annual cost for translations. Assume 0.1 FTE staff time for CAP checklist analysis (Year 1) plus 0.1 FTE (Year 2) for implementation of update. Assume start up and annual staff time and direct costs for award criteria development, selection, webpage maintenance and promotional materials like https://dublin.ca.gov/1323/Green-Shamrock-Business-Recognition-Prog		No direct or significant financial cost change to community.

References

GHG Analysis

Source Name	URL (if applicable)	Description
Dublin CAP		Appendix C contains detailed impact information and evidence per measure.
Pleasanton CAP 1.0		Impact estimations in the city's last CAP - Appendix D.
Hopkins et al. 2018. Decarbonization of Heating Energy Use in California Buildings	https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf	Cited by Dublin CAP; stats on proportion of residential and commercial water and space heating from natural gas.
EIA 2018 Comparison of commercial green vs. non-green certified buildings	https://www.eia.gov/consumption/commercial/data/2012/pdf/green_buildings_cbecs.pdf	Study found that green certified buildings use about 25% less energy per square foot).
US Green Building Council, "LEED certification for residential"	https://www.usgbc.org/leed/rating-systems/residential	Cites that on average, certified homes use 20 to 30 percent less energy than non-green homes.
Browne-LEED Certification_July 2020	https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/LEED%20Certification%20Nyanya%20Browne_July%202020.pdf	Report on the effect of LEED certification on residential and commercial office buildings in Washington DC in 2018
ACEEE Strategies for Energy Savings in Buildings 2018	https://www.aceee.org/toolkit/2018/04/strategies-energy-savings-buildings	Reports that efficiency retrofits after energy audits can typically reduce energy bills by 5-30%. Comprehensive upgrades can reduce commercial building use by 20-50%.
CARB_Technical_Analysis_EV_Charging_Nonresidential_CALGreen_2019_2020	https://ww2.arb.ca.gov/sites/default/files/2020-09/CARB_Technical_Analysis_EV_Charging_Nonresidential_CALGreen_2019_2020_Intervening_Code.pdf	EV Charging Infrastructure: Nonresidential Building Standards. CARB staff recommends a minimum 10 percent requirement for new construction to assist with filling the mid-range gap in Level 2 chargers needed by 2025.
EO-N-79-20	https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf	Executive order calling for all passenger vehicle sales to be ZEVs by 2035 and by 2045 for medium- and heavy-duty vehicles.
California Energy Commission: Zero Emission Vehicle and Infrastructure Statistics	https://www.energy.ca.gov/data-reports/energy-insights/zero-emission-vehicle-and-charger-statistics	Statistics on the number of vehicles by fuel type in CA, including by County.
Fehr & Peers 2019 TDM-Strategies-Evaluation	https://www.fehrandpeers.com/wp-content/uploads/2019/12/TDM-Strategies-Evaluation.pdf	Provides updated elasticities and GHG reduction estimates compared to the CAPCOA 2010 guidelines for TDM measures.
CAPCOA 2010 Quantifying Greenhouse Gas Mitigation Measures	https://www.contracosta.ca.gov/DocumentCenter/View/34123/CAPCOA-2010-GHG-Quantification-PDF	GHG emission reduction estimates for a variety of project-level mitigation measures.
CARB 2014_Impact_of_Jobs-Housing_Balance_on_Passenger_Vehicle_Use_and_Greenhouse_Gas	https://ww2.arb.ca.gov/sites/default/files/2020-06/Impact_of_Jobs-Housing_Balance_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Policy_Brief_0.pdf	
SB 1383	https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1383	Requires actions to produce a 75% reduction in disposal of organic waste by 2025.

Source Name	URL (if applicable)	Description
California Public Utilities Commission, as cited in "Community Power Coalition" presentation	https://www.mcecleanenergy.org/wp-content/uploads/2018/06/June-2018_FINAL-1.pdf	Source cited in Dublin CAP for info on CCA opt-out rates.
i-Tree Planting Calculator	https://planting.itreetools.org/help/	Estimates carbon sequestration rates for tree plantings of various types, sizes, etc.
De Gryze et al. 2009 Modeling shows that alternative soil management can decrease GHGs	https://escholarship.org/content/qt83p4m8qn/qt83p4m8qn_noSplash_8dfcc7dde94247d48b7c00319007875e.pdf?t=lnp5mk	Provides estimates for carbon sequestration associated with improved soil management.

Cost Analysis

Source Filename	Description
Dublin CAP	Sept 2020; Appendix C contains detailed cost information and evidence per measure.
Pleasanton CAP 1.0	There were cost estimations in the city's last CAP - Appendix D.
Redmond ESAP Action Costs	Spreadsheet used by subconsultant to estimate costs to City of implementing plan measures.
Walnut Creek CAP	Appendix 2 contains the quantification of costs and reductions of municipal measures (page A2-1)
El Cajon CAP_BenefitCostAnalysis	Presents costs to the City and community per MTCO2e reduced for various measures
08-10-2017 LEEDv4BDC vs CalGreen cost	Information about LEED certification.
LEED v4 Cost -USGBC Policy Brief 2018	Information about LEED certification.
Electrification Cost Effectiveness Memo_Update_Final	Oct 2020 Memo provided by subconsultant Rincon that estimates costs for building electrification.
Browne-LEED Certification_July 2020	https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/LEED%20Certification%20Nyanya%20Browne_July%202020.pdf
ACEEE Electrifying Commercial Buildings 2020	https://www.aceee.org/sites/default/files/pdfs/b2004.pdf
EPA Energy Star Portfolio Manager 2013	https://www.epa.gov/sites/production/files/2015-08/documents/overview_of_epas_energy_star_portfolio_manager.pdf
EBCE Power Mix & Compare Plans	https://ebce.org/our-power-mix/; https://ebce.org/compare-plans-business/; https://ebce.org/compare-plans-residential/index.htm
Community Power Coalition 2018	https://www.mcecleanenergy.org/wp-content/uploads/2018/06/June-2018_FINAL-1.pdf
CA SGIP	https://www.cpuc.ca.gov/sgip/
Local Gov't Commission- community gardens	https://www.lgc.org/resource/community-gardens/
Oakland Parks and Rec- Community Gardens	https://localwiki.org/oakland/Community_Gardens
USDN- Resilience Hub	http://resilience-hub.org/wp-content/uploads/2019/10/USDN_ResilienceHubsGuidance-1.pdf
SF Living Roof Cost Benefit Study page 9	https://default.sfplanning.org/Citywide/livingroof/SFLivingRoofCost-BenefitStudyReport_060816.pdf
Dublin San Ramon Services District - recycled wastewater	https://www.dsrsd.com/Home/Components/News/News/1318/18?selectview=1&npage=4&arch=1
San Jose Park and Rec- Fresh Approach farmers market	https://www.sanjoseca.gov/Home/Components/News/News/2607/5103
Saratoga Community Wildfire Protection Plan Table 6.1-6.5 Timelines	https://www.saratoga.ca.us/DocumentCenter/View/1760/Saratoga-Community-Wildfire-Protection-Plan-CWPP?bidId=
Santa Clara County CCWP- funding sources for fire resiliency (D-3)	https://www.sccfd.org/images/documents/fire_prevention/CWPP/CWPP_Strategic_Countywide_Appendices_08_29_16.pdf
ILG Beacon Program	https://www.ca-ilg.org/beacon-program
CA Energy Codes & Standards Cost-Effectiveness Explorer	https://explorer.localenergycodes.com/pleasanton-city/forecast/12-PGE/studies/1,2,3?exclude_prototypes=5,6,7,3,21&show_only_cost_effectiveness=
City of Pleasanton Economic Profile	http://dev.cityofpleasantonca.gov/gov/depts/ed/profile.asp

Source Filename	Description
U.S. Energy Information Administration	https://www.eia.gov/tools/faqs/faq.php?id=45&t=8#:~:text=One%20thousand%20cubic%20feet%20(Mcf,1.037%20MMBtu%2C%20or%2010.37%20therms
Utilities Local: Pleasanton, CA	https://utilitieslocal.com/states/california/pleasanton/
U.S. Census QuickFacts	https://www.census.gov/quickfacts/pleasantoncitycalifornia
Pleasanton_FY1921_BugdetBook_Master_Doc 071919	City of Pleasanton Operating Budget for Fiscal Year 2019-2020 through Fiscal Year 2020-2021.
Ann Arbor Zero-Climate-Action-Plan-_3.0 Apr 2020	Ann Arbor's Living Carbon Neutrality Plan
CalRecycle_Estimated Costs of SB1383	Presents monetary costs and non-monetary benefits of SB1383 implementation
Trails Master Plan	Includes cost estimates.
Pleasanton Bike/Ped Plan	Includes cost estimates.
Consumer Reports: Pay Less with Vehicle Maintenance with an EV	https://www.consumerreports.org/car-repair-maintenance/pay-less-for-vehicle-maintenance-with-an-ev/#:~:text=Consumers%20who%20purchase%20an%20electric,powered%20car%2C%20CR's%20study%20shows.&text=%E2%80%9CThe%20oil%20changes%20and%20engine,by%20the%20EV's%20relative%20simplicity.%E2%80%9D
Zero Emission Vehicle and Infrastructure Statistics	https://www.energy.ca.gov/data-reports/energy-insights/zero-emission-vehicle-and-charger-statistics
Yountville Gas Leaf Blower Ban	https://www.townofyountville.com/departments-services/public-works/electric-leaf-blower-incentive-program
Consumer Reports: Leaf Blower Buying Guide	https://www.consumerreports.org/cro/leaf-blowers/buying-guide/index.htm#:~:text=Gas%20handheld%20leaf%20blowers%20go,limited%20runtime%20per%20battery%20charge.&text=Wheeled%20blowers%20pack%20the%20most%20power%20by%20far.
Consumer Reports: Electric Lawn Mowers That Rival Gas Models	https://www.consumerreports.org/push-mowers/electric-lawn-mowers-that-rival-gas-models/#:~:text=The%20best%20electric%20push%20mower,out%20after%20about%2010%20years.
Consumer Reports: Chainsaw Face-off	https://www.consumerreports.org/chainsaws/electric-dewalt-vs-gas-stihl-chainsaw/
Home Depot: Pre-mixed Fuel Package	https://www.homedepot.com/p/TruFuel-50-1-Pre-Mixed-Fuel-6-Pack-6525638/202604386?source=shoppingads&locale=en-US&mtc=Shopping-B-F_D28I-G-D28I-28_37_OUTDOOR_POWER_ACC-NA-NA-NA-SMART-NA-NA-SMART_SHP&cm_mmc=Shopping-B-F_D28I-G-D28I-28_37_OUTDOOR_POWER_ACC-NA-NA-NA-SMART-NA-NA-SMART_SHP-71700000079956011-58700006728091443-92700060957828827&gclid=CjwKCAjwhMmEBhBwEiwAXwFoEa8n7-xTZnHJg721HVvXRH0PzUvSfsgtSWb0CHt5jzPgBXHdTuCkixoCpCMQAvD_BwE&gclsrc=aw.ds
USGBC Certification Fees	https://www.usgbc.org/tools/leed-certification/fees
City of Pleasanton: Housing Site Development Standards and Design Guidelines	http://www.cityofpleasantonca.gov/civicax/filebank/blobdload.aspx?BlobID=33648
City of Pleasanton: Municipal Code	http://qcode.us/codes/pleasanton/?view=desktop&topic=18-18_88-18_88_035
City of Pleasanton Major Development Projects	http://www.cityofpleasantonca.gov/gov/depts/cd/planning/plans_n_programs/major_development_projects.asp
Alternative Fuels Data Center: California Laws and Incentives	https://afdc.energy.gov/laws/all?state=CA

Source Filename	Description
Power Outdoor Equipment Global Market	https://www.researchandmarkets.com/reports/338686/powered_outdoor_equipment_global_market
Madrax: How to Affordably Park Multiple Bicycles	https://blog.madrax.com/blog/indoor-bike-storage-solutions#:~:text=The%20cost%20for%20a%206,of%20%24521.50%20per%20parked%20bicycle.
Recreation Management: Fundamental Considerations in Locker Room Design and Maintenance	https://recmanagement.com/feature_print.php?fid=200705fe01
Orlando Bicycle Request Program	https://www.orlandosentinel.com/business/os-bz-bike-rack-request-program-20190612-baewcdvj6fgnvbk6dcvtal3rgq-story.html
City of Pleasanton - Incentive programs for Bay-Friendly Landscape	http://www.cityofpleasantonca.gov/gov/depts/os/env/water/rebates.asp
City of Dublin- 2019 Green Stormwater Infrastructure Plan	https://dublin.ca.gov/DocumentCenter/View/20955/2019-Green-Stormwater-Infrastructure-Plan-APPROVED
Economic Evaluation of Stormwater Capture	Diringer, S. E., Shimabuku, M., & Cooley, H.. (2020). Economic evaluation of stormwater capture and its multiple benefits in California. PLOS ONE, 15(3), e0230549. https://doi.org/10.1371/journal.pone.0230549
Rainwater barrels and tanks/ Incentives SF	https://www.urbanfarmerstore.com/wp-content/uploads/2018/10/Sizes-Prices-SF-Subsidy-Program-2018-9s.pdf
SF Water Public Utilities Commission	https://sfwater.org/index.aspx?page=178
Redwood City's Water Conservation programs	https://www.redwoodcity.org/departments/public-works/water/conservation/programs-and-giveaways
Public Policy Institute of Cal. Lawns and Water Demand (page 9)	https://www.ppic.org/content/pubs/cep/EP_706EHEP.pdf
Louisville-JeffersonCountyDiversionPlan_Appx C	Appendix C of the 10-year solid waste plan includes detailed cost information for waste reduction programs (section C4. Strategy Cost Assumptions)
Marin County Code Amendment Toolkit	https://www.marincounty.org/depts/cd/divisions/sustainability/low-carbon-concrete-project
USFS_Life-Cycle Assessments Can Help You Make Sustainable Choices	https://www.fs.fed.us/t-d/pubs/htmlpubs/htm08732839/page02.htm